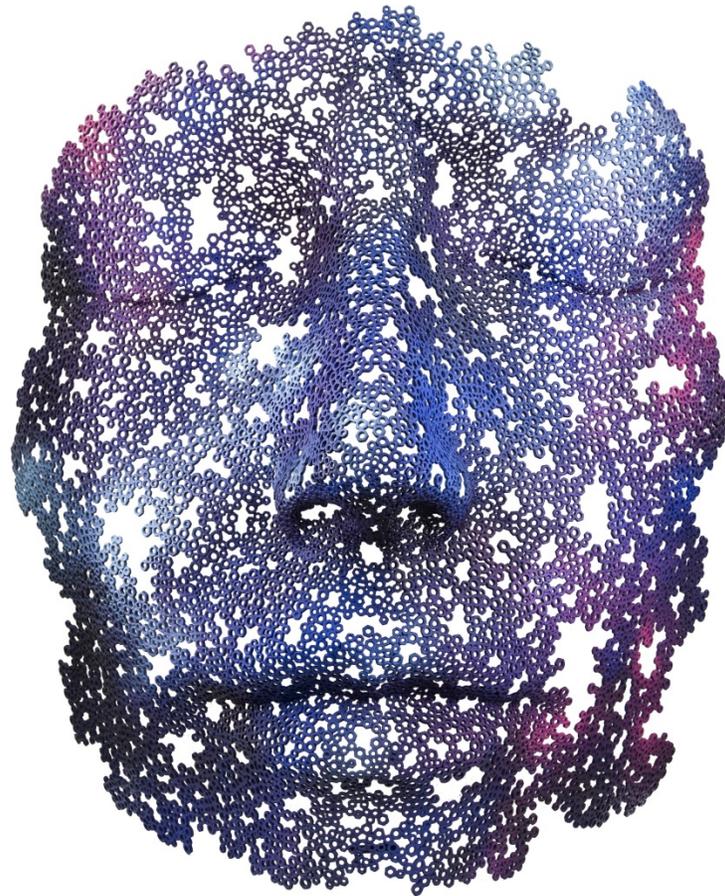


# Dictations and Coding in Oral and Maxillofacial Surgery



SECOND EDITION

JONATHON S. JUNDT, DDS, MD, FACS

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#### ABOUT THE ARTWORK

World renowned sculptor Manuel Marti Moreno resides in Valencia, Spain. His work captures the essence of the human condition and the transient nature of the individual. Each piece invokes a sense of reflection, intrigue and inspiration. We truly appreciate his permission to reproduce the images within this book. More information about Mr. Moreno and his work may be found at <http://martimoreno.com/>. Photography of the works in this book were masterfully created by Nacho López Ortiz. More information about Mr. Ortiz may be found at <http://nachofotografo.com/>.

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## FOREWORD

The importance of documentation in the medical record is emphasized time and again during the medico-legal and jurisprudence components of dental and medical education as well as residency. Unfortunately, aside from the standard admonishment to “please document your cases clearly” and the presumptive metric that a long note with plenty of detail is a good note, very little formal guidance is provided to trainees about what constitutes appropriate and complete documentation. Most of what has been written applies to the pre-operative setting including the three sovereign principles of medical documentation<sup>1</sup> and comprise a record of the risk-benefit analysis of performing a surgical intervention (describing not only the risks associated with an operation but also the expected benefits), the use of clinical judgment in deciding the appropriate course of action, and a patient’s understanding and acceptance of a planned procedure. But little has been said about what constitutes a proper operative note.

For those pursuing surgical disciplines, the operative note is an additional formal record of procedures performed as part of a patient’s care. This note is usually composed following a standard template, but the content of certain areas, notably the “Pre and Post-Operative Diagnosis”, “Indications”, “Procedure in Detail”, and “Findings” often require specific information for both completeness of the record and support for coding and billing purposes. When the individual composing the operative note lacks sufficient experience in the procedure, use of incorrect diagnostic terminology, omissions of key components of the surgery or disorganized operative sequences complicates proper coding and creates the impression of haphazard surgery.

Jonathon Jundt is a surgeon who recognizes problems or inefficiencies in the practice of our specialty and seeks solutions. His collection of operative notes featuring many common procedures performed within the scope of oral and maxillofacial surgery combined with coding pearls from expert medical coder Terri Bradley provides essential and useful information to all practicing surgeons and not just residents in training. The list of “Indications” suggests the necessary justification for a procedure while a description of the common “Complications” helps guide the consent process. And the “Procedure in Detail” represents a step-by-step description of a surgical procedure for those unfamiliar with the surgery. The value of this collection goes beyond that of a template for oral and maxillofacial surgery procedures and I believe this should become part of the required curriculum for all oral and maxillofacial surgery residents in training.

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<sup>1</sup> “Fundamentals of Medical Record Documentation” T G Gutheil, Psychiatry (Edgmont). 2004 Nov; 1(3): 26–28.



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# THE OPERATIVE REPORT

An operative report is a detailed description of the procedure, indications, intraoperative details and participants in a surgical operation.

The minimum requirements as set by the Joint Commission includes:

1. The name of the primary surgeon and assistants
2. Procedures performed and descriptions of each procedure findings
3. Estimated blood loss
4. Specimens removed
5. Postoperative diagnosis
6. Date and time of the procedure

A complete operative report will typically include the following:

PATIENT NAME:

MRN:

DATE OF SURGERY:

SURGEON:

1st ASSISTANT:

PREOPERATIVE DIAGNOSES:

POSTOPERATIVE DIAGNOSES:

PROCEDURES PERFORMED:

INDICATION:

PROCEDURE IN DETAIL:

FINDINGS:

SPONGE AND INSTRUMENT COUNTS:

DRAINS:

SPECIMENS:

IMPLANTS:

TOTAL FLUIDS:

ESTIMATED BLOOD LOSS:

BLOOD PRODUCTS ADMINISTERED:

URINE OUTPUT:

ANESTHESIA:

TIME-OUT:

COMPLICATIONS:

DISPOSITION:

# THE ANATOMY OF AN OPERATIVE REPORT

At times, medical coders use the operative report to determine billable codes from the medical record to support the selected CPT codes. If the actual procedural steps are not dictated, the surgeon may not receive compensation for the procedure.

1. Patient Identification/Demographics
2. Surgical Setting
3. Surgeon
4. Surgical Site
5. A preoperative diagnosis is the presumed disorder.
6. A postoperative diagnosis is the disorder identified during surgery.
7. The summary of procedures performed is a list of the procedures performed. Procedures in this list may not be coded if they are not described in the body of the operative report.
8. Indications for the surgery are the reasons for performing the procedure. Pain, malocclusion, facial disfigurement, neurosensory disturbance, functional deficits, prevention of future complication.
9. Procedure in detail is potentially the most important aspect of an operative report. If a procedure is not described in this section, from a coding perspective, it is as if it was never done. In addition, one should be able to perform the entire surgery based on the operative dictation.
10. Findings include those anatomical, pathological or abnormalities found during the procedure.
11. It is imperative to verify that surgical counts are correct as leaving gauze or needles within a wound could be grounds for legal recourse.
12. Drains are documented to insure that all providers are aware of their presence and the need for future removal or irrigation.
13. Specimens must include the site and type of specimen at a minimum.
14. The brand of implant, quantity and style of plates and screws are important in the event that removal becomes necessary and for proper billing. This also assists future surgeons in selecting the correct set to remove failed or infected hardware.
15. Total fluids received by the patient allows for determination of postoperative volume status and the correction of fluid deficits or excess.
16. Estimated blood loss is notoriously inaccurate but is an estimate based on the number of soaked gauze and blood in the suction canister less irrigation.
17. Blood products administered are included to account for intraoperative transfusions of packed red blood cells, fresh frozen plasma, platelets, albumin or cryoprecipitate.
18. Urine output is another important measure of fluid status and assists in managing fluid status as well as monitoring renal function.
19. The type of anesthesia is pertinent to determine length of recovery and facilitate discharge or transfer of the patient. Anesthesia providers may be mentioned here.
20. A surgical timeout should be documented in the operative report to verify that the correct patient, correct site and correct procedure were performed in accordance with the patient's consent.
21. Immediate complications must always be included in the operative report.
22. Disposition is the planned postoperative setting and level of care for the patient.

## WHAT MAKES A GOOD OPERATIVE REPORT?

A level of uncertainty exists regarding what constitutes a good operative report. Vergis et al. recognized this knowledge gap and created a “structured assessment format for evaluating operative reports in general surgery” known as SAFE-OR. The purpose was to create a validated reliable tool to assess the quality of the dictated operative note. In doing so, they established an objective measurement tool that is useful in identifying characteristics of effective operative note dictations. While created for general surgeons, the basic structure may be applied to any surgical specialty. According to their report, structured assessment items were classified as either simple or complex. A simple item is either described correctly or not (date, surgeon, estimated blood loss). A complex item is subject to a variety of interpretation and was scored on a 5 point Likert scale. Examples of their methods for evaluating the quality of an operative report are included below. Such scales and components are easily adapted to oral and maxillofacial surgery procedures and may be helpful in guiding surgeons toward more succinct and relevant operative note dictations.

1. Date of Surgery				YES	NO	
2. Date of Dictation				YES	NO	
3. Patient Identifiers				YES	NO	
4. Name of Surgeon and Assistants				YES	NO	
5. Name of Anaesthetist				YES	NO	
6. Pre-op Patient Diagnosis				YES	NO	
7. Post-op Patient Diagnosis				YES	NO	
8. Procedure Performed (including side)				YES	NO	
9. Copies Sent to Referring Physician/Institution				YES	NO	
10. Brief History of Present Illness (including relevant investigations)						
	0	1	2	3	4	
	No description of preoperative course or indications		Preoperative course and indications were described but some detail was lacking		Complete description of preoperative course and indications for procedure	
11. Procedure						
a. Type of Anesthesia				YES	NO	
b. Skin Preparation and Draping				YES	NO	
c. Patient Position				YES	NO	
d. Method of Abdominal Access						
	0	1	2	3	4	
	No mention of abdominal access		Method of abdominal access mentioned but specific details lacking		Complete description including location of incisions/trocar placements/insufflation pressures (if applicable)	
e. Findings on Exploration of Relevant Body Cavity						
	0	1	2	3	4	
	No mention of findings on exploration		States findings of exploration but detail/explanation lacking		Completely explains results of exploration making note of unexpected findings	
f. Technique of Resection, Including Tissue Mobilization						
	0	1	2	3	4	N/A
	No description of mobilization or resection technique		Mobilization and resection techniques described but details regarding operative steps incomplete		Complete description of tissue mobilization and method of resection including instruments used (staplers etc.)	
g. Limits of Resection						
	0	1	2	3	4	N/A
	No anatomical description of structures resected or mention of surgical margins		Resected structures listed but clear anatomical boundaries not well defined		Exact anatomical description of structures resected including all adjacent structures and margins	
h. Technique of Reconstruction						
	0	1	2	3	4	N/A
	No mention of technique of reconstruction		Type of technique mentioned but steps and results of reconstruction omitted		Comprehensive description of reconstruction including technique, equipment used, and integrity of repair	
i. Technique of Closure						
	0	1	2	3	4	
	No description of closure method		Closure described but specific details omitted		Comprehensive description including suture method, size and type of suture employed if applicable	
j. Irrigation				YES	NO	N/A
k. Drains and location				YES	NO	N/A
l. Prosthesis (size and type) or other items left in location				YES	NO	N/A
m. Estimated Blood Loss				YES	NO	
n. Dressings Applied				YES	NO	
o. Sponge and Instrument Count				YES	NO	
p. List of Specimens Sent (Micro and Pathology)				YES	NO	N/A

Fig. 1. Structured assessment form for evaluating operative reports in gastrointestinal surgery.

Please circle the number corresponding to the candidate's performance in each category.

<b>1. Readability of Dictation</b>				
1	2	3	4	5
Dictation was difficult to read and disorganized with incoherent flow		Dictation was relatively easy to read but at times lacked flow		Dictation was easy to read and well organized with coherent flow
<b>2. Description of Operative Indications</b>				
1	2	3	4	5
No description of preoperative course or indications was included		Preoperative course and indication were described but some detail was lacking or inaccurate		Dictation includes complete description of preoperative course and indications for specific procedure performed
<b>3. Inclusion of Operative Steps</b>				
1	2	3	4	5
Dictation was incomplete as most important steps were missing		Dictation included most important steps but some detail was missing		Dictation was comprehensive and included all important steps of procedure
<b>4. Description of Operative Findings</b>				
1	2	3	4	5
Operative findings described were irrelevant or omitted completely		Operative findings were described but some relevant detail was lacking		Operative findings were presented in a relevant and detailed fashion
<b>5. Succinctness of Dictation</b>				
1	2	3	4	5
Dictation was unnecessarily long with excessive inclusion of extraneous detail or truncated but lacking important elements		Dictation was relatively concise and inclusive with some extraneous detail included		Dictation was concise but inclusive with exclusion of extraneous detail
<b>6. Clarity of Dictation</b>				
1	2	3	4	5
Description of included steps was vague and unintelligible		Description of included steps was relatively clear and intelligible		Description of included steps was clear and complete
<b>7. Knowledge</b>				
1	2	3	4	5
Clearly lacks an understanding of the procedure and relevant anatomy		Has a reasonable understanding of the procedure and relevant anatomy		Demonstrates a full understanding of the procedure and relevant anatomy
<b>8. Reproducibility of Operative Procedure</b>				
1	2	3	4	5
Recreation of operative events would be impossible from this dictation		Reader could recreate events using own knowledge to fill in gaps		Reader has a complete understanding of operation and could recreate procedure step by step
<b><u>OVERALL PERFORMANCE</u></b>				
1	2	3	4	5
Unacceptable dictation Major deficiencies in operative dictation skills		Acceptable dictation Some room for improvement		Excellent dictation Quality consistent with that expected of an attending surgeon



## ICD-10/CPT CATEGORIES AND MODIFIERS IN OMS

ICD-10 introduced various changes to the coding methods in Oral and Maxillofacial Surgery. Some of the basic terminology will be introduced below to facilitate understanding. These classifications assist societies in analyzing and interpreting health data. The first three characters in the code refer to the category.

### Common International Classification of Disease (ICD) Categories in OMS

S00-S09 Injuries to the head

S10-S19 Injuries to the neck

K00-K93 Diseases of the digestive system

K00-K14 Diseases of the oral cavity, salivary glands and jaws

M00-M99 Disease of the musculoskeletal system and connective tissue

M26-M27 Dentofacial anomalies [including malocclusion] and other disorders of jaw

### Current Procedural Terminology (CPT) Modifiers in OMS

Modifiers are used to indicate a specific circumstance related to a procedure. The modifiers are categorized into Level 1 and Level 2 modifiers. Level 1 modifiers are indicated by two numbers whereas Level 2 modifiers are indicated by two letters or a letter and a number. Level 2 modifiers will not be included in this text, but may be found through the CMS website.

#### Level 1 Modifiers:

Modifier -21 Prolonged Evaluation and Management Services (Deleted, please use CPT 99354- 99359)

Modifier -22 Unusual Procedural Services

Modifier -23 Unusual Anesthesia

Modifier -24 Unrelated Evaluation and Management Service by the Same Physician during a Postoperative Period

Modifier -25 Significant, Separately Identifiable Evaluation and Management Service by the Same Physician on the Same Day of the Procedure or Other Service

Modifier -26 Professional Component

Modifier -27 Multiple Outpatient Hospital E/M Encounters on the Same Date.

Modifier -32 Mandated Services

Modifier -33 Preventive Service

Modifier -47 Anesthesia by Surgeon

Modifier -50 Bilateral Procedure

Modifier -51 Multiple Procedures

Modifier -52 Reduced Services

Modifier -53 Discontinued Procedure

Modifier -54 Surgical Care Only

Modifier -55 Postoperative Management Only

Modifier -56 Preoperative Management Only

Modifier -57 Decision for Surgery

Modifier -58 Staged or Related Procedure or Service by the Same Physician During the Postoperative Period

Modifier -59 Distinct Procedural Service

Modifier -62 Two Surgeons

Modifier -63 Procedure Performed on Infants less than 4kg

Modifier -66 Surgical Team

Modifier -73 Discontinued Outpatient Hospital/Ambulatory Surgery Center (ASC) Procedure prior to the

Administration of Anesthesia

Modifier -74 Discontinued Outpatient Hospital/Ambulatory Surgery Center (ASC) Procedure after Administration of Anesthesia

Modifier -76 Repeat Procedure by Same Physician

Modifier -77 Repeat Procedure by Another Physician

Modifier -78 Return to the Operating Room for a Related Procedure During the Postoperative Period

Modifier -79 Unrelated Procedure or Service by the Same Physician During the Postoperative Period

Modifier -80 Assistant Surgeon

Modifier -81 Minimum Assistant Surgeon

Modifier -82 Assistant Surgeon (when qualified resident surgeon not available)

Modifier -90 Reference (Outside) Laboratory

Modifier -91 Repeat Clinical Diagnostic Laboratory Test

Modifier -92 Alternative Laboratory Platform Testing

Modifier -99 Multiple Modifiers

**ICD-10 Seventh Characters for Fractures:**

A: Initial encounter for closed fracture

B: Initial encounter for open fracture

D: Subsequent encounter for fracture with routine healing

G: Subsequent encounter for fracture with delayed healing

K: Subsequent encounter for fracture with delayed healing

S: Sequela

## **USE OF UNSPECIFIED CODES**

It is important to use detailed codes when reporting a diagnosis for a patient. Avoid the use of unspecified codes.



## SECTION I: INTRODUCTION

The operative report is a window into the stream of consciousness of the surgeon. As an attending surgeon, I have observed that resident knowledge may be readily interpreted from the quality and structure of the dictated operative report. Unfortunately, very few residency programs offer formal instruction on the content, structure, or importance of the operative report. It is often a shared template passed down from a senior resident. As a result, surgeons don't realize the importance of properly dictating and coding an operative report until after residency when they've performed a substantial amount work and fail to receive reimbursement.

A financial analysis of coding and dictating errors in operative reports generated by surgical residents suggested an error rate of 28% and reduced reimbursements of 9.7% for general surgery procedures.<sup>1</sup> In a comparison of resident and attending coding on identical operative cases, researchers found poor concordance between resident and attending coding in foot and ankle surgery. Residents concordantly coded 42% of the attending coding.<sup>2</sup>

In a review of operative reports for patients undergoing rectal cancer surgery, researchers assessed notes for the presence of items deemed important by a consensus panel. Only 46% of items deemed important were found in these notes. Not only were notes lacking in critical patient care information but they also included unnecessary information 97% of the time.<sup>3</sup>

Surveys have shown that few residency programs offer formal instruction on the content, structure, or importance of the operative report. In a nationwide study of residents in general surgery, 73% believed that their operative notes required improvement, 80% reported learning to dictate by reading other operative dictations, and 75% indicated that their program did not provide any formal instruction to improve dictation quality. In conclusion, the authors wrote "there appears to be a marked deficiency in resident training and operative dictations nationwide."<sup>4</sup> As a result, residents leave their training programs to enter practice feeling inadequately prepared in this critical area.

Knowledge gaps in this area have important consequences for practitioners. Among the consequences is reduced reimbursement or even denied claims for services provided when notes lack adequate descriptions and appropriate terminology. With increasing scrutiny of medical records by payers, it is more important than ever for the operative note to succinctly and clearly describe what was done in order to justify the codes that are submitted and maximize the chances of full reimbursement.

*Operative Dictations in Oral and Maxillofacial Surgery* was developed to be a resource for residents, surgeons, office staff, and billing and coding specialists to enhance coding and operative dictation accuracy. Numerous procedures are found within each of the book's ten sections, and include indications, complications, key steps and a coded operative dictation template for individual procedures. Complete operative reports have been reviewed by expert surgeons for accuracy and content.

### References

<sup>1</sup>Novitsky Y, Sing R, Kercher K, Griffo M, Matthews B, Heniford B. Prospective, blinded evaluation of accuracy of operative reports dictated by surgical residents. *Am Surg* 2005; 71(8): 627-631.

<sup>2</sup>Murphy R, Littleton T, Throckmorton T, Richardson D. Discordance in current procedural terminology coding for foot and ankle procedures between residents and attending surgeons. *J Surg Educ* 2014; 71(2): 182-185.

<sup>3</sup>Edhemovic I, Temple W, de Gara C, et al. The computer synoptic operative report – a leap forward in the science of surgery. *Ann Surg Oncol* 2004; 11: 941-947.

<sup>4</sup>Gillman L, Vergis A, Hardy K, Park J, Taylor M. Resident training and the dictated operative report: a national perspective. *Can J Surg* 2010; 53(4): 246-250.



**SECTION I**  
**FACIAL TRAUMA SURGERY**

# 1) Mandibular Fractures

## a. Indications for Treatment

1. Trauma
2. Malocclusion
3. Trismus
4. Loss of airway patency
5. Trigeminal nerve dysfunction
6. Facial asymmetry/deformity
7. Hemorrhage

## b. Complications of Treatment

1. Infection acute and chronic
2. Screw loosening/implant failure
3. Malocclusion
4. Damage to teeth
5. Damage to nerves
6. Malunion, nonunion
7. Gingival recession

## c. Key Steps in Treatment

1. Exposure of the fracture
2. Release of the periosteum surrounding the mental nerve
3. Mobilization and curettage of fractured segments
4. Verification of restored occlusion
5. Fixation of fractured segments
6. Repeat verification of occlusion
7. Mentalis resuspension
8. Primary closure

## OPEN REDUCTION AND INTERNAL FIXATION OF A PARASYMPHYSIS FRACTURE AND CLOSED REDUCTION OF SUBCONDYLAR MANDIBLE FRACTURE

### PREOPERATIVE DIAGNOSES

1. Right subcondylar fracture of the mandible (ICD S02.62XA)
2. Left parasymphysis fracture of the mandible (ICD S02.61XA)

### POSTOPERATIVE DIAGNOSES

1. Right subcondylar fracture of the mandible (ICD S02.62 XA)
2. Left parasymphysis fracture of the mandible (ICD S02.61XA)

### PROCEDURES PERFORMED

1. Open reduction and internal fixation of left parasymphysis fracture (CPT 21462)
2. Closed reduction of right subcondylar fracture (CPT 21451) report with 59 modifier

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. The patient was prepared for a nasal intubation. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Upon verification of tube placement and inflation of the cuff, the patient was turned over to the surgeon for securing of the nasotracheal tube.<sup>2</sup> The distal most portion of the tube was cut and replaced with a 60-degree angled connector that was secured to an accordion extender. This was then placed in a pre-cut foam block and secured to the forehead with silk tape. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. After securing the nasotracheal tube, eye lubricant was placed bilaterally in the eyes and protective goggles/occlusive dressings were placed over the patient's eyes.

Next, the patient's arms were tucked. EKG leads and IV's were checked. The patient was prepared and draped in the normal sterile fashion. A throat pack was placed with a black suture identifying the throat pack. A 0.12% solution of chlorhexidine gluconate was used to rinse the oral cavity with a toothbrush. Three carpules of 2% lidocaine with 1:100,000 epinephrine were injected into the bilateral inferior alveolar nerves, mandibular vestibule as well as posterior superior alveolar nerve on the right and an anterior superior alveolar nerve for complete local anesthesia and hemostasis.

Attention was directed to the arch bars where they were premeasured using the intact dentition from first molar to first molar in the maxilla and mandible. Erich arch bars and 24-gauge wire<sup>3</sup> were used to secure the arch bars to the teeth. Upon conclusion of the arch bar placement, the patient was placed in maxillomandibular fixation and occlusion was verified to be class I occlusion bilaterally, both molar and canine. After this, a Bovie was used to make an incision in the anterior mandibular vestibule from the region of the right first premolar to the left first molar. This was carried through the mucosa and through the mentalis muscle and then angled perpendicular to the bone. Upon incising the periosteum overlying the anterior mandible, the symphysis and the parasymphysis regions were exposed to the inferior border of the mandible and posteriorly to the anticipated location of the plate. Mental

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<sup>2</sup> Variation exists amongst surgeons regarding methods to secure the nasotracheal tube. It is important to document the method as complications like alar necrosis can occur with improper immobilization methods.

<sup>3</sup> Wire gauge is a surgeon's preference and varies between 22-27 gauges. Some surgeons use smaller wire on anterior teeth. Wire should be pre-stretched to minimize post-placement movement.

nerves were identified bilaterally and remained intact throughout the procedure. The fracture was mobilized and curetted free of clotted blood, granulation tissue and bone debris. A small 4 mm x 2 mm piece of bone was removed from the fracture site at the most inferior most portion of the jaw. An 8-mm monocortical bur with saline irrigation was used to create a purchase for the reduction forceps. Reduction forceps were placed across the fracture site perpendicular to the fracture site. The mandible fracture was manipulated until satisfactory reduction of the fracture was appreciated. The occlusion was verified and remained class I both molar and canine bilaterally. Normal saline irrigation was used to better visualize the surgery site. A 4-hole tension plate with an isthmus was selected and two 2.7 mm x 8 mm monocortical screws<sup>4</sup> and two 2.0 mm x 8 mm monocortical screws were secured after drilling under saline irrigation. Next, a 6-hole plate with a pre-bent 140-degree angle was selected to plate the inferior border of the mandible. A template was utilized to accurately recreate the curvature of the mandible. This was bent to form and used as a template to bend the 6-hole plate. After satisfactory adaptation of the plate was achieved, a 12-mm non-locking bone screws were placed with a medial inclination in the hole closest to the fracture site. After this screw was placed, it was intentionally incompletely seated. The next screw on the distal side of the fracture site was drilled to depth. A 12-mm screw was placed. All drills were used under normal saline irrigation. The remaining four holes were drilled and screws were placed. A color-coded drill was used to determine screw length and verified with a depth gauge where applicable. The mandible fracture was reduced and fixated. After this was completed, the patient was released from MMF. Occlusion was verified again and the site was irrigated with normal saline. 2-0 braided polyglactin 910 pop-off sutures were used to reapproximate the mentalis muscle, three in total, one in the median raphe and two sutures bilaterally, left and right respectively. Furthermore, 3-0 braided polyglactin 910 was used to make tacking sutures in the vestibular incision. A 3-0 chromic gut suture was used to close the mucosa. The oropharynx was irrigated, suctioned free of debris and fluid, and the throat pack was removed. A nasogastric tube was inserted to suction stomach contents. Wire loops were again placed to perform the closed reduction of the fractured subcondylar segment.

A chin dressing was used to assist in supporting the mentalis resuspension. A facioplasty bandage was placed on the patient. The patient was extubated without complication by anesthesia. The patient was transferred to the stretcher and taken to the PACU in good condition.

#### Notes:

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<sup>4</sup> Screw length may be determined by a depth gauge, color coded drill, preoperative or intraoperative CT scan or direct visualization. The method of determining screw length selection may be included here.

## ORIF BILATERAL MANDIBULAR SUBCONDYLAR FRACTURE

### PREOPERATIVE DIAGNOSES

1. Bilateral subcondylar fractures (ICD S02.62XA)
2. Bilateral coronoid process fractures (ICD S02.63XA)
3. Comminuted fracture of the right parasymphysis of the mandible (ICD S02.66XA)

### POSTOPERATIVE DIAGNOSES

1. Bilateral subcondylar fractures (ICD S02.62XA)
2. Bilateral coronoid process fractures (ICD S02.63XA)
3. Comminuted fracture of the right parasymphysis of the mandible (ICD S02.66XA)

### PROCEDURES PERFORMED

1. Open reduction and internal fixation of bilateral subcondylar fractures (CPT 21462) x 2 with right and left listed
2. Open reduction and internal fixation of bilateral coronoid process fractures (CPT 21462) with 52 and 59 modifiers
3. Open reduction and internal fixation of right parasymphysis fracture (CPT 21462) with 52 and 59 modifiers

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to nasal intubation. Upon verification of tube placement and inflation of the cuff, the patient was turned over to the surgeon for securing of the nasotracheal tube. The distal most portion of the tube was cut and replaced with a 60-degree angled connector that was secured to an accordion extender. This was then placed in a pre-cut foam block and secured to the forehead with silk tape. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. After securing of the nasotracheal tube, eye lubricant was placed bilaterally in the eyes and protective goggles were placed over the patient's eyes.

Next, the patient's arms were tucked. Leads and IV's were checked. The patient was draped in the normal sterile fashion. A throat pack was placed with a black suture identifying the throat pack. A 0.12% solution of chlorhexidine gluconate was used to rinse the oral cavity with a toothbrush. Three carpules of 2% lidocaine with 1:100,000 epinephrine was injected.

Arch bars and a lingual splint were placed. The arch bars were secured with 24-gauge stainless steel wires. The lingual splint was placed in the mandibular arch to restore the normal width. After placement of arch bars, the patient remained out of maxillomandibular fixation. The throat pack was removed and the patient was re-prepped and draped for a transcervical incision initiated at the level of the hyoid bone extending from the tip of one mastoid to the tip of the other. The incision was made with a 15 blade and was carried down to platysma. Bovie electrocautery was utilized for hemostasis. Dissection was made above the platysma inferiorly and superiorly. The platysma was incised lower in the neck below insertion of the cervical branch of the facial nerve. After the platysma was incised, we exposed the investing fascia. Investing fascia was incised above the sternocleidomastoid and below the submandibular gland. We identified the greater auricular nerves bilaterally. The incision then was carried superiorly above the sternocleidomastoid towards the tip of the mastoid. Anteriorly, the inferior pole of the submandibular gland and facial vein were identified and a plane was developed inferior to the ligated facial vein. Anterior to the submandibular gland, the digastric muscle was exposed and followed superficially to the inferior border of the mandible. The facial arteries were ligated bilaterally. Small branches of the vena comitantes were

clipped with vascular clips. After exposing the inferior border of the mandible, an incision was made in the periosteum and continued in a subperiosteal plane exposing the entire mandible including the condylar neck bilaterally.

Both subcondylar fractures were severely displaced. Both coronoid processes were also fractured and displaced. At this point, the reduction was initiated. This was done first on the right and then on the left. To reduce the coronoid fracture, a 4-hole curve of plate of 1.5-mm thickness was placed. Two monocortical screws were placed proximally and initially a single screw distally. The same reduction for the fracture coronoid on the contralateral side was performed. At this point, the left subcondylar fracture was reduced. The mandible was manipulated to reduce the fracture. A lambda plate with 2 screws in the proximal segment and 4 screws distally was placed. Initially, a single loose screw was placed distally as the patient was not yet in MMF. The fracture was reduced by placing an axial K-wire.<sup>5</sup> A 0.5 K-wire was drilled following the axis of the neck of the condyle. Then, a groove was fashioned on ramus of the mandible to receive the K-wire. A square plate was secured over the K-wire to maintain its position. The patient was placed in maxillomandibular fixation using four 24-gauge wire loops. Attention was directed to the comminuted right parasymphyseal fracture where a 6-hole, 1.5-mm thick curved plate was adapted. Bicortical screws were placed.

Hemostasis was obtained and the wound was irrigated with antibiotic solution. Periosteum over the mandible using several interrupted 3-0 braided polyglactin 910 sutures. The platysma incision was sutured using 3-0 braided polyglactin 910. Dermal sutures were placed to close the skin using interrupted buried 4-0 braided polyglactin 910 sutures. Finally, the skin was closed with 4-0 poliglecaprone 25 in a running subcuticular fashion. Finally, we removed the MMF and checked occlusion; it was found to be acceptable. The pharynx was suctioned. All the sponge counts were correct. The patient then was extubated and transferred to PACU in good condition.

#### **Notes:**

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<sup>5</sup> Lag screws, k-wires, open reduction with plates and screws via rhytidectomy, submandibular, retromandibular, transparotid and retroparotid approaches have been reported.

**ORIF MANDIBULAR ANGLE FRACTURE with IMF SCREWS**

## PREOPERATIVE DIAGNOSES

1. Left open mandibular angle fracture (ICD S02.65XA)
2. Impacted teeth #'s 1, 16, 17 and 32 (ICD K01.1)

## POSTOPERATIVE DIAGNOSES

1. Left open mandibular angle fracture (ICD S02.65XA)
2. Impacted teeth #'s 1, 16, 17 and 32 (ICD K01.1)

## PROCEDURE PERFORMED

1. Open reduction and internal fixation of left mandibular angle fracture (CPT 21462)
2. Maxillomandibular fixation with IMF screws (CPT 21453)<sup>6</sup>
3. Surgical extraction of teeth #'s 1, 16, 17, and 32 (CDT 7210) (CPT 41899)

## PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was taken to OR# \_\_\_ by anesthesia where he was transferred to the OR table in the supine position. The patient was intubated in the right naris by anesthesia. Eye lubricant was placed in both eyes and sealed with an occlusive dressing and protective eye covering. The nasotracheal tube was modified using a 60-degree connector and accordion that was brought out over the head and secured with towel and tape to ensure no dislodgement during the procedure. The patient was prepped and draped in the normal sterile fashion with a povidone-iodine solution. A throat pack was placed. The oral cavity was cleaned using 0.12% chlorhexidine gluconate solution.

Before the initial incisions were made, 4 IMF screws were placed; 2 in the maxilla, 2 in the mandible with care to avoid perforating the roots of the teeth. Intraoral incisions were accomplished using a Bovie; a full thickness mucoperiosteal incision was made lateral to the ramus of the mandible and extending inferior to the impacted third molar around the tooth in an inferior direction and laterally to the first molar. Stenson's duct was identified and care was taken to avoid violating the duct. A #9 periosteal elevator was used to free the periosteum from the bone. Full exposure of the fracture site was accomplished. Bone was removed and tooth #17 was extracted due to its association with the fracture site, mesioangular impaction and inability to reduce the fracture with its presence. The tooth was elevated and extracted without complication. The socket was curetted and normal saline was irrigated. A 3-mm stab incision was made in the left posterior cheek in the direction of resting skin tension lines. This was used to bluntly introduce the trocar through the tissue. The strut plate was stabilized using the trocar with cheek retractor. The first hole was drilled in the mandible using a 1.8-mm drill of the hand piece to a depth of 8 mm under saline irrigation. An 8-mm titanium screw was used to fix this site together. Attention was next directed to the screw holes at the opposite side of the fracture site where again a 1.8-mm drill bit was used in all 4 sites, and 8-mm titanium screws were placed. Following that, the 8-mm screws were placed in the remaining strut plate holes. A 10-hole strut plate was utilized; there were 4 holes on either side of the fracture line with 2 holes in the middle that did not receive screws. The first screw placed was then re-tightened. Satisfactory anatomic reduction was observed. Occlusion was verified and repeatable. Throughout the plating of the mandible with the strut plate, the IMF screws remained intact as well as the intermaxillary fixation wires. Following placement of the plate, the patient was released from IMF and occlusion was once again verified. Normal saline irrigation into the site ensued. Next, attention was directed to tooth #16 where a full thickness mucoperiosteal flap was reflected, buccal

<sup>6</sup> This code may not be used if the patient does not remain in maxillomandibular fixation.

bone was removed and the tooth was elevated and extracted without complication. Next, teeth #1 and 32 were accessed in a similar manner with buccal osteotomy and full thickness mucoperiosteal flap. The teeth were then elevated and extracted without complication. Normal saline irrigation of the extraction sockets was accomplished, and the deep portions of the wound were closed with a 3-0 braided polyglactin 910 suture.

The lateral ramus incision was closed using a 3-0 chromic gut suture. The trocar incisions were closed using a 6-0 fast-absorbing gut suture. The oral cavity was again rinsed with normal saline and suctioned free. The IMF screws were removed. The throat pack was removed. An orogastric tube was passed. All the sponge counts were correct. The patient then was extubated and transferred to PACU in good condition. The patient tolerated the procedure well.

**Notes:**

## TRANSCERVICAL OPEN REDUCTION OF MANDIBULAR BODY FRACTURE

### PREOPERATIVE DIAGNOSIS

1. Left mandibular body fracture (ICD S02.600A)

### POSTOPERATIVE DIAGNOSIS

1. Left mandible body fracture (ICD S02.600A)

### PROCEDURE PERFORMED

1. Open reduction internal fixation of left mandibular body fracture (CPT 21462)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. The patient was prepared for a nasal intubation. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Upon verification of tube placement and inflation of the cuff, the patient was turned over to the surgeon for securing of the nasotracheal tube. The distal most portion of the tube was cut and replaced with a 60-degree angled connector that was secured to an accordion extender. This was then placed in a pre-cut foam block and secured to the forehead with silk tape. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. After securing of the nasotracheal tube, eye lubricant was placed bilaterally in the eyes and protective goggles/occlusive dressings were placed over the patient's eyes.

A 0.5% bupivacaine with 1:200,000 epinephrine solution was injected into the left neck approximately 1-2 cm inferior to the border of the mandible. A throat pack was placed. The oral cavity was also injected with 2% solution of lidocaine with 1:100,000 epinephrine approximately 3.4 mL. Attention was then directed to the left neck where a 3 cm incision was made 2 cm inferior to the border of the mandible. This was continued through skin and subcutaneous tissue deep to identify the platysma muscle which was divided sharply and exposed, and then retracted superiorly and inferiorly. Next, the superficial layer of the deep cervical fascia was divided layer by layer using a nerve stimulator to avoid any damage to the marginal mandibular branch of the facial nerve, as well as the cervical branch of the facial nerve which continued until the facial vein was identified and ligated at the distal proximal aspect of the wound. This was retracted superiorly and the incision was continued until the inferior border of the mandible was identified. This periosteum overlying the inferior border of the mandible was excised sharply using Bovie electrocautery. The patient was then placed in the maxillomandibular fixation to re-establish the previous occlusion which appeared to be a class III relationship. The overlying segments were difficult to realign, thus, a wire was placed around the teeth as well as the 2 holes drilled in the inferior border of the mandible to facilitate introduction of a transosseous wire. Once this was held in place, it was found to be adequately reduced at the inferior border. A 4-hole plate with an isthmus was placed across the site, and the 4 bicortical screws were placed thus reducing the fracture. The arch bar was cut and smoothed around the teeth to avoid lacerations to the tongue. The rosettes were tightened on the previously existing arch bars, and the throat pack was removed. The oral cavity was suctioned, irrigated thoroughly and patient was placed into maxillomandibular fixation with wires. The neck wound was irrigated thoroughly with normal saline. The platysma was then closed with 3-0 braided polyglactin 910 sutures in interrupted fashion. Next, a subdermal suture was placed with 3-0 in a vertical interrupted pattern, and the skin was closed with a 4-0 poliglecaprone 25 in a subcuticular fashion. Once the entire area of the wound had been closed, slight tension was placed on it and tissue adhesive was placed over the incision. The patient tolerated the procedure. All the sponge counts were correct. The patient then was extubated and transferred to PACU in good condition.

**Notes:**

## EXTERNAL FIXATOR MANDIBULAR FRACTURE

### PREOPERATIVE DIAGNOSES

1. Right mandibular osteomyelitis (ICD M27.2)
2. Nonunion of right mandibular angle fracture (ICD S02.65XK)
3. Carious teeth involving the pulp #28, 29 (ICD K02.63)
4. Infected right mandibular hardware (ICD T84.69XA)

### POSTOPERATIVE DIAGNOSES

1. Right mandibular osteomyelitis (ICD M27.2)
2. Nonunion of right mandibular angle fracture (ICD S02.609K)
3. Carious teeth involving the pulp #28, 29 (ICD K02.63)
4. Infected right mandibular hardware (ICD T84.69XA)

### PROCEDURES PERFORMED

1. Placement of external fixator right mandible (CPT 21100)
2. Removal of infected right mandibular hardware (CPT 20680)
3. Debridement of right mandible (CPT 21025)
4. Removal of teeth #28, 29 (CDT D7140) (CPT 41899)
5. Maxillomandibular fixation (CPT 21453)<sup>7</sup>

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. The patient was prepared for a nasal intubation. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Upon verification of tube placement and inflation of the cuff, the patient was turned over to the surgeon for securing of the nasotracheal tube. The distal most portion of the tube was cut and replaced with a 60-degree angled connector that was secured to an accordion extender. This was then placed in a pre-cut foam block and secured to the forehead with silk tape. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. After securing of the nasotracheal tube, eye lubricant was placed bilaterally in the eyes and protective goggles/occlusive dressings were placed over the patient's eyes.

Next, the patient's arms were tucked. The patient was draped in the normal sterile fashion. A throat pack was placed with a black suture identifying the throat pack. A 0.12% solution of chlorhexidine gluconate was used to rinse the oral cavity with a toothbrush. Three 1.8ml carpules of 2% lidocaine with 1:100,000 epinephrine were injected.

Teeth #28 and 29 were extracted using dental extraction elevators and forceps. All the roots were removed. The previous incision in the area of the right mandible was exposed using a 15 blade and then subperiosteal dissection was performed exposing the right mandible to the level of the inferior border. A curette was used to remove all the grossly necrotic bone and was trimmed using a rongeur. The right mental nerve was skeletonized to aid in retraction and visualization of the necrotic bone. All necrotic bone was removed and wound edges and granulation tissue was debrided using a curette. The retained infected hardware was then removed from the lateral aspect of the mandible. Significant mobility was appreciated at the fracture site.

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<sup>7</sup> This code may not be used separately as it is included in the 21100 code.

The previously placed arch bars were tightened and wires were replaced where needed. The patient was placed under maxillomandibular fixation and then the external mandibular fixator was affixed to the mandible with two pins on either side of the fracture in solid bone. This was performed by creating a stab incision in the skin with a 15 blade and then bluntly dissecting down to the bone and using the trocar against the mandible and then the Schanz screws were placed per protocol using the pistol type drill. All the pins were noted to be stable in the bone and were tightened down to the collar of the screws. The frame was affixed to the pins using the supplied clips and these were tightened. The patient was released from maxillomandibular fixation and the mandible was confirmed to be stable with the external fixator. Occlusion was stable and repeatable. The oral cavity was thoroughly irrigated. The wound was thoroughly irrigated and a 15 round Blake drain was inserted. This was secured to the skin using 4-0 nylon suture. The internal wound was then closed using 3-0 chromic sutures in interrupted fashion to obtain primary closure. Xeroform gauze was then placed around the pin sites on the skin. Prior to placement and after the mucosal wound was closed, the oral cavity was serially irrigated and suctioned clear. Throat pack was removed and an orogastric tube was passed to evacuate any stomach contents and oropharyngeal secretions. Rubber caps were then placed on the pin sites after they had been trimmed the proper length and the patient was then transferred to the anesthesiology team and was extubated without complication. All the sponge counts were correct. The patient then was extubated and transferred to PACU in good condition.

**Notes:**

## 2) Nasal Bone Fractures

### a. Indications for Treatment

1. Trauma
2. Loss of nasal airway patency
3. Nasal asymmetry
4. Epistaxis
5. Nasal deviation

### b. Complications of Treatment

1. Inadequate reduction of fractures
2. Turbinate fracture
3. Nasal septum perforation
4. Ocular trauma
5. Damage to canalicular system
6. Damage to cribriform plate
7. Hemorrhage

### c. Key Steps in Treatment

1. Local anesthesia infratrochlear, infraorbital, external nasal
2. Vasoconstriction/hemostasis
3. Insertion of elevator
4. Reduction of fractured segments
5. Internal splinting
6. External splinting

## CLOSED REDUCTION BILATERAL NASAL BONE FRACTURES

### PREOPERATIVE DIAGNOSIS

1. Bilateral nasal bone fractures (ICD S02.2XXA)

### POSTOPERATIVE DIAGNOSIS

1. Bilateral nasal bone fractures (ICD S02.2XXA)

### PROCEDURE PERFORMED

1. Closed reduction, bilateral nasal bone fractures (CPT 21310/21315/21320)<sup>8</sup> x2 with 59 modifier

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Upon verification of tube placement and inflation of the cuff, the tube was secured with silk tape. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. Eye lubricant was placed bilaterally in the eyes.

The patient's face was prepped with ethyl alcohol and facial nerve blocks including the infratrochlear bilaterally, the infraorbital bilaterally, as well as the external nasal were accomplished. Prior to the anesthetic, phenylephrine was sprayed, one spray in each nostril and 4% cocaine<sup>9</sup> pledgets were placed intranasal for approximately 7 minutes. These were subsequently removed for the intranasal local anesthetic injection. The patient received 108 mg of lidocaine total with 54 mcg of epinephrine. Next, attention was directed towards the nasal fracture. Using a Sayre instrument, the medially displaced nasal fractures were brought laterally and the fracture was reduced both palpably and visually. Once again, as the Doyle splints were being prepared with antibiotic ointment, the nose was packed with phenylephrine-soaked neuro sponges. These were subsequently removed and the Doyle splints were placed in each naris. A 2-0 polypropylene suture on a CT-1 needle was introduced through the septum and through the Doyle splints and secured to the septum. Next, the nose was painted with skin adhesive and allowed to dry and strips were placed on the dorsum of the nose. This was followed by the placement of a pre-molded Denver splint with self-adhesive tape. All the sponge counts were correct. The patient was then extubated and transferred to PACU in good condition.

### Notes:

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<sup>8</sup> 21310 is without manipulation, 21315 is without stabilization, 21320 is with stabilization.

<sup>9</sup> Intranasal vasoconstrictors vary widely amongst surgeons. Phenylephrine, pseudoephedrine, oxymetazoline, and cocaine are common. Several surgeons have reported difficulty in controlling blood pressure when multiple soaked pledgets are placed intranasally during or before nasal surgery.

## OPEN REDUCTION BILATERAL NASAL BONE FRACTURES

### PREOPERATIVE DIAGNOSES

1. Bilateral nasal bone fractures (ICD S02.2XXA)
2. External nasal deformity (ICD M95.0)

### POSTOPERATIVE DIAGNOSES

1. Bilateral nasal bone fractures (ICD S02.2XXA)
2. External nasal deformity (ICD M95.0)

### PROCEDURE PERFORMED

1. Open reduction, bilateral nasal bone fractures (CPT 21325) x2 with 59 modifier

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. The patient was prepared for a nasal intubation. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Upon verification of tube placement and inflation of the cuff, the patient was turned over to the surgeon for securing of the oral endotracheal tube. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. After securing of the oral endotracheal tube, eye lubricant was placed bilaterally. Next, the patient's arms were tucked. Leads and IV's were checked. The patient was draped in the normal sterile fashion.

The sidewalls along the nasofacial sulcus for the lateral osteotomies were drawn out using a marking pen. The medial osteotomies were also marked at approximately 15 degrees from the midpoint of the nasal bones right over the nasal dorsum. Bilateral piriform apertures were injected with lidocaine 1%, 1: 100,000 epinephrine. The lateral sidewall was also injected as well as the dorsum. A septal/intercartilaginous incision was made on the left-hand side to create a pocket for medial osteotomies. A Cottle was used to dissect the septum and the intercartilaginous region over the upper lateral cartilages and onto the nasal dorsum. A 15-blade scalpel was used to make an incision over the piriform aperture and bilateral sides. The Cottle was used to dissect on either side of the bone to allow for the 4 mm curved and guarded osteotome. Once that was done, the osteotome was engaged on the right side and a high osteotomy was made on the piriform aperture followed by low curvilinear osteotomies on the frontal process of the nasal bone and then a high gently curved osteotomy on the nasal bones. In the same manner on the left side, the 4mm osteotome was placed in the previous incision. It was engaged high. An osteotomy was made on the piriform aperture followed by a low osteotomy in a curvilinear fashion on the nasofrontal process followed by a high osteotomy curving medially on the nasal bones. Gentle pressure was applied to the bilateral sides to recreate the patient's previously fractured nasofacial sulcus. The nose was straightened and narrowed to reflect the pre-injury appearance.

At this time, the nose appeared narrower and more symmetrical, eliminating the previous nasal deformity. Due to excellent reduction and narrowing with lateral osteotomies, we elected not to perform medial osteotomies. Bilateral incisions were closed with 4-0 chromic gut. The septal incision was also closed with a 4-0 chromic gut in an interrupted fashion. Doyle splints were prepared with antibiotic ointment. These were subsequently removed and the Doyle splints were placed in each naris. A 2-0 polypropylene suture was placed through the septum and through

the Doyle splints and secured intranasal. Next, the nose was painted with skin adhesive and allowed to dry and adhesive strips were placed on the dorsum of the nose. This was followed by the placement of a pre-molded Denver splint with self-adhesive tape.<sup>10</sup> All sponge counts were correct. The patient then was extubated and transferred to PACU in good condition. The patient tolerated the procedure well.

**Notes:**

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<sup>10</sup> Alternatively, a thermoplastic splint may be utilized. Resorbable intranasal dressings are also used by many surgeons to reduce postoperative bleeding.

### 3) Naso-orbital-ethmoidal Fractures

#### a. Indications for Treatment

1. Telecanthus
2. Herniation or entrapment of ocular muscle
3. Facial asymmetry
4. Detached canthal tendon
5. Midface intrusion
6. Functional deficit
7. CSF Fistula

#### b. Complications of Treatment

1. Diplopia
2. Scarring
3. Telecanthus
4. Enophthalmos
5. Ocular dystopia
6. Blindness
7. Cerebrospinal fistula
8. Anosmia
9. Epiphora
10. Nasal deformities
11. Neurosensory disturbances
12. Infection

#### c. Key Steps in Treatment

1. Preoperative visual examination
2. Forced duction test
3. Protection of the globe
4. Exposure via existing lacerations, coronal incision, subciliary incision, sublabial incision, or canthal stab incision
5. Identify medial canthal tendon
6. Reduction/ reconstruction of medial orbital rims
7. Reconstruction of medial orbital wall
8. Transnasal canthopexy
9. Nasolacrimal apparatus repair
10. Nasal reconstruction
11. Soft tissue closure

Currently, ICD coding systems do not differentiate between the various types of NOE fractures or approaches. It is included under other skull base fracture or maxillary fractures. As such specific codes do not exist for each type of naso-orbital-ethmoidal fracture. A dictation outlining treatment for an NOE fracture is included at the end of this chapter in the panfacial trauma sequence.

Current codes include:

1. Other fractures of base of skull (ICD S02.19XA)
2. Open treatment without external fixation of NOE fracture (CPT 21338)
3. Open treatment with external fixation of NOE fracture (CPT 21339)
4. Percutaneous treatment of NOE fracture (CPT 21340)

## 4) Frontal Sinus Fractures

### a. Indications for Treatment

1. Displaced fracture of anterior table
2. Displaced fracture of posterior table
3. Disruption of drainage outflow
4. Pneumocephalus
5. Aesthetics

### b. Complications of Treatment

1. Mucocele
2. Meningitis
3. Wound infections
4. Temporal Nerve paresis
5. Frontal bone irregularities
6. Frontal paresthesia
7. Diplopia in upward gaze
8. CSF leak
9. Encephalitis
10. Brain abscess
11. Frontal osteomyelitis
12. Nonunion

### c. Key Steps in Treatment

1. Establish frontal bone continuity
2. Anterior table – ORIF
3. Posterior table – Craniotomy including sinus. Remove posterior table. Obliterate sinus. Replace craniotomy.
4. Eradicate sinus cavity if drainage cannot be established
5. Remove all lining with a bur or laser
6. Obstruct nasal frontal outflow tract – raise pericranial flap and seal
7. Plate anterior table
8. Create a permanent barrier between extra and intracranial contents

## ORIF FRONTAL SINUS FRACTURE

### PREOPERATIVE DIAGNOSIS

1. Anterior table frontal sinus fracture (ICD S02.19XA)

### POSTOPERATIVE DIAGNOSIS

1. Anterior table frontal sinus fracture (ICD S02.19XA)

### PROCEDURE PERFORMED

1. Open reduction and internal fixation of the anterior table frontal sinus fracture (CPT 21343)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Upon verification of tube placement and inflation of the cuff, the tube was secured with silk tape. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. Eye lubricant was placed bilaterally in the eyes and protective goggles and occlusive dressings were placed over the patient's eyes. The patient's arms were tucked. IV tubing and leads were verified to function properly. The patient underwent an uneventful oral endotracheal intubation which was secured to the face with tape by the anesthesia team.

A Mayfield head rest was used to position the head. A shoulder roll was placed. The anticipated incision was marked with a surgical marker and the scalp was cleansed with ethyl alcohol. Hash marks were made and a superficial line was drawn with a 10 blade on the patient's scalp. All the hair was removed using shears. The excess hair was removed using tape. The patient was prepped and draped in the standard sterile fashion. A 1:50,000 solution of epinephrine was injected into the scalp along the planned incision line from the right root of the ear helix to the left root of the ear helix, with an anterior curvilinear incision remaining within the hairline and posterior to the superficial temporal artery. Hash marks were made into the skin superficially to index the flap and the incision was made anteriorly with a 10-blade coursing in a curvilinear fashion from anterior to posterior along the intended path.<sup>11</sup> Blood vessels were identified and cauterized at the wound margin using a Jacobson and a Bovie electrocautery. Raney clips were then placed along the skin flap edges to aid in hemostasis throughout the procedure.<sup>12</sup>

A subgaleal plane was developed and continued anteriorly and then the remainder of the incision on the right and left side were continued to the superficial temporal line and the superficial layer of the temporal fascia was identified and incised. This plane was continued inferiorly to the root of the helix bilaterally. Mayo scissors were used to bluntly dissect the loose aponeurotic tissue beneath the galea and above the pericranium and this continued until the lateral orbital rims were identified bilaterally.

Supraorbital nerves were identified and care was taken to avoid disruption of these nerves. An osteotome was used to remove the portion of the orbital rim surrounding the right supraorbital rim. The patient of note had a normal anatomy where the right supraorbital nerve was fully encased in the foramen whereas the left passed through a notch in the left supraorbital rim. This dissection continued to approximately 2 cm superior to the infraorbital rim.

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<sup>11</sup> Geometric or zig-zag coronal incisions are utilized as well as hemi-coronal incisions and varies according to the surgeon's preference.

<sup>12</sup> Raney clips have been implicated in hair loss if left on for greater than 30 minutes. Consider removing the Raney clips and isolating /ligating/cauterizing individual vessels.

An incision was made in the pericranium overlying the frontal bone. The tissue was reflected superiorly and then inferior to expose the radix of the nose as well as the glabellar region. The anterior table frontal sinus fracture was identified and bony fragments from within the contents of this fracture were evacuated and placed on the back table for future placement. The frontal sinus was then evaluated and irrigated thoroughly. Excess clots and blood and tissue were removed from the sinus. Grossly depressed and contaminated frontal sinus epithelium was removed with a curette and the corresponding frontal nasal junction of the nasal bone was reduced with a periosteal elevator.

A template using sterile packaging material was made over the frontal sinus and a 0.4 mm Titanium mesh was then cut to form over the supraorbital plate extending into the bilateral supraorbital rims. This was adapted to reestablish the patient's contour and provide support to the frontal sinus fracture. Six 4 mm self-tapping screws were placed in the right side of the frontal sinus fracture. At this time, the bone was taken from the back table and held in place with a Jacobson and a drill was used to place holes and secure the bony fragments to the titanium mesh. This then was continued until the frontal sinus fracture bony reconstruction was complete. All nerves remained intact, exiting the supraorbital rims. The scalp was irrigated thoroughly as well as the pericranium and this flap was repositioned and 2-0 braided polyglactin sutures were placed in an interrupted fashion with deep sutures re-establishing the wound. After this, a stapler was used to close the skin incision and 500g of bacitracin was placed over all the incisions followed by an adhesive dressing.

At the conclusion of the procedure the oral cavity was suctioned and orogastric tube was passed. The patient was extubated in the OR without complication and transferred to the PACU in good condition. The patient tolerated the procedure well.

**Notes:**

## 5) Le Fort I-III Fractures

### a. Indications for Treatment

1. Class I, II and III posttraumatic malocclusion
2. CSF leak
3. Facial asymmetry
4. Trauma
5. Malocclusion

### b. Complications of Treatment

1. Relapse
2. Hemorrhage
3. Ophthalmic injury
4. Condylar malposition
5. Neurological dysfunction
6. Unfavorable facial aesthetics
7. Failure of implanted devices
8. Pseudoaneurysm/aneurysm
9. Trigeminal neuralgia
10. Latent herpes infection reactivation
11. Malunion
12. Nonunion
13. Infraorbital nerve paresthesia
14. Deviated septum
15. Epiphora

### c. Key Steps in Treatment

1. Exposure of the fractures
2. Reestablish occlusion
3. Identify medial canthal tendon
4. Reduction/ reconstruction of medial orbital rims (if necessary)
5. Reconstruction of medial orbital wall (if necessary)
6. Transnasal canthopexy (if necessary)
7. Nasolacrimal apparatus repair (if necessary)
8. Reestablish vertical height and fixation (all fractures)
9. Reestablish midface width and fixation
10. Check occlusion
11. Internal fixation with plates and screws
12. Alar cinch
13. V-Y closure of mucosa

## LEFORT I, II, III FRACTURE

### PREOPERATIVE DIAGNOSES

1. Comminuted fracture of the anterior and posterior tables of the frontal sinus (ICD S02.19XA)
2. Bilateral Le Fort I, II and III (ICD S02.411A, ICD S02.412A, and ICD S02.413A)
3. Comminuted bilateral NOE fracture (ICD S02.19XA)
4. Palatal fracture (ICD S02.8XXA)
5. Left coronoid process fracture (ICD S02.62XA)<sup>13</sup>

### POSTOPERATIVE DIAGNOSES

1. Comminuted anterior and posterior table of the frontal sinus fractures (ICD S02.19XA)
2. Le Fort I, II and III fractures bilaterally (ICD S02.411A, ICD S02.412A, and ICD S02.413A)
3. Comminuted bilateral NOE fracture (ICD S02.19XA)
4. Comminuted bilateral orbital floor fractures (ICD S02.3XA)
5. Palatal fracture (ICD S02.8XXA)

### PROCEDURES PERFORMED

1. Open reduction internal fixation of bilateral zygomaticomaxillary process fractures (CPT 21365) x2 with 59 modifier
2. Open reduction internal fixation at Le Fort I, II and III (CPT 21433) with 52 and 59 modifier
3. Open reduction internal fixation bilateral NOE fracture with nasal reconstruction (CPT 21338) 52 and 59 modifier

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. Eye lubricant was placed bilaterally in the eyes and protective goggles and occlusive dressings were placed over the patient's eyes. The patient's arms were tucked. IV tubing and leads were verified to function properly. The patient was prepped and draped according to both head and neck surgery and neurosurgery standards.

Neurosurgery proceeded to approach the frontal sinus fracture via a coronal incision and cranialized the frontal sinus with a laterally positioned pericranial flap. For details of this procedure, please see neurosurgery dictation.

The coronal incision was extended laterally and inferiorly in the preauricular area on the right side to expose the right zygomatic arch. The dissection was carried superficial to the temporalis fascia to the zygomatic arch and then subperiosteal using #9 periosteal elevators. The right zygomatic arch was exposed and it was noted that it was comminuted. Anatomical reduction was obtained and using 1.5 mm plates the zygomatic arch was reapproximated to anatomical contours and the plate was secured to the bone with 5 mm screws. The left zygomaticofrontal suture was also secured to the zygomatic process of the temporal bone with a 1.5 mm plate and then attention was drawn to the left side where it was noted that due to the laterally positioned pedicle flap, the left zygomatic arch could not be approached. Then using Metzenbaum scissors, the laceration located in the glabellar region and over the bridge of the nose was opened exposing the comminuted NOE fracture. It was noted that the segments were severely displaced. The segments were freed with #9 periosteal elevators and the nasal bone was secured to the glabella using 1.5 mm and 1.3 mm plates bilaterally. Then the medial rims of the orbits were reconstructed by identifying the frontal processes of the maxilla and securing these to the glabella and the nasal bone with 1.3 mm plates with 4 mm screws. It was noted that the medial canthi were attached to large fragments of bone and by reducing these; the intercanthal distance was established at 37 mm which was a significant improvement over the telecanthus that

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<sup>13</sup> If the coronoid fracture is not treated, it doesn't need to be listed in the preoperative diagnoses.

resulted from the trauma.

Then attention was drawn to the oral cavity where an incision in the vestibule was made after having infiltrated 5 mL of 1% lidocaine with 1:100,000 epinephrine. The incision was carried with Bovie cautery with a Colorado tip and a full-thickness mucoperiosteal flap was reflected using #9 periosteal elevators. The left zygomaticomaxillary buttress was identified and it was noted to be in one fragment, whereas, on the right side it was noted that the zygomaticomaxillary buttress was severely comminuted. Tissue was reflected superiorly exposing the lateral surfaces of the piriform aperture and the frontal processes of the maxilla were secured to the maxilla using 1.5 mm plates bilaterally secured to the bone with 4 mm screws. The left zygomaticomaxillary buttress was reduced and another 1.5 mm plate was used to secure this segment to the maxilla. Then the vestibular incision was extended on the right side and the mucoperiosteal flap was dissected superiorly towards the rim. The small fragments of the inferior orbital rim were identified and were secured to each other with a 1.3 mm plate. A small 5 mm defect was noted. Then attention was again directed to the previous mid face incision that was carried out through the previous scar and an additional fragment of bone was identified to be attached to the right medial canthus. This segment was stabilized with 2.0 fiber wire through and through secured to the contralateral plate on the left medial rim. Then the right anterior wall of the maxillary sinus was reconstructed with 1.0 mesh through the vestibular approach.

All surgical sites were irrigated and then the vestibular incision was closed using 3.0 polyglactin 910 sutures. The facial incisions, including the coronal incision were closed using polyglactin 910 sutures and polypropylene sutures. The corneal shields were removed. At the end of the procedure, it was noted that the patient's occlusion was adequately stable after having been released from maxillomandibular fixation. The patient tolerated the procedure well.

**Notes:**

## 6) Orbital Fractures

### a. Indications for Treatment

1. Aesthetics
2. Functional deficit
3. Extraocular muscle entrapment
4. Oculocardiac reflex
5. Trauma
6. Enophthalmos
7. Diplopia

### b. Complications of Treatment

1. Blindness
2. Change in vision
3. Ectropion
4. Entropion
5. Diplopia
6. Scarring
7. Infection
8. Failure of implanted device
9. Device migration

### c. Key Steps in Treatment

1. Preoperative visual examination by ophthalmologist
2. Forced duction test
3. Protect the globe
4. Exposure of orbital rim
5. Release the orbital contents herniated into the sinus
6. Find a posterior stop
7. Reduction of orbital rim fracture
8. Reconstruction of orbital floor
9. Forced duction test
10. Resuspend lateral canthus or ligamentous structures
11. Wound closure

## TRANSCONJUNCTIVAL APPROACH TO THE ORBITAL FLOOR

### PREOPERATIVE DIAGNOSIS

1. Right orbital floor blowout fracture (ICD S02.3XXA)

### POSTOPERATIVE DIAGNOSIS

1. Right orbital floor blowout fracture (ICD S02.3XXA)

### PROCEDURE PERFORMED

1. Reconstruction of right orbital floor (CPT 21386)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Upon verification of tube placement and inflation of the cuff, the tube was secured with silk tape. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. Eye lubricant was placed bilaterally.

The patient was then prepped and draped in the standard sterile fashion. Lidocaine 2%, 0.5 mL, with 1: 100,000 epinephrine was infiltrated into the right orbital lower lid conjunctiva. 10 minutes elapsed prior to incision. A forced duction test was performed revealing mild restricted up gaze.

A 15-blade was used to perform a conjunctival incision of the right lower lid at the base of the fornix, lateral to the inferior lower lid punctum. This was extended laterally near the lateral canthus. Then, blunt dissection was used in a preseptal plane inferiorly. Dissection was then performed bluntly down to the level of the orbital rim and then the periosteum over the line of the inferior orbital rim was incised using a 15-blade. A subperiosteal dissection was then performed along the orbital floor posteriorly. The fracture was identified and the herniated orbital contents were replaced into the orbit proceeding posteriorly until the posterior wall of the maxillary sinus was identified. Retraction was then carried superiorly until a stable stop was identified. Hemostasis was achieved using bipolar electrocautery.

Once the floor had been adequately reduced and all orbital contents had been retracted into the orbit, a 0.8 mm titanium reinforced porous polyethylene orbital implant was then shaped and contoured to reconstruct the right orbital floor. This was placed overlying the defect and was secured to the infraorbital rim using two, 4 mm self-drilling screws. The area was then inspected to ensure that the plate was above the posterior ledge. This was confirmed. A forced duction test was performed confirming that there was no further restriction of the right globe with upward movement. The wound was irrigated and inspected to verify hemostasis. The periosteum was closed using 4-0 polyglactin 910 sutures and the conjunctiva was then sutured using 5-0 fast absorbing gut suture, burying the knots in an interrupted fashion placing three sutures.

Again, the forced duction test was performed confirming no restriction with upward movement or in any other gaze and the globes were irrigated with balanced salt solution and the patient was then extubated without complication, transferred to the PACU in good condition. The patient tolerated the procedure well.

**Notes:**

## TRANSANTRAL ENDOSCOPIC ASSISTED ORBITAL FLOOR RECONSTRUCTION

### PREOPERATIVE DIAGNOSIS

1. Right orbital floor fracture (ICD S02.3XXA)

### POSTOPERATIVE DIAGNOSIS

1. Right orbital floor fracture (ICD S02.3XXA)

### PROCEDURE PERFORMED

1. Transantral endoscopic orbital floor reconstruction (CPT 21385)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to oral intubation. The tube was secured by the anesthesia team. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. After securing of the oral endotracheal tube, eye lubricant was placed bilaterally.

Next, the patient's arms were tucked. Leads and IV's were checked. The patient was draped in the normal sterile fashion. Attention was first directed to the right eye, where a forced duction test demonstrated limited range of motion with up gaze and down gaze movements of the right globe. The left eye did not demonstrate any restrictions. A 6-0 polypropylene suture was used to place a tarsorrhaphy suture.<sup>14</sup> Attention was then directed to the oral cavity, where a throat pack was placed. The oral cavity was cleaned thoroughly with a 0.12% solution of chlorhexidine gluconate and a brush. A 4.5 cm incision was made with a #15 blade through the maxillary vestibular unattached mucosa deep to bone, and a periosteal elevator was used to expose the anterior wall of the maxilla and laterally to the root of the zygoma. Hemostasis was achieved and a 702 bur was used to trough out a 2 cm x 1.5 cm bony window into the anterior maxillary wall, avoiding the infraorbital nerve. This piece was removed and saved, and the maxillary sinus was irrigated thoroughly with normal saline. The herniation of the orbital content and fat was appreciated into the right maxillary sinus. Orbital contents were lifted up in place with a periosteal elevator and a Freer elevator, and was found to restore the contours of the orbital floor. A 30-degree scope was used to visualize the maxillary sinus and prolapsed fractured floor of the orbit. At this time titanium porous polyethylene coated orbital floor plate was trimmed to fit into the posterior wall and medial aspect of the maxillary sinus. The 4 screws were placed into the anterior maxillary wall and secured. The sinus again was irrigated thoroughly. The bony window was then also plated with 4 screws and secured in place. This was irrigated and closed with 3-0 chromic gut suture in a running fashion. At the end of the case, a forced duction test was found to have much better range of motion for the right eye. Then the tarsorrhaphy suture was removed bilaterally. The throat pack was removed, the oral cavity was suctioned, and an orogastric tube was passed and suctioned. The patient was extubated in the OR without any complications and taken to the PACU in good condition. The patient tolerated the procedure well.

### Notes:

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<sup>14</sup> 4-0 – 6-0 sutures are commonly used. Silk may also be used. Tarsorrhaphy sutures may or may not be used. This is surgeon dependent.

## SUBCILIARY APPROACH ORBITAL FLOOR RECONSTRUCTION

### PREOPERATIVE DIAGNOSIS

1. Left orbital floor and medial wall fractures (ICD S02.3XXA)

### POSTOPERATIVE DIAGNOSIS

1. Left orbital floor and medial wall fractures (ICD S02.3XXA)

### PROCEDURE PERFORMED

1. Orbital floor reconstruction via subciliary approach (CPT 21386)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to oral intubation. The tube was secured by the anesthesia team. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally.

Next, the patient's arms were tucked. Leads and IV's were checked. The patient was draped in the normal sterile fashion. A corneal shield was placed prior to incisions and a tarsorrhaphy suture was placed. Using a very fine marking pen, the planned subciliary incision was marked out approximately 2 mm below the superior border of the inferior lid. A lateral extension was performed in a resting skin tension line. Using a 15 blade, an incision was made through the skin only, following the same incision design. Bovie electrocautery was used for hemostasis throughout the procedure. Next, using iris scissors starting at the lateral portion, it was taken down to the lateral orbital rim. Blunt dissection was carried out in a supraperiosteal submuscular plane. The orbicularis oculi was incised through with scissors using this plane. This allowed visualization of the periosteum covering the inferior orbital rim. Using a 15 blade, incision was made over top of the orbital rim through the periosteum. Molt #9 elevators were used for subperiosteal blunt dissection in an inferior portion over the inferior orbital rim as well as for the orbital floor. Dissection was carried out using Molt #9 elevator, a malleable, and cottonoids to approximately 30 mm. Next, a 0.8 mm titanium porous polyethylene orbital floor plate was trimmed to size and inserted. The plate was then adjusted to fit the floor for reconstruction. Two 5 mm self-drilling screws were then placed in the inferior orbital rim to hold the plate in place. The site was then thoroughly irrigated and suctioned and noted to be lying flat without resistance. Triamcinolone 40 mg was then irrigated inside the orbit underneath the globe. Next, using a 5-0 polyglactin 910 suture, a deep SOOF elevating suture was placed in the lateral portion in order to support the lateral tissues. Five single interrupted 6-0 fast-absorbing gut sutures were placed to close the skin of the subciliary incision. It was noted at this time that the incision was closed without any resistance or complications. The modified tarsorrhaphy suture that was placed in the lower lid was removed and the corneal shields were removed as well. The patient was cleaned and adhesive strips were applied to the lateral portion over the wound for additional support and closure. The patient was extubated in the OR without complication, tolerated the procedure well and was transferred to the PACU in good condition.

### Notes:

## 7) Zygomaticomaxillary Complex Fractures

**a. Indications**

1. Flattening of malar prominence
2. Flattening of zygomatic arch
3. Deformity of zygomatic buttress of maxilla
4. Deformity of orbital margin
5. Diplopia
6. Enophthalmos

**b. Complications**

1. Enophthalmos
2. Malar asymmetry
3. Visual disturbances
4. Sensory disturbances of cheek
5. Infection/plate infection
6. Plate exposure
7. Cold intolerance to plate
8. Palpable plate

**c. Key Steps**

1. Clinical exam and forced duction test
2. Protection of the globe
3. Reduction of the fracture
4. Assessment of reduction
5. Application of fixation device
6. Internal orbital reconstruction
7. Assessment of ocular motility
8. Bone graft osseous defects
9. Soft tissue resuspension
10. Postsurgical ocular exam

ZMC fractures have 5 CPT codes assigned for usage:

21355 Percutaneous treatment of malar area (Carroll-Girard screw)

21356 Indirect approach (Keen, Gilles, intraoral)

21360 Open treatment with facial incisions

21365 Open treatment with facial incisions of complicated/comminuted fracture

21366 Open treatment with facial incisions of complicated/comminuted fracture with bone graft

## OPEN REDUCTION AND INTERNAL FIXATION OF ZYGOMATICOMAXILLARY COMPLEX FRACTURE

### PREOPERATIVE DIAGNOSES

1. Left zygomaticomaxillary complex fracture (ICD S02.402A)
2. Left orbital floor fracture (ICD S02.3XXA)

### POSTOPERATIVE DIAGNOSES

1. Left zygomaticomaxillary complex fracture (ICD S02.402A)
2. Left orbital floor fracture (ICD S02.3XXA)

### PROCEDURES PERFORMED

1. Open reduction internal fixation of left zygomaticomaxillary fracture (CPT 21360)
2. Reconstruction of left orbital floor (CPT 21385)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

Attention was first directed to the left eye where a forced-duction test was performed. The forced-duction test was negative. The patient had full mobility of the left globe. There was mild subconjunctival hemorrhage preoperatively. Attention was then directed to the left lower lid crease where a curvilinear incision was made with a 15 blade through skin and subcutaneous tissue, and the orbicularis oculi muscle. This was dissected deep to the infraorbital rim where a significant step was appreciated in the bony contours of the infraorbital rim. This dissection was continued posteriorly into the orbit, and inferiorly to expose the second division of the trigeminal nerve. Once this was accomplished, cottonoids were placed.

Attention was next directed to the left frontozygomatic suture where again a full-thickness incision was made deep to the lateral orbital rim where the second fracture was located. This was dissected superiorly and inferiorly on the rim until enough room was made for 3 holes on each side of a 1.0 mm plate. Next, the intraoral incision was made. It was approximately 4.0 cm and went through oral mucosa, submucosa, deep through the periosteum to the bone. This tissue was reflected superiorly, laterally and medially and extended showing a gross comminution of the anterior wall of the maxilla with multiple missing pieces, as well as a comminuted segment of the lateral zygomaticomaxillary buttress. Next, a bone hook was utilized to mobilize the zygoma which was pulled anteriorly reestablishing facial form. The frontozygomatic suture after being held in place by a Kocher was first plated with a 1.0 mm set with 3 screws on each side of the fracture.

Next, attention was directed to the left infraorbital rim where again a straight plate was used to adapt the 3 bony segments of the infraorbital rim into a reasonable alignment. Finally, a curved 0.8 mm plate was used on the infraorbital rim to traverse the distance from the left zygoma to the anterior maxillary wall. A curved plate was used to this effect, and was trimmed until the size appeared adequate for the size of the defect. Three screws were placed superiorly in the curved plate extending from the zygoma to the left maxilla. Each was secured with 5 mm self-drilling screws. Another 1 mm plate was screwed to the lateral buttress which was free floating in the lateral aspect of the maxilla. This was temporarily secured until the larger plate was able to engage those portions of bone to keep them in place.

At this point, attention was directed to the floor of the orbit which was explored extensively, and the defects were evaluated. A porous polyethylene sheet was cut to the appropriate dimension to fit in the floor of the orbit, and sutured in place using two 6-0 Polypropylene sutures.

Next, all the sites were irrigated with normal saline; 40 mg of triamcinolone was irrigated into the left orbital floor

incision area, and the periosteum was closed with 5-0 polyglactin 910 suture from periosteum to periosteum. The superficial layer was closed using a 5-0 fast-absorbing gut. The same manner of closure was obtained for the frontozygomatic suture. Finally, the oral cavity was again rinsed, and a hemostatic agent was placed posterior to the pterygoid plates, lateral to the zygomatic arch, as well as in the anterior maxilla. At the conclusion of the case the throat pack was removed. The corneal shield was removed. A forced-duction was performed and no entrapment of the extraocular muscles was appreciated. The eye was then flushed with saline solution. The patient tolerated the procedure well, was extubated in the OR, and transferred to the PACU.

**Notes:**

## GILLIES APPROACH TO THE ZYGOMATIC ARCH FRACTURE

### PREOPERATIVE DIAGNOSIS

1. Right zygomatic arch fracture (ICD S02.402A)

### POSTOPERATIVE DIAGNOSIS

1. Right zygomatic arch fracture (ICD S02.402A)

### PROCEDURE PERFORMED

1. Open reduction without internal fixation of right zygomatic arch fracture (CPT 21356)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was then taken to OR # \_\_\_ by the anesthesia team and transferred to the OR table in the supine position. All appropriate monitors were placed and all pressure points were padded. The patient underwent oral intubation uneventfully and the tube was secured. Subsequently, the patient was prepped and draped in the standard sterile fashion. 2 mL of 2% lidocaine with 1:100,000 epinephrine was used to obtain local anesthesia and aid in hemostasis.

The surgical site hair was trimmed. The incision was marked 2.5 cm superior and 2.5 cm anterior to the helix of the ear. A 1.5 cm linear incision was made through skin and subcutaneous tissue. Dissection continued through the superficial layer of the temporalis fascia through the deep temporalis fascia until the belly of the temporalis muscle was appreciated. An elevator was used to lift the segment laterally restoring facial contour. Closure of the temporal wound was achieved with 3-0 polyglactin 910 sutures and 5-0 resorbable monofilament superficially. This was covered with sterile adhesive strips and a coverlet. The patient tolerated the procedure well, was extubated in the OR and transferred to the PACU in stable condition.

### Notes:

## 8) Tracheostomy

### a. Indications for Treatment

1. Pneumonia
2. Severe intracranial injury
3. Acute/ chronic respiratory failure
4. Cervical trauma
5. Phrenic nerve damage
6. Emergent loss of airway
7. Autoimmune neurologic disease

### b. Complications of Treatment

1. Hemorrhage
2. Tracheoinnominate fistula
3. Tracheoesophageal fistula
4. Laryngeal nerve damage
5. Transient hypothyroidism
6. Tracheal stenosis
7. Damage to vocal cords

### c. Key Steps in Treatment

1. Marking of surgical landmarks
2. Skin incision
3. Subcutaneous tissue (potential for large veins)
4. Superficial layer of the deep cervical fascia
5. Thyrohyoid, sternothyroid, linea alba
6. Thyroid isthmus
7. Pretracheal fascia
8. Pre-oxygenate with 100% oxygen then decrease Fio2 if tolerated
9. Cricoid hook
10. Tracheal incision (+/- Polypropylene stay suture)
11. Tracheal dilator
12. Lubricated and tested tracheostomy tube insertion with obturator
13. Removal of Army/Navy retractors after end tidal co2 is appreciated
14. Secure the tracheostomy tube to the skin

## OPEN TRACHEOSTOMY

### PREOPERATIVE DIAGNOSES

1. Acute respiratory failure with hypoxia (ICD J96.01)
2. Pneumonia (ICD J18.9)

### POSTOPERATIVE DIAGNOSES

1. Acute respiratory failure with hypoxia (ICD J96.01)
2. Pneumonia (ICD J18.9)

### PROCEDURE PERFORMED

1. Open tracheostomy (CPT 31600)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was then taken to OR # \_\_\_ by the anesthesia team and transferred to the OR table in the supine position. All appropriate monitors were placed and all pressure points were padded. The patient underwent oral intubation uneventfully and the tube was secured.

The patient remained in a supine position with proper head and neck support while maintaining cervical spine precautions and a Miami-J collar in place. One sandbag was placed on each side of the patient's head and silk tape was used to secure the head and neck during the procedure prior to the removal of the anterior portion of his Miami-J collar.<sup>15</sup>

The face and neck were prepped and draped in a sterile manner at this time with betadine. The anatomy of the anterior neck was marked with a skin marker. The skin incision was marked and a 15 blade was used to make an incision through skin and subcutaneous fat. Bovie electrocautery was then used to obtain appropriate hemostasis. Curved hemostats and electrocautery were used to continue the surgical approach through layers to the level of the platysma. At this time Army-Navy retractors were used to begin retracting soft tissues laterally and hemostats were used to bluntly dissect in the midline of the neck down towards the underlying trachea. The superficial layer of the deep cervical fascia was incised and divided. The strap muscles were retracted laterally. The thyroid isthmus was cauterized and divided. Dissection proceeded towards the trachea just inferior to the cricoid cartilage. The anesthesia team was made aware that the surgical team was approaching the trachea and to confirm that the fraction of inspired oxygen was appropriately titrated down while the Bovie was being used. The anterior wall of the trachea was encountered and cleared with a Kitner.

A cricoid hook was engaged after the cuff of the endotracheal tube was deflated. The inner space between the second and third tracheal cartilage was identified and a 15 blade was used to make an incision through the anterior trachea between the two cartilaginous rings after the anesthesia team had deflated the cuff of the endotracheal tube once more. After initial incision through the anterior portion of the tracheal wall, Metzenbaum scissors were used to extend this opening laterally up to the right and left, so as to create an opening large enough for insertion of the tracheostomy tube. A 2-0 polypropylene stay suture was passed through the anterior wall of the trachea along the portion of the trachea inferior to our incision. The suture was clamped and slight retraction was held on the stitch. The oral endotracheal tube was slowly backed out until the distal tip of the endotracheal tube was visible within the trachea. The tracheal exposure was widened using a tracheal spreader to facilitate easily insertion of the tracheostomy tube.

Next, a 6-0 Shiley tracheostomy tube whose cuff had already been verified to be functional was inserted into the

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<sup>15</sup> It is important to note precautions taken in patients with pre-existing cervical trauma.

tracheotomy with the cuff deflated. After insertion of the tracheostomy tube, the oral endotracheal tube was left in place momentarily and the cuff of the tracheostomy tube was inflated. The anesthesia circuit was connected to the tracheostomy tube and end tidal CO<sub>2</sub> was verified and appropriate tidal volumes were reported. The retractors were removed from the surgical site and surgical hemostatic agent was injected around the tracheostomy tube to assist in continued hemostasis.

Next, the four corners of the flange of the tracheostomy tube were sutured to the skin using 2-0 silk suture and a tracheostomy sponge soaked in iodine was passed under the tracheostomy flange. The neck strap was then secured to the flange of the tracheostomy tube and secured appropriately around the patient's neck for further stabilization. Attention was paid to the stability of the tracheostomy tube and it was noted that the tube was in place without ability to dislodge the tube from its appropriate position. The oral endotracheal tube was removed at this time by the anesthesia team and the oral cavity was suctioned free of debris. Stomach contents were suctioned with an orogastric tube. Eye protection was removed and the patient's eyes were flushed with balanced salt solution. The face was cleaned and the patient was turned over to anesthesia team for preparation of transfer back to the ICU. The patient tolerated the procedure well.

**Notes:**

## PERCUTANEOUS TRACHEOSTOMY

### PREOPERATIVE DIAGNOSIS

1. Acute respiratory failure with hypoxia (ICD J96.01)
2. Pneumonia (ICD J18.9)

### POSTOPERATIVE DIAGNOSES

1. Acute respiratory failure with hypoxia (ICD J96.01)
2. Pneumonia (ICD J18.9)

### PROCEDURE PERFORMED

1. Percutaneous tracheostomy (CPT 31600)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

Attention was first directed to the midline of the trachea, where the standard landmarks were palpated. 2% lidocaine with 1:100,000 epinephrine was used for hemostasis and analgesia. The trachea was entered with the 23-gauge needle and additional local anesthetic was deposited within the trachea. A 2 cm incision was made 2.5 cm superior to the sternal notch.

Blunt dissection continued down to subcutaneous tissue with hemostats. The anterior trachea was visualized; tracheal rings were identified. The trachea was then entered with a 14-gauge needle and sheath. A fiberoptic scope was used to confirm the tracheal perforation with the needle. The endotracheal tube was withdrawn superior to the vocal cords.

Next, a guidewire was inserted through the sheath after the need was withdrawn. Serial dilation of the tracheal rings was performed. A pre-tested #8 Shiley tracheostomy tube was then advanced over the guidewire into the trachea. The tracheostomy tube was visualized entering the trachea. The inner cannula was placed and the circuit connected. End tidal CO<sub>2</sub> and adequate tidal volume was confirmed. The tracheostomy tube was secured using 2-0 silk suture and an iodine-soaked dressing was placed. The patient tolerated the procedure well.

### Notes:

## 9) Panfacial Trauma Sequence

Severe traumatic facial injuries result in substantial bony comminution with concomitant loss of hard and soft tissue landmarks making reconstruction particularly challenging. Through staging the reconstruction, a reasonable outcome may be achieved. The following dictations present an example of a panfacial injury that was repaired in a specific sequence to optimize the outcome. This sequence will vary across institutions and surgeons. *Panfacial trauma* is not a diagnosis; each injury must be addressed separately.

### FIRST STAGE

1. Tracheostomy
2. Examination under anesthesia
3. Placement of arch bars
4. Dental impressions with alginate of the maxillary and mandibular arches

The anterior neck was inspected, and the anatomical landmarks were marked with a skin marker following which approximately 2 cc of 0.5% bupivacaine with 1: 200,000 epinephrine were injected along the incision site between the second and third cartilages.

A #15 blade was used to incise the skin through the subcutaneous fat to the level of the platysma while the tissue was retracted with tissue retractors, and a Bovie set at 25-25 was used to continue the dissection along the midline of the trachea through the prevertebral fascia and through the strap muscles, reflecting the strap muscles using a hemostat to dissect the tissue layers down to the thyroid gland and incising the fascial planes with the Bovie after the dissection was carried forth to the edge of the wound. Army-Navy retractors were used to retract the tissue laterally, and a tissue retractor was used to retract the tissue superiorly to access the trachea. Once the trachea was visualized and palpated for the cartilaginous ring, a #15 blade was used to incise an incision in the ring, approximately 2 cm in length, with a vertical incision of about 1.0 cm in the midline. The endotracheal tube was slowly retracted until the distal tip was visible within the trachea. An 8-0 Shiley was placed. The cuff was inflated and the circuit was reconnected. Once the tracheostomy was secured in the airway, 2-0 silk sutures were used to suture the skin to the Shiley tracheostomy. Then, 2-0 silk sutures were placed in the cartilaginous rings for safety sutures to access the airway in an emergency.

A throat pack was placed, and approximately 6 cc of 0.5% bupivacaine with 1: 200,000 epinephrine were injected intraorally for hemostasis. Arch bars were placed using 24-gauge wire on the maxillary and mandibular arches following distraction of tooth #7. Tooth #7 was fractured off below the gingiva. Tooth #7 was extracted using a #301 elevator and #150 forceps. Impressions were taken with alginates of the maxilla and mandible. The patient was placed in intermaxillary fixation after the throat pack was removed. The patient was turned over to anesthesia team, and transported fully monitored to the ICU in stable condition.

## SECOND STAGE

1. Open reduction and internal fixation of right angle fracture.
2. Open reduction with external fixation with arch bars of dentoalveolar alveolar fracture on segment 27 through 29.
3. Open reduction and internal fixation of a left comminuted body fracture.
4. Open reduction and internal fixation of a left subcondylar fracture.

Attention was then directed to the right lower quadrant. A Bovie was used to make a submucosal incision from the lateral ramus to the first molar. A full thickness mucoperiosteal flap was then developed from the first molar up to the coronoid notch. Another incision was then made just posterior to the canine. The mental nerve was then identified. The bone segments were then manipulated so that the fracture was aligned.

Attention was then focused on the left lower quadrant. Again, an incision was made with the Bovie electrocautery from the ascending ramus to the first molar. This incision was taken through the mucosa initially and then deepened through the periosteum. A #9 Molt periosteal elevator was then used to develop a full-thickness mucoperiosteal flap. The incision was placed distal to the lateral incisors and canine. This incision was then joined with the previous incision, and the mental nerve was isolated and visualized.

A small dentoalveolar segmental fracture was undermined slightly as to not devascularize the flap. This segment was then mobilized and placed into anatomical position. A lower arch bar was then removed and re-placed. A 2.0 mm locking plate was secured to the right body. All drills were predrilled and 2.0 mm locking screws were used. Extensive irrigation was used to reduce drilling temperatures. With the fracture reduced and plated, our attention was then focused on the right side. A 2.4 mm locking reconstruction plate was used to stabilize the angle. This was an 11-hole, 2.4 reconstruction plate. The plate was bent accordingly. The holes were drilled, and 2.0 mm screws were then used to fixate the plate. Our attention was then focused on the alveolar segment. This was wired in using 24-gauge wire to the arch bar after anatomically reduced.

The surgical sites were all irrigated. The intraoral wounds were then sutured with continuous 3-0 chromic suture. Three small stab incisions were made on the right side, and a trocar was placed while placing the plate. These were sutured with 5-0 polypropylene.

A retromandibular incision was then made with a #15 scalpel. This was first made through the skin and then the subcutaneous tissue. Blunt dissection was then used as well as a nerve stimulator to avoid the facial nerve. Blunt dissection through the parotid, through the masseter, onto the lateral aspect of the ascending ramus of the mandible was obtained. The masseter muscle was then incised, and a #9 elevator was then used to make a subperiosteal flap. The subcondylar fracture was then mobilized and reduced. A 2.0 mm miniplate was then used with six screws to fixate the left subcondylar fracture. This was then irrigated with normal saline. The parotid/masseteric fascia was then closed. The subcutaneous tissue was then closed, followed by skin. The skin was closed with 6-0 polypropylene.

A facial wrap/pressure dressing was placed. The patient tolerated the procedure well.

## THIRD STAGE

1. Open reduction and internal fixation of maxilla LeFort I, II, and III fractures
2. Right NOE fracture with transnasal wiring.

The head had been previously shaved in preparation for a coronal access. It was then injected with 1:100,000 concentration of epinephrine for a total of 20 cc. This was placed in the subgaleal layer, extending from the posterior lobe of the right ear directly superior across the midline of the parietal bone and down into the left ear. A marker was then used to mark the initial incision. Electrocautery was then used to incise the scalp to the epidermis and into the subcutaneous level. A Metzenbaum was then used to dissect down to a subgaleal layer. The bicoronal flap was then lifted with blunt dissection using a Metzenbaum scissor in a subgaleal layer. This flap was extended anteriorly 4 cm superior to the supraorbital rims. The pericranium was then incised and a full-thickness pericranial flap was then lifted to the superior rims. The dissection was then carried down to the temporoparietal fascia on the left side. The superficial layer of the deep temporal fascia was dissected off the temporal fat pad. Dissection was then carried down to the arch. The periosteum was incised on the left arch and a full-thickness mucoperiosteal flap was then developed. This was then connected with the supraorbital rims following the bony lateral rims.

Our attention then focused to the right side and, in the same manner as previously stated, the temporoparietal fascia was lifted. The superficial layer of the deep temporal fascia was removed with the Cooley scissors. The temporal fat pad was exposed and the dissection was carried down to the zygomatic arch. The periosteum was incised and the lateral aspect of the periosteum was then lifted and a periosteal flap was then used and tissue was incised and the bicoronal flap was then connected with the arch. This was done by following the bony remnants of the orbital walls. The facial periosteum was then dissected and segments were mobilized as well as they could. Our attention was then focused to the right orbit. A skin hook was used to retract the right lower eyelid. A Seldin was then used to protect the globe and Metzenbaum scissors were used to make a lateral canthal release. Electrocautery was used to stop the bleeding. Blunt dissection was then performed using Metzenbaum scissors to undermine the conjunctiva of the lower lid. This was then undermined and incised using the tenotomy scissors. Electrocautery was then used to cut down to the inferior orbital rim. This incision was extended as far medially and laterally as the orbital rim could be palpated. A #9 periosteal elevator was then used to remove the facial aspect of the periosteum.

The left orbit under the same outline as above for the right orbit was performed. The periosteum was reflected from both orbits and the periosteum was stripped off facially from the zygoma back to the arch. Thus the incisions that were performed were connected. The segments were mobilized as much as possible.

Our attention was then focused intraoral and a vestibular incision was then made with electrocautery. A full thickness mucoperiosteal flap was reflected. This dissection was carried superiorly starting at the piriform rims. Bony segments were manually reduced as well as possible. The anterior maxillary sinus walls were comminuted and displaced into the sinus. The periosteum was then lifted off of both zygomas. The segments were then manipulated such that reduction was obtained.

After mobilizing the fractured maxillary segments, the patient was released from internal maxillary fixation. The orbits were then reconstructed using titanium plates. These plates were 1.0mm. They were placed at the frontal zygomatic suture. They were also placed around bilateral inferior orbital rims. A plate was then placed at the medial orbital rim of the left orbit. The patient had a right NOE fracture. The nasal bone/maxillary bone, at transosseous hole was then placed and a 28-gauge wire was threaded through these two holes made in the frontal process of the maxillary bone. An awl was then placed from the left medial orbital wall transnasally, entering the right anterior medial wall of the right orbit. The 28-gauge wire was then passed and a hemostat was then placed on this wire to be used at a further point in the operation. Bilateral arches were then reduced in rigid fixation using a 1.0 titanium plate was used for rigid fixation. Two plates were used on the right side as the fracture was comminuted. Disimpaction forceps were then used to disimpact the maxilla so that better alignment could be achieved. After alignment was gained with the Rowe forceps, 1.5mm L plates were used to stabilize the maxilla to the now fixated zygomas. The nasal septum was reduced with an Ash and a Goldman was used also to replace the nasal bone. At this time, the transnasal wire was then fixed and the patient's inner canthal distance was measured and placed to be 32 mm.

Attention was then focused to the orbital floors. The orbital floor periosteum and orbital fat were then pulled up into the floor and it was noted that on the right side the floor defect was quite large. Titanium mesh implants were used on bilateral orbital floors. Post-placement of titanium graft, forced duction of both eyes showed good range of passive motion of both globes. Bur holes were then placed in bilateral lateral orbital rims. This was used to tie the lateral canthal ligaments back down to the lateral orbital rims. This was done post-drill placement using a 4-0 polyglactin 910 suture. A 6-0 polypropylene was then used to reapproximate the upper lid with the lower lid. All areas were then irrigated with saline solution. A Jackson-Pratt #7 drain was then placed in the subgaleal position of the scalp. The scalp was then reapproximated with 4-0 Polyglactin 910 sutures. Staples were then used to close the skin. Then 6-0 Polypropylene was then used to close the skin preauricular with this incision. 3-0 catgut was then used to close the buccal vestibule of the maxillary incision. Doyle splints were then tied with suture and placed in the nose. The occlusion was then checked again to make sure that the patient had good occlusion. This was also done throughout the procedure to maintain the patient's occlusion. The patient had adequate occlusion. The corneal protectors were then removed. These were placed at the beginning of the case. Bacitracin was then placed on the scalp wound. Eye lubricant was then placed in the eyes. A pressure dressing using a gauze roll and elastic bandaging was then placed to the scalp. The drain was placed to suction bulb. The patient remained in internal maxillary fixation. The patient was then transferred back to the stretcher and then returned back to the intensive care unit.

## 10) Submental Intubation

Submental intubation is a procedure that can avoid tracheostomy and allow for the concomitant restoration of occlusion and reduction of facial fractures in those that are ineligible for nasotracheal intubation. This procedure consists of exteriorizing an oral endotracheal tube through the floor of the mouth and submental triangle. The original surgical protocol dictated a 2 cm incision in the submental, paramedian region extending cephalad until the lingual mucosa was tented with a hemostat after which another 2 cm incision parallel to the mandible is made in the lingual gingivae. The breathing circuit is briefly disconnected as the tube is externalized through the submental region and reconnected to the circuit and secured to the patient. This may be performed on or off the surgical field. Many aspects of submental intubation make it a useful surgical adjunct in a variety of settings including facial trauma, pathology and elective facial surgery.

**Notes:**



**SECTION III**  
**COSMETIC FACIAL SURGERY**

## 11) Rhinoplasty/Septoplasty

### a. Indications for Treatment

1. Nasal deformity secondary to cleft lip and palate
2. Chronic nasal obstruction
3. Chronic rhinosinusitis
4. External deformity

### b. Complications of Treatment

1. Late deformities
2. Nasal bleeding
3. Infection
4. Hematomas
5. Tape reaction
6. Skin slough secondary to tight or inappropriately placed dressing
7. Poor cosmetic result
8. Nasal obstruction

### c. Key Steps in Treatment

1. Open
  1. Columellar incision
  2. Bilateral marginal incision
  3. Skeletonization and exposure of the bone and cartilage
  4. Dorsal reduction
  5. Dome division if access is needed to the septum for septoplasty or graft harvest
  6. Septoplasty, if required
  7. Turbinate modification if required
  8. Lateral nasal osteotomy
  9. Tip plasty
  10. Alar base modification
  11. Closure and splinting
2. Closed
  1. Partial transfixion incision
  2. Intercartilaginous incision
  3. Septoplasty
  4. Turbinate modification if required
  5. Dorsal reduction
  6. Lateral nasal osteotomies
  7. Marginal incision
  8. Delivery of lower lateral cartilages
  9. Tip plasty
  10. Alar base modification
  11. Closure and splinting

## SEPTOPLASTY and SPREADER GRAFT

### PREOPERATIVE DIAGNOSES

1. Late effect of fracture of facial bone (ICD S02.2XXS)
2. Acquired deviated nasal septum (ICD J34.2)

### POSTOPERATIVE DIAGNOSES

1. Late effect of fracture of facial bone (ICD S02.2XXS)
2. Acquired deviated nasal septum (ICD J34.2)

### PROCEDURES PERFORMED

1. Repair of nasal vestibular stenosis with spreader grafting (CPT 20912)
2. Septoplasty or submucous resection, with or without cartilage scoring, contouring or replacement with graft (CPT 30520)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient's identity and planned procedure were verified in the preoperative holding area. The patient was then taken to OR # \_\_\_ by the anesthesia team and transferred to the OR table in the supine position. All appropriate monitors were placed and all pressure points were padded. The patient underwent oral intubation uneventfully and the tube was secured. The eyes were lubricated and taped. The bed was turned 90 degrees. Subsequently, the patient was prepped and draped in the standard sterile fashion. 5 mL of 1:50,000 epinephrine was used to aid in hemostasis. A preoperative examination of the nasal cavity demonstrated a 1 cm area of denuded mucosa along the left nasal septum.

A transcolumellar incision was made with a triangle at the midline for ease of approximation with a 15 blade followed by the marginal incision which was carried bilaterally to the lateral aspect of the columella. This incision was then undermined using tenotomy scissors and continued through a subperichondrial plane which was created superficial to the lateral cartilages. Dissection was carried caudally up the nasal dorsum in a subperichondrial plane to expose the lower lateral cartilages and along the septum cephalically to the radix point with blunt dissection using tenotomy scissors. Once the dissection was complete, the upper lateral cartilages were exposed using tenotomy scissors extending cephalic to the radix. Next, the interdomal attachments were released and the midline septum was exposed. A 15 blade was used to incise the mucoperichondrium over the septum and dissection was continued caudal and posterior using a Freer.

The cartilaginous septum was evaluated and found to have significant deviation. A 1-cm dorsal and 1-cm caudal aspect of the cartilage was measured and marked. The incision was initiated with a 15 blade. A swivel knife was used to harvest cartilage. The cartilage graft was then harvested and placed in a normal saline soaked raytec. The cartilage grafts were prepared on the back table for spreader grafts and a strut graft.

Attention returned to the nose which required spreader grafts. The spreader grafts were then sutured in place using 5-0 polypropylene suture, ensuring that the spreader grafts were placed on each side of the septum approximately 1 cm in length, incorporating the upper lateral cartilages with the spreader grafts. Once the spreader grafts were in place the grafts were trimmed and contoured. Flex HD alloderm was contoured and placed over the dorsum to increase soft tissue thickness over the spreader graft and secured in place using 4-0 chromic gut suture with a transcutaneous suture.

The marginal incision and the transcolumellar incision were then closed using 6-0 polypropylene and 5-0 chromic gut sutures. The profile view of the nose and the bird's eye view were then confirmed to be as desired and photographs were taken. Doyle splints were placed bilaterally with bacitracin and sutured in place using 2-0 silk suture. Adhesive was then used to prep the nose, nasal tip support. Sterile adhesive strips were placed with a Denver splint.

At the conclusion of the procedure, all sponge and needle counts were verified. The patient was extubated in the operating theater without complication and transferred to the PACU in stable condition. The patient tolerated the procedure well.

**Notes:**

## **RHINOPLASTY with SPREADER AND STRUT GRAFT**

### PREOPERATIVE DIAGNOSES

1. Late effect of fracture of nose (ICD S02.2XXS)
2. Deviated nasal septum (ICD J34.2)

### POSTOPERATIVE DIAGNOSES

1. Late effect of fracture of nose (ICD S02.2XXS)
2. Deviated nasal septum (ICD J34.2)

### PROCEDURE PERFORMED

1. Rhinoplasty, primary; complete, external parts including bony pyramid, lateral and alar cartilages, and/or elevation of nasal tip (CPT 30410)
2. Septoplasty or submucous resection, with or without cartilage scoring, contouring or replacement with graft (CPT 30520)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

Throughout the procedure, a total of 10 cc of 1: 50,000 epinephrine solution was injected into the surgical sites. A transcolumellar incision was made with a triangle at the midline for ease of approximation with a 15 blade followed by the marginal incision which was carried bilaterally to the lateral aspect of the columella. This incision was then undermined using tenotomy scissors and continued through a subperichondrial plane which was created superficial to the lateral cartilages, and continued caudally up the nasal dorsum in a subperichondrial plane to expose the lower lateral cartilages entirely and along the septum cephalically to the radix point with blunt dissection using tenotomy scissors. Once the dissection was complete, the upper lateral cartilages were noted to be down from the nasal bone attachments.

The cartilaginous septum was evaluated and found to have significant deviation. A subperichondrial plane was then created in the cartilaginous septum, and with a 1-cm dorsal aspect remaining and a 1-cm caudal aspect of the cartilage was left in place. The incision was measured, marked and initiated with a 15 blade. A swivel knife was used to harvest cartilage. The cartilage graft was then harvested and placed in a normal saline soaked raytec. The cartilage grafts were prepared on the back table for spreader grafts and a strut graft.

Attention returned to the nose which required spreader grafts. The spreader grafts were then sutured in place using 5-0 polypropylene suture, ensuring that the spreader grafts were placed on each side of the septum approximately 1 cm in length, incorporating the upper lateral cartilages with the spreader grafts. Once the spreader grafts were in place, attention was then turned to the strut graft which was measured to be as desired. The strut graft was sutured in place to the existing caudal septum. Further suturing of the lower lateral cartilages was performed to get the desired tip support using 5-0 polypropylene sutures which was secured to the strut graft.

Next, the nasal bones were marked and a small 3mm stab incision was made bilaterally estimating the location of the lateral nasomaxillary suture of the nasal bones. An osteotome was used to fracture in the nasal bones in a low

to high manner extending from the piriform rim to several millimeters inferior to the suture. These fractured bone segments were mobilized and placed into the desired position.

The marginal incision and the transcolumellar incision were then closed using polypropylene and chromic gut sutures. Two 5-0 polypropylene sutures were placed in the osteotomy sites. The profile view of the nose and the birds eye view were then confirmed to be as desired. Doyle splints were placed bilaterally with bacitracin and sutured in place using 2-0 silk suture. Mastisol was then used to prep the nose, nasal tip support. Sterile adhesive strips were placed with a Denver splint.

**Notes:**

## 12) Otoplasty

### a. Indications for Treatment

1. Prominauris
2. Post-traumatic deformity
3. Congenital deformity

### b. Complications of Treatment

1. Hematoma
2. Infection
3. Overcorrection
4. Recurrence
5. Suture loosening

### c. Key Steps in the Mustarde Technique

1. Fusiform skin excision postauricular surface
2. Undermining of posterior aspect of the helix, antihelix and concha
3. Care is taken to leave perichondrium attached to auricular cartilage
4. Extent of antihelical fold recreation is determined by pinching the anterior auricle between index finger and thumb
5. May also be accomplished with methylene blue dipped needles
6. Permanent sutures are placed into the helical cartilage parallel to the helical rim
7. Sutures must traverse cartilage and perichondrium but not skin
8. The superior crus is created first
9. Second suture is placed inferior to the junction of the superior and inferior crura
10. Overcorrect superiorly as inadequate reduction may result in relapse

## OTOPLASTY MUSTARDE TECHNIQUE

### PREOPERATIVE DIAGNOSIS

1. Bilateral prominauris (ICD Q17.5)

### POSTOPERATIVE DIAGNOSIS

1. Bilateral prominauris (ICD Q17.5)

### PROCEDURE PERFORMED

1. Bilateral otoplasty (CPT 69300) with modifier 50

### DETAILS OF PROCEDURE

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient's identity and planned procedure were verified in the preoperative holding area. The patient was then taken to OR # \_\_\_ by the anesthesia team and transferred to the OR table in the supine position. All appropriate monitors were placed and all pressure points were padded. The patient underwent oral intubation uneventfully and the tube was secured. The eyes were lubricated and taped. The bed was turned 90 degrees. Subsequently, the patient was prepped and draped in the standard sterile fashion.

The ears were marked appropriately and then infiltrated with 1% Lidocaine with epinephrine to improve hemostasis. A triangle of skin was removed posteriorly and the otoplasty rasps were inserted to score and release the pull of the antihelix cartilages. After this the cartilage was softened with the otoplasty rasp, which was placed through a subcutaneous tunnel anteriorly, #4-0 wide Mersilene sutures were then placed in a horizontal suture fashion redefining the antihelical fold. The tension was adjusted to bring the ears back into proper anatomical position, after which interrupted #4-0 Polyglactin 910 was used to approximate the skin edges. A #5-0 running Polyglactin 910 was then used to close the skin. Identical procedure was carried out bilaterally, except on the left ear a small Darwinian tubercle was removed and shaved down through a helical incision. The excess cartilage was properly excised and the skin closed with the running interrupted #5-0 polypropylene. Postoperatively, damp cotton was applied to the ear to hold it in proper position after which a wraparound light fluffy head dressing was applied. The patient was then transferred from the operating table to the recovery area having tolerated the procedure without difficulty.

### Notes:

## 13) Rhytidectomy

### a. Indications for Treatment

1. Skin laxity
2. Deep furrow lines
3. Facial cosmetic improvement

### b. Complications of Treatment

1. Hematoma
2. Skin flap necrosis
3. Paralysis of facial nerve
4. Skin slough
5. Parotid sialocele
6. Salivary fistula
7. Hypertrophic scarring
8. Keloids
9. Alopecia
10. Earlobe distortion

### c. Key Steps in Treatment

1. Vasoconstriction
2. Skin incision and dissection
3. Plication vs. imbrication
4. Level will vary depending on the technique
5. Closure

## RHYTIDECTOMY

### PREOPERATIVE DIAGNOSIS

1. Facial rhytids (ICD L57.4)
2. Dermatochalasis (ICD H02.836- left eye, H02.832- right eye)

### POSTOPERATIVE DIAGNOSIS

1. Facial rhytids (ICD L57.4)
2. Dermatochalasis (ICD H02.836- left eye, H02.832- right eye)

### PROCEDURES PERFORMED

1. Laser resurfacing, perioral and periorbital skin (CPT 17999)
2. Bilateral lower blepharoplasty with temporary tarsorrhaphy (CPT 15823)<sup>16</sup>
3. Bilateral subcutaneous neck lift (CPT 15825) with 50 modifier
4. Submental liposuction (CPT 15876)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient's identity and planned procedure were verified in the preoperative holding area. The patient was then taken to OR #\_\_\_ by the anesthesia team and transferred to the OR table in the supine position. All appropriate monitors were placed and all pressure points padded. The bed was turned 90 degrees. Subsequently, the patient was prepped and draped in the standard sterile fashion.

The eyelid skin was cleansed and the endotracheal tube protected with aluminum foil. Laser eye shields were placed in the eyes. Utilizing the carbon dioxide laser, the lower eyelid and upper eyelid skin were resurfaced with two passes at 300 millijoules, pulse 10. The skin was cleansed between each pass and dried. The glabellar skin was resurfaced with two passes at 400 millijoules as well as the periorbital skin and the vermilion-cutaneous junction. The eye shields were removed. The patient was prepped and draped. Facelift incisions were marked in gentian violet utilizing a tragal flap. A submental incision was marked for the chin augmentation. The lateral brow lift incisions were made beginning at the mid pupil line at the anterior hairline extending for 2-1/4 inches curvilinear into the lateral hairline bilaterally. Infiltration anesthesia was performed utilizing 1% lidocaine with epinephrine into the lower eyelids and the medial fat pad of the upper eyelids and the lateral forehead and brow.

Surgery was initiated on the right lower eyelid. An incision was made and a muscle flap developed; however, muscle was left over the mid lamella. The bleeders were coagulated. The septum orbitale was opened and the 3 compartments of fat, nasal, central and temporal, were identified. The herniating portions were dissected free, cross clamped at their base, resected and coagulated. Due to the deep tear trough, a dissection was carried out over the orbital rim medially, and a small piece of fat that had been removed from the lower lid was trimmed and placed in this dissected area to fill out the tear trough. The lid was then laid back to its anatomical position. Approximately 1 to 1.5 mm of skin was resected since the laser had tightened the lower lid skin. The incision was closed with a running 6-0 fast-absorbing suture.

The right upper eyelid nasal fat compartment was then opened in the pretarsal crease. The herniating fat was dissected free, cross clamped at its base, resected and coagulated. Bleeders were coagulated, and the incision closed with a running 6-0 fast-absorbing suture. A temporary tarsorrhaphy suture was placed at the lateral eyelids with 6-0 fast-absorbing suture. The right temporal incision was made and dissection carried out in a subcutaneous plane,

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<sup>16</sup> Use twice if performed on both eyes.

taking care to leave the superficial sensory nerves intact. This was carried down to 1 cm above the supraorbital rim. Bleeders were coagulated. The flap was then elevated and rotated slightly medially, elevating the lateral brow to the proper position. A key incision was made through the flap and a 4-0 nylon suture placed. The excess skin was then trimmed on each side. A running 4-0 nylon suture was utilized for the closure. The exact same procedure was carried out on the left lower and upper eyelids as well as the lateral brow, with the same techniques.

The left side of the face was infiltrated with 50 mL of 0.5% lidocaine with epinephrine diluted with 100 mL of saline. After the incisions were made, subcutaneous dissection was carried out, leaving a moderately thick flap in the postauricular skin. Dissection was carried down onto the neck and out over the cheek below the zygomatic arch. Bleeding vessels were coagulated. The spatula cannula was then utilized for vacuum technique liposuction of the submental fat pad through the lateral flap. The lateral platysma was then grasped with a pickup and undermined with a scalpel. This was undermined at the angle of the mandible for approximately 1.5 cm. This tapered down to 0 cm along the lateral border. A curvilinear portion of SMAS was then resected with Joseph scissors from near the base of the lobule, which connected to the incised platysma up to just under the zygomatic arch. This was closed with a running 3-0 white nylon suture which plicated the SMAS. The lateral edge of the platysma muscle was then pulled in a superior-lateral direction and anchored to the mastoid fascia with 3-0 polyglactin 910 suture. The lateral border of the platysma was then sutured along the sternocleidomastoid fascia with a running 3-0 polyglactin 910 suture. This was reinforced with a running 3-0 white nylon suture. After a final check for hemostasis, a 10 round JP drain was placed in the neck, exteriorized through a stab incision, and sutured in place with 3-0 polyglactin 910 suture.

A solution of 5 mL of 1% lidocaine with epinephrine was mixed with 0.5 mL of methylprednisolone. This was shaken in the syringe and 3 mL was sprayed over the soft tissues for postoperative analgesia. Bupivacaine 0.25% with epinephrine 10 mL was infiltrated into the incision lines and the postauricular cartilage for postoperative analgesia. The skin flaps were then advanced and trimmed. The ear lobule was suspended free-floating by anchoring the posterior skin to the postauricular sulcus with 2 interrupted 5-0 resorbable monofilament sutures. One was placed at the inferior and superior pole of the tragus. Preauricular closure was with a running 4-0 nylon suture. The hair-bearing and postauricular sulcus incisions were closed with a running 3-0 plain gut suture. The same procedure was carried out on the right side of the face with the exact same technique. The patient tolerated the procedure well, was extubated in the OR and transferred to the PACU in stable condition.

**Notes:**

## **RHYTIDECTOMY with PLATYSMAPLASTY**

### **PREOPERATIVE DIAGNOSIS**

1. Cervicofacial rhytids (ICD L57.4)

### **POSTOPERATIVE DIAGNOSIS**

1. Cervicofacial rhytids (ICD L57.4)

### **PROCEDURES PERFORMED**

1. Cervicofacial rhytidectomy (CPT 15825)
2. Cervicoplasty (CPT 15819)

### **PROCEDURE IN DETAIL**

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient's identity and planned procedure were verified in the preoperative holding area. The patient was then taken to OR #\_\_\_ by the anesthesia team and transferred to the OR table in the supine position. All appropriate monitors were placed and all pressure points padded. The bed was turned 90 degrees. Subsequently, the patient was prepped and draped in the standard sterile fashion.

Next, 2% lidocaine with epinephrine was injected into the proposed sites to aid in hemostasis and analgesia followed by tumescent solution which was injected into the subcutaneous plane to aid in hydrodissection, hemostasis and analgesia of the cervicofacial area.

Initially, attention was directed to the patient's right pre-auricular region where a standard skin only incision was made with a 15 blade that extended in the pre-auricular region starting at the root of the helix within an existing skin crease extending inferiorly down to 2 mm below the patient's lobule and moving superiorly behind the patient's ear. It was then extended up to the patient's hairline where the incision was, again, redirected in a posteroinferior direction following the patient's hairline. This was a skin only incision. The incision was then deepened to the supra-SMAS plane and a skin only flap was raised along all aspects of the initial incision. The patient's skin was undermined in such a way that 3 to 4 mm of adipose tissue remained on the deep aspect of the patient's skin. A skin pocket was developed from the pre-auricular region running anteriorly to within 3 cm of the patient's commissure and extended approximately 3 cm in both superior and inferior directions. The flap was extended in the subcutaneous plane below the ear approximately 3 cm and posteriorly behind the auricle that same distance. The patient's subdermal adhesions were removed and appropriate skin only flap was obtained for cervicofacial rejuvenation. Next, this procedure was repeated on the patient's left side.

Next, attention was directed to the patient's submental region where a 4cm skin only incision was made in a pre-existing crease. The incision was made to a supra-platysmal plane. Using facelift scissors, the plane was extended down to the thyroid cartilage and connected with both supra-SMAS planes. A 1cm x 1cm direct lipectomy was accomplished. Using multiple single interrupted 3-0 polydioxanone, a platysmaplasty was performed.

Following this, polyglactin sutures were used on the patient's right SMAS where a standard SMAS plication was performed to elevate the patient's deep tissue layer. Three polyglactin sutures were used for the SMAS plication, one from the angle of mandible to sub-tragus, one from angle to mastoid, and one from malar region to supra-tragus. At this point it was noted that the deep tissue of the patient's cervicofacial region was lifted tightening the skin of the neck and improving jaw line definition. The same was performed on the patient's left side. There was no evidence of skin bunching or adhesions, so the skin was then laid back to its normal anatomical location and excess skin removed from the patient's posterior margin of the skin flap which included excision of approximately 1 cm

bilaterally. This was repeated on the patient's both right and left side to remove approximately 1 cm of skin bilaterally. Sterile saline irrigation was then used in all the surgical sites. Next, the patient's surgical sites were then closed primarily using a combination of deep polyglactin sutures and a combination of running and interrupted polypropylene sutures in the pre- and post-auricular region with fast absorbing gut around the root of the helix. Bacitracin was applied to all the surgical sites and a facioplasty wrap was placed using a gauze roll. Occlusive dressings were removed from the patient's eyes bilaterally. The patient was extubated in the OR, tolerated the procedure well and was taken to the PACU in stable condition.

**Notes:**

## 14) Brow Lift

### a. Indications for Treatment

1. Brow ptosis
2. Cranial nerve palsy

### b. Complications of Treatment

1. Paresthesia, anesthesia
2. Surgical scarring
3. Relapse
4. Infection
5. Ptosis

### c. Key Steps in Treatment

1. Direct
  - a. Mark length of superior border of the brow
  - b. Lift forehead and hold pen steady, mark this height
  - c. Identify supraorbital nerves and vessels
  - d. Make an incision and deepen at right angles to the skin
  - e. Medial aspect deepen only until fat appears, at the lateral aspect continue just past the fat layer
  - f. Excise an ellipse of tissue
  - g. Close in two layers
  - h. Use monofilament sutures for deep layers
  - i. Close skin with subcuticular
  - j. Steri-strips
2. Indirect Pretrichial
  - a. Despite the name suggesting an incision in front of the hairline, it is advised to make the incision 2 mm posterior to the hairline
  - b. Utilize irregularities in the incision to hide the scar
  - c. Tumescence infiltration 1:500,000 epinephrine in plane between frontalis and dermis
  - d. A beveled incision is made along the Pretrichial markings
  - e. Separate dermis from corrugator supercilii and procerus muscle attachments
  - f. Define desired amount of brow lift
  - g. Excise excess tissue
  - h. Close with poliglecaprone 25
3. Indirect Endoscopic Brow Lift
  - a. Tape hair away from incisions, do not shave or cut
  - b. Three 2-3 cm incisions, posterior and parallel to the hairline are developed
  - c. Insert the endoscope and perform subperiosteal release and elevation of the tissues.
  - d. Lateral/superolateral orbital rim is dissected with a curved elevator
  - e. Arcus marginalis is divided and corrugator, procerus and depressor supercilii muscles are debulked
  - f. A 2mm skin incision is made at the level of the tail of the eyebrow
  - g. A grasper is used to pass a suture through the skin to the periosteum of the frontal bone and galea then out through the same incision
  - h. The lateral sutures are tightened first, followed by the central based on brow elevation

**BROW LIFT/ BLEPHAROPLASTY/SUBMENTAL LIPOSUCTION**

## PREOPERATIVE DIAGNOSES

1. Bilateral upper lid dermatochalasis (ICD Left H02.34/ Right H02.31)
2. Bilateral lower lid dermatochalasis (ICD Left H02.35/ Right H02.35)
3. Submental lipodystrophy (ICD E88.1)

## POSTOPERATIVE DIAGNOSES

1. Bilateral upper lid dermatochalasis (ICD Left H02.34/ Right H02.31)
2. Bilateral lower lid dermatochalasis (ICD Left H02.35/ Right H02.35)
3. Submental lipodystrophy (ICD E88.1)

## PROCEDURES PERFORMED

1. Right trans blepharoplasty endotine brow lift (CPT 67900)
2. Bilateral upper lid blepharoplasty (CPT 15823) with 50 modifier
3. Bilateral lower lid transconjunctival blepharoplasty (CPT 15821) with 50 modifier
4. Submental liposuction (CPT 15876)

## PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

With the patient positioned in the supine position on the operating room table, a satisfactory level of general anesthesia was obtained. The face and neck were prepped and draped in the sterile manner after instillation of lubricant in both eyes. Attention was then turned to injection of the brow bilaterally with 1% lidocaine with 1:100,000 epinephrine as well as subperiosteal area of the forehead. Once this was completed, attention was turned to marking the upper eyelids and injecting 1% lidocaine with epinephrine and then a transconjunctival injection of 1% lidocaine with epinephrine was placed in both sides.

Attention was then turned to the right upper eyelid where a crease incision was made, carried down through the subcutaneous tissue. Superior dissection was then carried up to the level of the superior orbital rim. Attention was turned to scoring periosteum along the orbital rim, above the orbital fat pad, and once this was completed, attention was turned to elevating periosteum up to the upper third of the forehead using a Freer elevator. After this was completed, attention was turned to the drilling of Endotine hole 4 mm above the inferior aspect of the orbital rim. After this was completed, a 3 mm Endotine device was placed. Periosteum was suspended over the top of the Endotine and secured. After this was completed, attention was turned to opening the orbital septum. Medial and middle fat compartments were evacuated of excessive fatty tissue and attention was then turned to hemostasis. Closure was performed with subcuticular running 5-0 polypropylene. Attention was then turned to the left upper eyelid where crease incision was made. Skin strip was removed. Orbicularis muscle strip was removed. The orbital septum was opened and excessive fatty tissue was resected and hemostasis was obtained.

No Endotine device was placed on the left side due to the fact that the left brow was higher than the right and attention was then turned to closure of the upper eyelid with 5-0 subcuticular polypropylene. The brow was then taped superiorly with half-inch Steri-Strips in the right side and secured with transverse Steri-Strips above the level of the brow bilaterally. After this was completed, the attention was then turned to the lower eyelid. Starting on the right side, a transconjunctival incision was made with the Colorado-tip Bovie. Traction suture, 6-0 silk, was placed on the superior conjunctival flap. Oblique dissection was carried towards the orbital rim until the fat compartments were opened. The medial, middle, and lateral fat compartments were evacuated of excessive fatty tissue and

hemostasis was obtained. Closure of the conjunctiva was now done with interrupted buried 6-0 rapidly absorbing gut.

Attention was then turned to the left lower eyelid where the exact same procedure was performed without complications. After this was completed, the eyes were irrigated with balanced salt solution, two drops of tetracaine were placed in each eye, and ophthalmic ointment was placed. Attention was turned to placing 1% lidocaine with 1:100,000 epinephrine in the previously marked areas of the neck. After adequate hemostasis was obtained, cross-tunneling liposculpturing was performed using decreasing caliber Klein cannulas until adequate contour in submental regions was performed. All areas expressed excessive fluid. Closure was performed with 5-0 nylon and a compression facial garment was applied after cleansing the face, removing all betadine paint. The patient tolerated the procedure well. Ice compressors applied to the eyes. The patient was transferred to the recovery room in excellent condition.

**Notes:**

## INDIRECT PRETRICHIAL BROW LIFT

### PREOPERATIVE DIAGNOSES

1. Peripheral visual field deficits secondary to brow ptosis (ICD H53.453)
2. Bilateral upper lid dermatochalasis (ICD Left H02.34/ Right H02.31)

### POSTOPERATIVE DIAGNOSES

1. Peripheral visual field deficits secondary to brow ptosis
2. Bilateral upper lid dermatochalasis (ICD Left H02.34/ Right H02.31)

### PROCEDURES PERFORMED

1. Pretrichial brow lift (CPT 67900)
2. Bilateral upper lid blepharoplasty (CPT 15823) with 50 modifier

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

With the patient positioned in the supine position on the operating room table, satisfactory level of general anesthesia was obtained. The face and neck were prepped and draped in the sterile manner after instillation of eye lubricant in both eyes.

The proposed incisions for the patient's trichophytic brow lift were marked with surgical marker extending between the conjoined tendons right inside the hairline. The incision design was a zigzag pattern. A total of 7.2 mL of 2% lidocaine with 1: 100,000 epinephrine injected into the proposed incision area and allowed to sit for roughly 10 minutes. After this amount of time, an incision was made using a 10-blade down to the level of the cranial bone and a forward dissection was then made in the subperiosteal plane taking care not to cleave the pericranium from the galea. Minimal dissection was made in the posterior dimension. Dissection was continued down in the blunt fashion to the superior orbital rims. Care was taken to protect the bilateral superior orbital and trochlear nerves. Both were found to exit from a notch. Dissection was then continued around to cleave the arcus marginalis and the periosteum over the radix. Dissection continued down laterally, bilaterally, to free the zygomatic frontal sutures. After adequate dissection had been made, the patient's brow was then elevated and then repositioned posteriorly. Roughly 1 cm of forehead full thickness tissue was then removed in a mirrored zigzag fashion. The tissue was then placed on the back table.

The flap was then irrigated with normal saline and then closed initially with 3-0 polyglactin deep sutures through the galea and pericranium and deep dermal layers. This was done to reapproximate the elevated brow. Prior to complete closure the previously collected autologous blood had been spun down and was then injected underneath the forehead flap. The remaining deep 3-0 polyglactin sutures were placed and then the skin was closed with 5-0 polypropylene sutures.

Attention was next directed to the bilateral upper lid blepharoplasties. Attention was first directed to the right side. The proposed incision markings were made to correspond with a resting eyelid crease and then roughly 5 mm superior to that it corresponded to elevation of approximately 3 mm of redundant tissue, was marked and the corresponding fusiform ellipse of skin was then anesthetized with 1.7 mL of 2% lidocaine with 1: 100,000 epinephrine. After awaiting the appropriate amount of time, a 15-blade was used to make a skin only incision through the proposed blepharoplasty. The area was then undermined with a blepharoplasty scissors and removed. A strip of muscle was then also removed to gain access down to the orbital septum. Bleeding was controlled with

electrocautery set at 10/10. Subsequently the blepharoplasty incision was then closed with running 6-0 polypropylene subcuticular suture with a midline loop. The same procedure was done on the left side, both without complication.

At the end of this portion of the procedure it was noted that the right palpebral fissure had roughly 5 mm of lag and the left had 4 mm of lagophthalmos. The patient's face was then cleaned of all dried blood and the patient's eyes were rinsed with BSS. Ophthalmic bacitracin was placed in the eyes bilaterally. Xeroform was placed over the brow incision. A gauze roll and Coban head dressing was placed to allow for postoperative compression of the surgical site. The patient extubated in the operating room and tolerated the procedure well and was taken to the PACU in stable condition.

**Notes:**

## INDIRECT ENDOSCOPIC BROW LIFT

### PREOPERATIVE DIAGNOSES

1. Bilateral brow ptosis (ICD H53.453)
2. Bilateral upper eyelid dermatochalasis (ICD Left H02.34/ Right H02.31)

### POSTOPERATIVE DIAGNOSES

1. Bilateral brow ptosis (ICD H53.453)
2. Bilateral upper eyelid dermatochalasis (ICD Left H02.34/ Right H02.31)

### PROCEDURES PERFORMED

1. Bilateral endoscopic brow lift (CPT 67900) with 50 modifier
2. Periorbital CO2 laser resurfacing (CPT 17999)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient's identity and planned procedure were verified in the preoperative holding area. The patient was then taken to OR #\_\_\_\_ by the anesthesia team and transferred to the OR table in the supine position. All appropriate monitors were placed and all pressure points were padded. The patient underwent oral intubation uneventfully and the tube was secured. The bed was turned 90 degrees. Subsequently, the patient was prepped and draped in the standard sterile fashion.

With the patient in an upright position, the position of her brow was noted to be at her supraorbital rim. The scar from her previous blepharoplasty was identified and marked with a marker. The patient's hair was then braided using elastics and vaseline on her hair to prevent hair from entering the incision sites. Approximately 7.2 cc of 2% lidocaine with 1: 100,000 epinephrine were then injected into one midline incision, approximately 2 cm back from the hairline as well as two lateral incisions in line with the lateral limbus of the eye. Two additional vertical incisions were made in the temporalis region in line with the ala in the lateral canthus approximately 2 cm behind the hairline. The patient was then prepped and draped in the standard fashion for a sterile extraoral procedure and the bed was then turned 180 degrees.

A #15 blade was then used to make a 2 cm in incision two centimeters behind the hairline. Two additional incisions were made 2 cm behind the hairline to align with the lateral limbus. A skin incision was made in the right and left temporal region as previously described. Using standard endoscopic brow lift pericranial elevators, the pericranium was dissected free from the cranium anteriorly to approximately 2 cm above the brows. Dissection proceeded laterally to the area of the conjoint tendon. We then dissected posteriorly approximately 5 cm back from these incision areas to prevent bunching of the scalp after the brow was lifted.

Attention was then directed to the right temporal incision. Hemostats were used in a crisscross fashion to dissect down to the glistening white temporalis fascia. An endoscopic brow elevator was then used to elevate the soft tissue overlying the superficial layer of the temporalis fascia anteriorly to the lateral orbital rim. The endoscope was then inserted into the midline incision and directed towards the right side.

The pericranial elevator was then used to elevate the conjoint tendon off the cranium from the posterior to the anterior. The sentinel vein and the temporal branch of the facial nerve were not visualized. No gross bleeding was encountered during this time.

Attention was then directed to the left temporal incision. Dissection proceeded in the same manner as was performed on the contralateral side. Specifically, a pericranial elevator was inserted into the temporal incision after the temporalis fascia had been identified. The conjoint tendon was then released from the cranium from posterior to anterior direction.

Attention was then returned to the patient's right side. The endoscope was inserted and dissection was then continued down to the supraorbital rim. The arcus marginalis along the supraorbital rim of the right eye was then released. The right supraorbital nerve was freed from the supraorbital notch. It was visualized and noted to remain intact throughout the entirety of the procedure. Dissection then proceeded down the right lateral orbital rim onto the malar prominence. The periosteum covering the zygoma just inferior to the lateral aspect of the eye was released from the bone. The periosteum overlying the right supraorbital rim was then scored using a side cutting scissor in the endoscopic brow lift kit.

Attention was then directed to the left supraorbital rim where the same procedure was done. Specifically, the periosteum was elevated off the supraorbital and lateral orbital rims. Dissection proceeded inferiorly to release the periosteum off of the malar prominence. The periosteum overlying the supraorbital rim was then scored using the side cutting scissors in the same manner as the contralateral side. The periosteum overlying the mid brow region was then elevated free. Dissection did not continue down onto the nasal bone as the medial aspect of the brow was in the appropriate position.

A 2-0 polydioxanone suture was then passed through the holes of a midface endotine. This endotine was then tunneled down to the malar prominence on the right side. This was done with the aid of the endoscope. The soft tissue was then engaged and the polydioxanone suture was then retracted and noted to elevate the soft tissue along the right infra and lateral orbital region. This polydioxanone suture was then fixated to the right temporalis fascia.

The same procedure was then performed on the left malar region. Specifically, an endotine was then passed through the left temporal incision down to the malar prominence. This engaged the soft tissue and the polydioxanone suture that had been tied. This endotine was then fixated to the left temporalis fascia. The incision right of midline was then retracted forward. A hand drill was then used to create a small hole in the frontal bone. After this had been hand drilled, an endotine was then placed. An endotine was then placed in the frontal bone through the left lateral incision. This endotine also noted to engage firmly into the bone and was noted to be secure. The brow was elevated to the appropriate position and seated the tissue into the endotines. We verified that the tissue on this site was secure. The patient was then sat up in the beach chair position to confirm the appropriate positions of the brow. A ruler was then used to verify that the lateral aspect of the brow was noted to be approximately 12 mm superior to the lateral supraorbital rim.

Platelet rich plasma that had been mixed from 60 cc of the patient's blood that had been drawn prior to the start of the surgery was then flowed into the forehead region through the 5 incision sites. Pressure was then held for 5 minutes in this region. Staples were then used to close the 5 scalp incisions, taking care to ensure that the tissue edges were everted.

Attention was then directed to the right eye. The planned areas of the upper lower and lateral orbital regions were then identified by the surgical team. A CO2 laser was set to 80 mJ, 100Hz with a density of 4%. The right lateral lid and right lower lid were then lasered. Prior to lasering, all personnel in the operating room were wearing protection throughout the entirety of the laser portion. Also prior to doing the laser, ocular lubricant was placed in metal eye shields which were then placed in the patient's left and right eye to ensure that the patient's eyes were not damaged during the laser portion of the procedure. Attention was then direct to the left eye where CO2 laser at the same settings was then performed along the left upper, lower and lateral orbital regions. A small amount of Triamcinolone was then placed over the periorbital region as well as ophthalmic Bacitracin.

The patient's hair was then washed using baby shampoo. A comb was used to remove the knots in the patient's hair. Warm saline was then used to irrigate out the shampoo. A Barton head wrap using gauze roll and elastic bandage

was then wrapped around the patient's head to apply pressure to the surgical site and provide stability to the brow lift. This concluded the surgical portion of the procedure.

The patient was then extubated deep by the Anesthesia team. The Foley catheter was removed. The head of bed was then rotated 180 degrees back to the anesthesia team. The patient was then transferred from the operating room table back to the gurney. The patient was then transported to the PACU for further recovery. The patient tolerated the procedure well and there were no apparent intraoperative complications.

**Notes:**

## DIRECT BROW LIFT

### PREOPERATIVE DIAGNOSIS

1. Brow ptosis (ICD H53.453)

### POSTOPERATIVE DIAGNOSIS

1. Brow ptosis (ICD H53.453)

### PROCEDURE PERFORMED

1. Direct brow lift (CPT 67900)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient's identity and planned procedure were verified in the preoperative holding area. The patient was then taken to OR # \_\_\_ by the anesthesia team and transferred to the OR table in the supine position. All appropriate monitors were placed and all pressure points were padded. The patient underwent oral intubation uneventfully and the tube was secured. The bed was turned 90 degrees. Subsequently, the patient was prepped and draped in the standard sterile fashion.

A fine-tipped marking pen was used to mark out the proposed skin excision superior to each brow. Next, 2% lidocaine with 1: 100,000 epinephrine was injected bilaterally above the eyebrows for hemostasis.

Attention was first directed to the right eyebrow where a 15 blade was used along the marked-out incision line through skin and subcutaneous tissue. Bovie electrocautery was used to carry this to a deeper plane and bleeding points were controlled. A wedge of skin and subcutaneous tissue was then dissected out with scissors approximately 8 mm in height and tapered at the edges. Bleeding points were controlled with Bovie electrocautery. The exact same procedure was completed then on the left eyebrow with a 15 blade and then scissor dissection. Deep 3-0 poliglecaprone 25 sutures were placed after irrigating the wounds, approximating the edges adequately. After deep closure, the skin was sutured with a 5-0 blue polypropylene suture in a running fashion. Bacitracin was applied to the wounds. The eyes were rinsed with balanced salt solution throughout the procedure to keep them lubricated. A xeroform dressing was placed over the incisions and a gauze roll and Coban head-wrap was completed without complication. The drapes were taken down, the face was cleansed of the facial prep, and care of the patient was returned to the anesthesia team.

### Notes:

## 15) Blepharoplasty

### a. Indications for Treatment

1. Aesthetic complaints
2. Dermatochalasis
3. Blepharochalasia
4. Blepharoptosis
5. Prolapsed fat pad
6. Hypertrophic orbicularis oculi
7. Lower lid malposition

### b. Complications of Treatment

1. Chemosis
2. Bruising
3. Subconjunctival hemorrhage
4. Blurred vision
5. Persistence of orbital fat pad
6. Excess or redundant skin
7. Asymmetry
8. Lid malposition
9. Dry eyes
10. Diplopia
11. Retrobulbar hemorrhage
12. Blindness

### c. Key Steps in Treatment

1. Upper lid
  - a. Marking
  - b. Incision
  - c. Removal of excess tissue
  - d. Exposure of septum
  - e. Transverse incision
  - f. Removal of prolapse portion of fat pad
  - g. Slight lagophthalmos (1-2mm) is desirable at this point
  - h. Bilateral symmetry of the correction
  - i. Closure
2. Lower lid
  - a. Transconjunctival
    - i. Marking of incision and fat prolapse area
    - ii. Incision of the palpebral conjunctiva
    - iii. Incision of the capsulopalpebral fascia
    - iv. Clamping, trimming and electrocautery of excess fat
  - b. Transcutaneous
    - i. Marking
    - ii. Incision 3-4mm below lower lashes started under the punctum and extended laterally
    - iii. Skin-only flap
    - iv. Muscle flap in a step fashion
    - v. Transverse incision through the septum
    - vi. Clamping, trimming and electrocautery of excess fat
    - vii. Removal of excessive skin
    - viii. Muscle flap closure
    - ix. Skin flap closure

## BLEPHAROPLASTY/SUBMENTAL LIPOSUCTION

### PREOPERATIVE DIAGNOSES

1. Bilateral upper lid dermatochalasis (ICD Left H02.34/ Right H02.31)
2. Bilateral lower lid dermatochalasis (ICD Left H02.35/ Right H02.35)
3. Submental lipodystrophy (ICD E88.1)

### POSTOPERATIVE DIAGNOSES

1. Bilateral upper lid dermatochalasis (ICD Left H02.34/ Right H02.31)
2. Bilateral lower lid dermatochalasis (ICD Left H02.35/ Right H02.35)
3. Submental lipodystrophy (ICD E88.1)

### PROCEDURES PERFORMED

1. Right trans blepharoplasty endotine browlift (CPT 67900)
2. Bilateral upper lid blepharoplasty (CPT 15823) with 50 modifier
3. Bilateral lower lid transconjunctival blepharoplasty (CPT 15821) with 50 modifier
4. Submental liposuction (CPT 15876)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

With the patient positioned in the supine position on the operating room table, satisfactory level of general anesthesia was obtained. The face and neck were prepped and draped in the sterile manner after instillation of eye lubricant in both eyes. Attention was then turned to injection of the brow bilaterally with 1% lidocaine with 1:100,000 epinephrine as well as subperiosteal area of the forehead. Once this was completed, attention was turned to marking the upper eyelids and injecting 1% lidocaine with epinephrine and then a transconjunctival injection of 1% lidocaine with epinephrine was placed in both sides.

Attention was then turned to the right upper eyelid where a crease incision was made, carried down through the subcutaneous tissue. Superior dissection was then carried up to the level of the superior orbital rim. Attention was turned to scoring periosteum along the orbital rim, above the orbital fat pad, and once this was completed, attention was turned to elevating periosteum up to the upper third of the forehead using a Freer elevator. After this was completed, attention was turned to the drilling of Endotine hole 4 mm above the inferior aspect of the orbital rim. After this was completed, a 3 mm Endotine device was placed. Periosteum was suspended over the top of the Endotine and secured. After this was completed, attention was turned to opening the orbital septum. Medial and middle fat compartments were evacuated of excessive fatty tissue and attention was then turned to hemostasis. Closure was performed with subcuticular running 5-0 polypropylene. Attention was then turned to the left upper eyelid where crease incision was made. Skin strip was removed. Orbicularis muscle strip was removed. The orbital septum was opened and excessive fatty tissue was resected and hemostasis was obtained.

No Endotine device was placed on the left side due to the fact that the left brow was higher than the right to begin with and attention was then turned to closure of the upper eyelid with 5-0 subcuticular polypropylene. The brow was then taped superiorly with half-inch Steri-Strips in the right side and secured with transverse Steri-Strips above the level of the brow bilaterally. After this was completed, the attention was then turned to the lower eyelid. Starting on the right side, a transconjunctival incision was made with the Colorado-tip Bovie. Traction suture, 6-0 silk, was placed on the superior conjunctival flap. Oblique dissection was carried towards the orbital rim until the fat compartments were opened. The medial, middle, and lateral fat compartments were evacuated of excessive fatty tissue and hemostasis was obtained. Closure of the conjunctiva was now done with interrupted buried 6-0 rapidly

absorbing gut.

Attention was then turned to the left lower eyelid where the exact same procedure was performed without complications. After this was completed, the eyes were irrigated with balanced salt solution, two drops of tetracaine were placed in each eye, and ophthalmic ointment was placed. The patient tolerated the procedure well. Ice packs were applied to the eyes. The patient was transferred to the PACU in excellent condition.

**Notes:**

## 16) Submental Liposuction

### a. Indications for Treatment

1. Submental lipomatosis/lipodystrophy
2. Skin elasticity

### b. Complications of Treatment

1. Hemorrhage
2. Contour irregularities
3. Damage to facial nerve, great auricular nerve, lingual nerve
4. Damage to submandibular gland
5. Skin perforation
6. Skin burning/laceration
7. Hematoma
8. Seroma

### c. Key Steps in Treatment

1. Marking of surgical boundaries
2. Incisions 3mm
3. Create a pocket within the superficial fat plane between the dermis and the platysma
4. Tumescent solution infiltration (50cc 1% lidocaine, .5cc of 1:1000 epinephrine, 10cc of 1meq/ml bicarbonate, 1000cc saline)
5. Wait 10-15 min
6. Use cannula with aperture away from skin surface
7. Stay in superficial plane as the cannula is inserted and retracted systematically
8. Wound closure
9. Pressure dressing

## **SUBMENTAL LIPOSUCTION**

### **PREOPERATIVE DIAGNOSIS**

1. Submental lipodystrophy (ICD E88.1)

### **POSTOPERATIVE DIAGNOSIS**

1. Submental lipodystrophy (ICD E88.1)

### **PROCEDURES PERFORMED**

1. Submental suction assisted lipectomy (CPT 15876)

### **PROCEDURE IN DETAIL**

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

A 0.5cm incision was made in the submental crease in a horizontal direction through the skin and subcutaneous tissue. A Metzenbaum scissors was used to make 2-3 cm radial tunnels in the submental region from the angle of the mandible to the next angle of the mandible. A 4 mm liposuction cannula was introduced along these previously outlined tunnels into the jowl on both sides and along the anterior border of the sternocleidomastoid laterally and just past the thyroid notch inferiorly. The tunnels were enlarged with a 6 mm flat liposuction cannula. Liposuction machine suction was accomplished in all tunnels. The suction cannula tip remained away from the dermis and symmetry in adipose tissue removal was achieved. A portion of the platysma was excised at the cervicomental angle and a 4-0 polyglactin 910 suture was placed, plicating the muscle. A 5-0 polyglactin 910 suture was placed in the dermis. A 6-0 plain gut suture was used to close the skin margins.

### **Notes:**

## 17) Facial Implant (Malar)

### a. Indications for Treatment

1. Malar deficiency
2. Facial deformity

### b. Complications of Treatment

1. Implant failure
2. Infection
3. Poor aesthetic result
4. Nerve damage

### c. Key Steps in Treatment

1. Malar
  - a. Skin marking
  - b. Site of most projection of implant should be 10 mm lateral and 12 mm inferior to the lateral canthus
  - c. Exposure of zygomatic buttress
  - d. Subperiosteal pocket extended to infraorbital rim and over the zygomatic arch and include a portion of the lateral wall of the orbit
  - e. Avoid infraorbital nerve bundle
  - f. Implant in gentamycin prior to insertion
  - g. Fixation
  - h. Closure
2. Chin
  - a. Incision
  - b. Release 1-2cm of mentalis muscle
  - c. Subperiosteal pocket
  - d. Soak implant in gentamycin
  - e. +/- fixation
  - f. Closure

## PLACEMENT OF IMPLANT RIGHT MALAR EMINENCE

### PREOPERATIVE DIAGNOSES

1. Craniofacial microsomia (ICD Q67.4)

### PREOPERATIVE DIAGNOSES

1. Craniofacial microsomia (ICD Q67.4)

### PROCEDURES PERFORMED

1. Placement of 4x implant, right malar augmentation prosthetic material (CPT 21270)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. The patient was prepared for a nasal intubation. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. After securing of the nasotracheal tube, eye lubricant was placed bilaterally in the eyes and protective goggles/occlusive dressings were placed over the patient's eyes.

A vestibular incision was made in the vestibular mucosa of the maxilla. Subperiosteal dissection ensued and continued up the right anterior maxillary wall and laterally to the body of the zygoma. Instrumentation along the malar eminence and posteriorly along the arch and inferior to the infraorbital rim allowed access to the area for a placement of a 4x implant. The implant was trimmed and repeatedly inserted to verify size and projection of the malar eminence. The implant was impregnated with a concentrated solution of clindamycin and fixated with two 1.5 mm screws. All wounds were then irrigated with normal saline and an antibiotic solution. An alar base cinch was placed, 4-0 polyglactin sutures were used to complete the V-Y closure. 3-0 chromic gut running suture was used to close the oral mucosa. No complications were encountered. The patient tolerated the procedure well and was taken from the OR to the PACU in stable condition.

### Notes:

## 18) Facial Implant (Chin)

### a. Indications for Treatment

1. Elective
2. Microgenia
3. Asymmetry

### b. Complications of Treatment

1. Lip incompetence
2. Implant migration
3. Infection
4. Bone resorption
5. Malposition
6. Excessive augmentation
7. Inadequate augmentation
8. Neurosensory disturbance
9. Damage to teeth

### c. Key Steps in Treatment

1. Case selection and proper diagnosis
2. Evaluation of anatomy, cephalometric examination
3. Selection of alloplastic material
4. Intra-oral approach vs incision in the submental crease
5. Insertion of the alloplastic material (carbon-based polymer, silicone, titanium or hydroxyapatite)
6. Securing the implant with titanium screws or suture
7. Antibiotic irrigation/impregnation
8. Wound closure

## CHIN IMPLANT

### PREOPERATIVE DIAGNOSIS

1. Microgenia (ICD M26.06)

### PREOPERATIVE DIAGNOSIS

1. Microgenia (ICD M26.06)

### PROCEDURE PERFORMED

1. Chin alloplastic implant (CPT 21120)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. The patient was prepared for intubation. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The chin had been infiltrated with 1% lidocaine with epinephrine, a total of 8 mL. The incision in the submental crease was opened. The exposure continued through skin subcutaneous tissues and submental adipose tissue. The anterior inferior aspect of the mandibular symphysis was identified and exposed. A subperiosteal pocket was developed to the dimensions of the extra small chin implant. The chin implant was soaked in iodine, inserted, and positioned. A single 5-0 poliglecaprone 25 suture was placed in the deep tissues and the skin closed with a running 4-0 polypropylene suture. Mastisol and sterile adhesive strips were placed as a wound dressing. The patient tolerated the procedure well and was sent to recovery room in good postoperative condition.

### Notes:

## 19) Eyelid Weight

### a. Indications for Treatment

1. Lagophthalmos

### b. Complications of Treatment

1. Poor eyelid contour
2. Extrusion of the weight
3. Capsule formation that causes visible skin swelling
4. Irritation of the eyelid
5. Implant migration

### c. Key Steps in Treatment

1. Test weight size by taping a double-sided tape to upper lid with test weight. Look for closure within 2-4 mm
2. Local or general anesthesia
3. Identify midline of superior palpebral with pupil
4. 1.5-2 cm incision in deep sulcus horizontally at junction of medial and central  $\frac{2}{3}$  of lid just through orbicularis to below its plane
5. Bluntly dissect to make room for the weight on top of tarsal plate
6. Place plate with lower edge 4-5 mm above lower lid margin
7. Place round corners down
8. Suture to tarsal plate w/ 6-0 non absorbable sutures
9. Place additional sutures if the implant is not parallel to lid margin
10. Close soft tissue

## PLACEMENT OF EYELID WEIGHT

### PREOPERATIVE DIAGNOSES

1. Right paralytic lagophthalmos (ICD H02.231)
2. Right mandibular ankylosis (ICD M26.61)

### POSTOPERATIVE DIAGNOSES

1. Right-sided paralytic lagophthalmos (ICD H02.2)
2. Right-sided mandibular ankylosis (ICD M26.61)

### PROCEDURES PERFORMED

1. Placement of right upper eyelid platinum chain implant for lagophthalmos (CPT 67912)
2. Removal of implant superficial (CPT 20670)

### PROCEDURE IN DETAIL

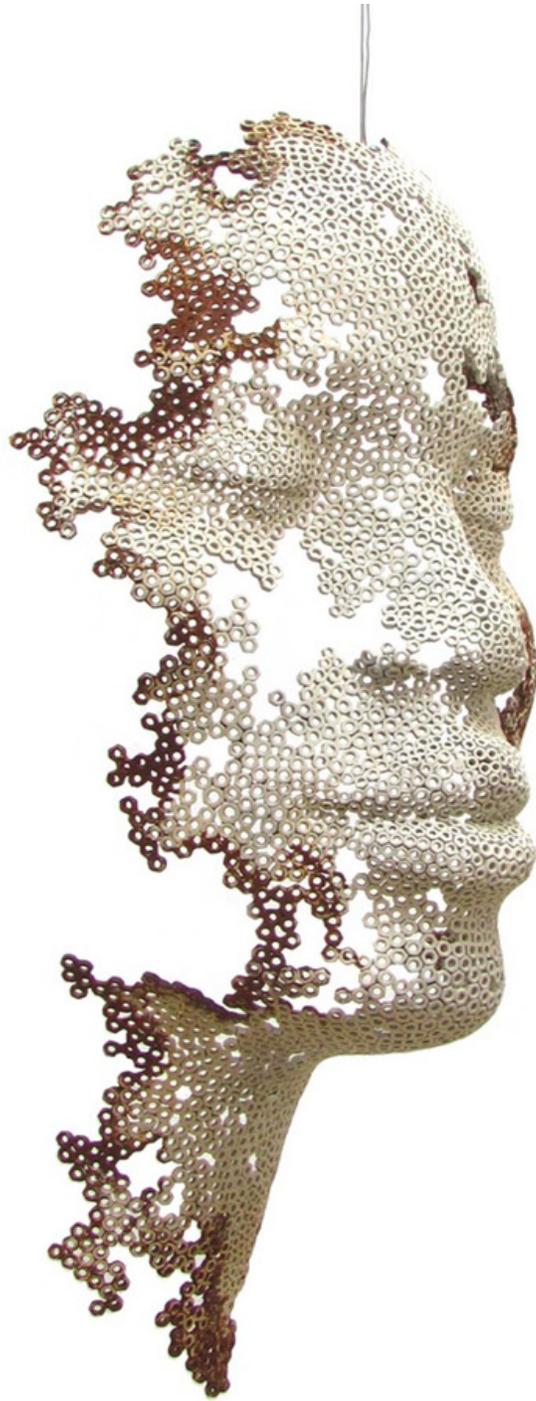
The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. The patient was prepared for an oral intubation. In the preoperative area the patient's upper eyelid crease was marked out, as well as the mid pupillary line was also marked out.

A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

On the table the patient's eyelid crease was injected with 1% lidocaine with 1:100,000 epinephrine. He was prepped and draped for the procedures. A 15 blade was used to make an incision through the skin and dermis. The orbicularis muscle was incised and dissected free until we reached the aponeurosis of the levator palpebrae superioris. Some of the bands were cleaned off to expose the tarsal plate. Once the tarsal plate was exposed, the implant was then placed in and adequately adjusted to approximately 2 mm away from the lash line. The upper suture was used to affix the implant into proper position and the lower two fixation points were fixed to the tarsal plate using the 6-0 polypropylene. It was palpated for adequate fixation. The orbicularis muscle was closed using 5-0 fast and the skin was closed using running 5-0 fast. Adhesive was placed to the upper eyelid and a 1/4-inch sterile adhesive strip was then placed. We then turned our attention to the oral cavity. The teeth were brushed adequately and all of the previous rosettes were cut. The arch bars were removed from the upper and lower dentition. Teeth were brushed one more time, a manual brisement was done and the patient came to an opening of 42 mm MIO. The patient was then turned over to anesthesia for emergence and extubation.

### Notes:





**SECTION IV  
ORTHOGNATHIC SURGERY**

## 20) Orthognathic Surgery

### a. Indications for Treatment

1. Malocclusion
2. Maxillary hypoplasia
3. Mandibular hypoplasia
4. Maxillary hyperplasia
5. Mandibular hyperplasia
6. Jaw asymmetry
7. Apertognathia
8. Transverse hypoplasia
9. Poor mastication
10. Speech deficits
11. Obstructive sleep apnea
12. Post-traumatic malocclusion

### b. Complications of Treatment

1. Hemorrhage
2. Malocclusion
3. Injury to nerves resulting in dysesthesia, anesthesia, hypoesthesia, loss of taste
4. Damage to teeth
5. Relapse
6. Hardware failure
7. Undesirable outcome of facial appearance
8. Loss of airway

### c. Key Steps in Treatment

1. Measure landmarks, confirm surgical movements
2. Verify splints fit the patient prior to surgery
3. BSSO
  - a. Palpate ascending ramus
  - b. Make incision 1-2cm above occlusal plane and lateral to dentition
  - c. Expose mandibular border and strip temporalis
  - d. Make horizontal cut of osteotomy of medial ramus
  - e. Continue osteotomy laterally across external oblique ridge adjacent to 1st and 2nd molars  
Penetrate only anterior cortex
  - f. Vertical osteotomy between 1st and 2nd molars, penetrate buccal cortex
  - g. Complete split with chisel/smith spreader and hammer or other instrument
  - h. Complete on both sides so segments are mobile and easy to position
  - i. Place initial splint on distal segment and place dentition into MMF
  - j. Seat proximal segment into the condylar fossa
  - k. Obtain fixation with bicortical screws
  - l. Release MMF and check occlusion, remove screws and repeat if occlusion not repeatable
  - m. Close incision
4. LeFort 1 Osteotomy
  - a. Incise upper buccal mucosa from first molar to first molar
  - b. Elevate mucosa over anterior maxilla up to zygomaticomaxillary buttress
  - c. Elevate nasal mucosa from floor of nose to nasal fossa
  - d. Osteotomies in maxilla from lateral aspect of piriform buttress 4-6 mm above apices of teeth
  - e. Separate nasal septum

- f. Separate maxillary buttress from pterygoid plates with osteotomes, stay below lateral cut to avoid damage to the internal maxillary artery
- g. Down fracture maxilla
- h. Provide rigid fixation with new occlusion
- i. Alar cinch suture
- j. V-Y closure

**BILATERAL SAGITTAL SPLIT OSTEOTOMY SETBACK WITH THREE-PIECE LE FORT I**

## PREOPERATIVE DIAGNOSES

1. Maxillary hypoplasia (ICD M26.02)
2. Mandibular hyperplasia (ICD M26.03)
3. Malocclusion (ICD M26.213)<sup>17</sup>

## POSTOPERATIVE DIAGNOSES

1. Maxillary hypoplasia (ICD M26.02)
2. Mandibular hyperplasia (ICD M26.03)
3. Malocclusion (ICD M26.213)

## PROCEDURES PERFORMED

1. Bilateral Sagittal Split Osteotomy of the Mandible (CPT 21196)
2. 3-piece Le Fort I Osteotomy (CPT 21147)<sup>18</sup>

## PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was then taken to OR #\_\_\_ by the anesthesia team and transferred to the OR table in the supine position. All appropriate monitors were placed and all pressure points were padded. The patient underwent nasal intubation uneventfully and the tube was secured. A throat pack was placed and the oral cavity was cleansed with a 0.12% chlorhexidine gluconate solution.

Subsequently, the patient was prepped and draped in the standard sterile fashion. 10 mL of 2% lidocaine with 1:100,000 epinephrine was used for local anesthesia and aid in hemostasis. 1 mL of which was placed at the radix of the nose.

A 0.45mm k-wire was placed into the radix of the nose while protecting the eyes.<sup>19</sup> Measurements were made between the k-wire and the central and lateral incisors and their respective brackets. These were written down for reference later in the procedure.

Attention was first directed to the right posterior mandible where a 2.5 cm incision was made lateral to the external oblique ridge and extended anteriorly to the second mandibular molar. Dissection ensued subperiosteally to expose the angle, lateral and medial ramus of the mandible and body anterior to the anticipated site for the osteotomy. The medial dissection was undertaken to avoid injury to the inferior alveolar neurovascular bundle. The reciprocating saw was positioned on the medial aspect of the mandible at an oblique bias superior to the lingula and mandibular foramen. A medial cut was made approximately 0.5 cm into the ramus of the mandible. The tip of the saw was then used to extend the osteotomy anterior, inferior and medial to the oblique ridge. At this time, a 703 bur was used to make monocortical holes in the planned osteotomy site. The holes were connected to form the superior body cut on the mandible.<sup>20</sup> Next, a channel retractor was used to expose the inferior border and the 703 bur was used to make the inferior cut which was extended to meet superiorly with the existing cut. A 5 mm osteotome and mallet was used to complete the osteotomy and insure separation of the cortices at a lateral bias. A fiber handled osteotome was placed between the cortices slowly separating the proximal and distal segments. The neurovascular bundle was

<sup>17</sup> Each type of Angle classification of malocclusion has an ICD 10 code associated with it.

<sup>18</sup> LeFort I's are classified relative to whether a bone graft was used and the degree of segmentalization. A LeFort I without a bone graft codes as 21141,21142,21143 for a 1-piece, 2-piece and 3-piece respectively. A LeFort I with a bone graft codes as 21145,21146,21147 for a 1-piece, 2-piece and 3-piece respectively.

<sup>19</sup> The medial canthus may be used instead of a glabellar k-wire.

<sup>20</sup> A sagittal saw may be used to make the entirety of this osteotomy.

appreciated in the proximal segment was dissected free from the surrounding marrow and out of the inferior alveolar canal. Once free from the proximal segment, a Kocher was used to bring the proximal segment superiorly. A 0.8 cm piece of bone was removed from the proximal segment to accommodate the mandibular setback. A pneumatic rasp was used to smooth the remaining sharp bony edges. This site was irrigated thoroughly and packed with a raytec.

Next, a 2.5 cm incision was made lateral to the external oblique ridge in the left posterior mandible and extended anteriorly to the second mandibular molar. Dissection ensued subperiosteally to expose the angle, lateral and medial ramus of the mandible and body anterior to the anticipated site for the osteotomy. The medial dissection was undertaken to avoid injury to the inferior alveolar neurovascular bundle. The reciprocating saw was positioned on the medial aspect of the mandible at an oblique bias superior to the lingula and mandibular foramen. A medial cut was made approximately 0.5 cm into the ramus of the mandible. The tip of the saw was then used to extend the osteotomy anterior, inferior and medial to the oblique ridge. At this time, a 703 bur was used to make monocortical holes in the planned osteotomy site. The holes were connected to form the superior body cut on the mandible. Next, a channel retractor was used to expose the inferior border and the 703 bur was used to make the inferior cut which was extended to meet superiorly with the existing cut. A 5 mm osteotome and mallet was used to complete the osteotomy and insure separation of the cortices at a lateral bias. A fiber handled osteotome was placed between the cortices slowly separating the proximal and distal segments. The neurovascular bundle was appreciated in the proximal segment which was dissected free from the surrounding marrow and out of the inferior alveolar canal. Once free from the proximal segment, a Kocher was used to bring the proximal segment superiorly. A 0.8 cm piece of bone was removed from the proximal segment to accommodate the mandibular setback. A pneumatic rasp was used to smooth the remaining sharp bony edges. This site was irrigated thoroughly and packed with a raytec.

The intermediate splint was secured in place positioning the cut mandible to the uncut maxilla. The distance between the proximal and distal segments was visualized insuring alignment of the inferior border and a 6 hole curved BSSO plate was placed with 5 mm monocortical screws using a drill guide. This procedure was performed bilaterally fixing the mandible in the desired position. Prior to fixation, the condyles were verified to be in the fossae.

Next, the splint was released and attention was directed to the anterior maxilla where a vestibular incision was made from premolar to premolar. The lateral and medial buttress of the maxilla was exposed and the dissection continued posteriorly to the pterygomaxillary fissure. Cottonoids were placed in these sites. The anterior nasal spine was dissected free from the septal cartilage and removed using a rongeur. The floor of the nasal mucosa was elevated and separated as well as the lateral nasal walls and septal mucosa attachments. Oxymetazoline soaked cottonoids were placed in the floor of the nose to aid in hemostasis.

Next the interdental osteotomies were initiated. The attached gingiva was reflected free from between teeth #6 and 7, 10 and 11. A 701 bur was used to create a groove between these teeth, avoiding the roots. A 5mm osteotome was used to further delineate the osteotomy site. Once adequate troughing between the teeth was achieved, a reciprocating saw was used to make the LeFort I osteotomy bilaterally and a guarded osteotome was used to separate the septum from the palatine bone. Once this was accomplished, the maxilla was down fractured. A polyp was suctioned from the right maxillary sinus. Excess bony fragments and loose pieces of bone were removed from the maxilla. All sites were thoroughly irrigated. The maxilla was easily down fractured at this time due to the thin lateral nasal and maxillary sinus walls. Minimal bleeding was appreciated at this time and the descending palatine artery was visualized and remained intact. The interdental osteotomies were revisited at this time and completed using the reciprocating saw under saline irrigation. Once these cuts were complete the maxillary final splint was secured to the maxillary teeth in the desired position using 28-gauge wire. The maxilla was then secured to the mandible, seating the mandibular teeth within the splint and fixating with 28 gauge wires.

The nasal mucosa was inspected and lacerations were sutured using 3-0 chromic gut suture. Fibrin was sprayed over the nasal mucosa. Next, the maxilla was placed in the planned position by measuring from the k-wire to the

brackets. 6 mm advancement plates were placed on the piriform rim superiorly and on both maxillary segments inferiorly. The anterior maxillary sinus wall was exceedingly thin and unable to accommodate fixation. Two 5mm screws were positioned on the superior aspect of the left sided plate and 3 screws were positioned superiorly on the right piriform rim. 4 screws were placed inferiorly bilaterally on the anterior and lateral segments of the LeFort I osteotomy directed away from the roots of the maxillary teeth. The quality and quantity of bone in the posterior maxilla was of such poor quality that it would not allow for posterior fixation. All sites were irrigated thoroughly. A 3-0 polyglactin 910 suture was used to place the alar cinch suture. V-Y closure of the superior lip was performed with 3-0 chromic gut suture. Avitene, bone graft and saline with bacitracin was made into putty and placed into the maxillary and mandibular osteotomy sites.<sup>21</sup>

The maxillary vestibular incision was closed in a running fashion with 3-0 chromic gut suture. BSSO incisions were closed with 3-0 chromic gut in a running fashion. The patient's oropharynx was suctioned and irrigated thoroughly and the throat pack was removed. At this time, the gingival and palatal tissue was examined for perfusion and was noted to be pink and well perfused. The patient's mandible was then positioned in the splint and 28 gauge wires were used to achieve maxillomandibular fixation. A nasogastric tube was placed to suction oral contents. The k-wire was removed. At the conclusion of the procedure, all sponge counts were verified. The patient was extubated in the operating theater without complication and transferred to the PACU in stable condition. The patient tolerated the procedure well.

**Notes:**

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<sup>21</sup> Variations of bone grafting for maxillary osteotomies exist.

**BILATERAL SAGITTAL SPLIT OSTEOTOMY AND LEFORT I**

## PREOPERATIVE DIAGNOSES

1. Maxillary hypoplasia (ICD M26.02)
2. Mandibular asymmetry (ICD M26.12)

## POSTOPERATIVE DIAGNOSES

1. Maxillary hypoplasia (ICD M26.02)
2. Mandibular asymmetry (ICD M26.12)

## PROCEDURE PERFORMED

1. Le Fort I osteotomy (CPT 21141)<sup>22</sup>
2. Bilateral sagittal split osteotomy (CPT 21196)
3. Extraction of tooth #1 (CDT D7240)

## PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was then taken to OR # \_\_\_ by the anesthesia team and transferred to the OR table in the supine position. All appropriate monitors were placed and all pressure points were padded. The patient underwent nasal intubation uneventfully and the tube was secured. A throat pack was placed and the oral cavity was cleansed with a 0.12% chlorhexidine gluconate solution. Subsequently, the patient was prepped and draped in the standard sterile fashion. 10 mL of 2% lidocaine with 1:100,000 epinephrine was used for local anesthesia and aid in hemostasis. Preoperative measurements were performed from the medial canthi to the maxillary central and canine teeth.

Maxillary and mandibular arch bars were placed in standard fashion. Our attention was then drawn to the maxilla where a Bovie cautery was used to make a full-thickness mucoperiosteal incision from the midline bilaterally to the first molar area avoiding the parotid duct. Dissection was then carried out with a periosteal elevator exposing the piriform rims and posterior towards the pterygoid plates as well as the zygomatic buttresses bilaterally. Again, the periosteal elevator was used to elevate the nasal mucosa in all directions. A guarded osteotome was then used to separate the nasal septum. At this time, a periosteal elevator was placed inside of the piriform rim between the rim and the nasal mucosa of the right piriform rim. A reciprocating saw was then used to make an osteotomy from the area of the right pterygoid plates to the right piriform rim. This procedure was repeated in similar fashion on the left. Then a curved osteotome was placed in correct position of the pterygoid plates and with a mallet with finger placed behind the pterygoid plates on the palatal area was used to separate the plates. This again was done bilaterally. After separation of the pterygoid plates the maxilla was down fractured without incident. Any protuberant or sharp bony areas were then removed with rongeur and reciprocating saw. The stent was then put into position between the mandible and maxilla and rotated in the correct position. After removing bony interferences bilaterally with a reciprocating saw the maxilla was secured into position with 2 L plates bilaterally without complication. Next, we drew our attention to the mandible where incisions were made bilaterally from the external oblique ridge posteriorly to the first premolar anteriorly. A flap was reflected using a periosteal elevator exposing the posterior mandible to the inferior border. At this time teeth 17 and 32 were extracted using standard #301 elevator and forceps technique without complication. Next, a periosteal elevator was used to elevate a full thickness mucoperiosteal flap. The left ramus medial to the internal oblique ribs towards the lingula.

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<sup>22</sup> Always indicate whether a graft was placed and the number of segmentations.

The lingula was exposed and a reciprocating saw was used to make a horizontal cut above the lingula, extending anteriorly along the ramus until the area anterior to second molar was then extended inferiorly with a 703 bur. The final cut was made with a reciprocating saw on the inferior border parallel to the vertical cut made with the 703 bur. This process was repeated on the right side as well. Then, wood handled osteotomes were used to complete the osteotomy. On the right side the nerve was retained in the proximal segment and had to be dissected out using the curette. A reciprocating rasp was then used to smooth out the proximal and distal segments of the mandible bilaterally to remove any sharp bony structures that could damage the nerve. A 2-mm osteotomy was performed with a reciprocating saw on the most anterior aspect of the proximal segment of the left mandible in order to accommodate the leftward rotation. The maxilla and mandible were then secured together with wire loops after placing the final splint into position.

After checking the final occlusion, the mandible was fixated bilaterally using 6-mm curved sagittal split plates with 3 screws on both the proximal and distal segments. We then took the patient out of fixation and the mandible fit passively into the splint. At this time, all sites were thoroughly irrigated with normal saline. The mandible was closed with running 3-0 chromic gut sutures. The maxilla was closed with a V-Y closure anteriorly with interrupted sutures and then running 3-0 chromic gut sutures. Tooth #1 was taken out after the down fracture due to its position inside of the maxillary sinus. After closure the patient was found to be hemostatic. The oral cavity was again rinsed with normal saline and the throat pack was removed. The patient was turned back to anesthesia who extubated him without complications and tolerated the procedure well.

**Notes:**

## HEMI-MANDIBULAR HYPERPLASIA CORRECTION

### POSTOPERATIVE DIAGNOSIS

1. Right-sided hemi-mandibular hyperplasia (ICD M26.03)

### POSTOPERATIVE DIAGNOSIS

1. Right-sided hemi-mandibular hyperplasia (ICD M26.03)

### PROCEDURES PERFORMED

1. Bilateral sagittal split osteotomy of the mandible (CPT 21196)
2. Le Fort 1 osteotomy with bone graft (CPT 21145)
3. Genioplasty (CPT 21121)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

A K-wire was placed through the skin overlying the superior portion of the nasal bone. Using the K-wire we measured distances from the maxillary central incisor, orthodontic brackets as well as the sagittal edges as well as the maxillary canine brackets and sagittal edges. These marks were then recorded. We then injected local anesthesia which consisted of lidocaine 1% with 1:100,000 epinephrine into the right ascending ramus portion of the mandible as well as the mandibular vestibule in the anterior mandible and planned incision. Approximately 8 mL was injected. We then made our first incision, which was a mucoperiosteal full-thickness incision going from the midpoint of the occlusal plane on the right mandible along the ascending ramus extending anteriorly towards the mandibular vestibule going to the area of approximately tooth #30. Dissection was carried down to the inferior border stripping the inferior border of the right mandible on the lateral side from the ascending ramus region down to the angle, going forward to the mid body and body region.

An incision was then made through the mucosa of the lower lip of the anterior mandible extending from the canines bilaterally. This incision was carried down through submucosa and through the mentalis muscle into the parasymphysis region of the mandible, leaving mentalis muscle cuff superiorly for closure. A subperiosteal dissection was then carried out to expose the inferior border of the anterior mandible from the canine region. Dissection was then carried laterally with exposure of the mental nerves bilaterally and protection of the mental nerve.

We dissected lingually from the ramus area extending back to the medial portion of the ascending ramus to expose the lingula. Once the lingula was exposed, a Seldin retractor was placed and protected the inferior alveolar nerve that ran through the lingula. A reciprocating saw was used to make a monocortical osteotomy extending above the lingula moving anteriorly with a distance of about 22 mm from the anterior portion of the ascending ramus above the lingula going anteriorly. This was then carried down in a vertical fashion along the anterior border of the ramus along the external oblique ridge. We then carried this osteotomy forward along the external oblique ridge all the way to the mental foramen. Once we reached the mental foramen, we took care to protect the nerve. The osteotomy was then brought vertically from below the mental foramen carried up in bicortical fashion just at the mental foramen. Osteotomes were then used to further separate these osteotomies and to initiate a sagittal split of the

mandible in this area using care. The mandible was then sagittally split up to the level of the mental foramen

Using a surgical guide, a jig was placed along the external oblique ridge and the line created from the jig was then marked with a pencil. This line was then used to create an osteoplasty of the inferior border of the mandible area at the area of the angle of the mid body region. This bone was removed and then saved. We extended this osteoplasty to the area marked on the surgical guide. Once the osteoplasty was achieved, all sharp bony edges were smoothed and the inferior alveolar nerve was checked for viability and protected. At this point, the sagittal split on the right side was completed as well as the inferior border osteoplasty. We then turned our attention to the left side.

A similar incision on the left side was carried out in order to expose the ascending ramus as well as the lateral and medial portion of the ramus on the left side of the mandible. This incision was carried in a full-thickness mucoperiosteal fashion extending from the occlusive plane going anteriorly to the level of the first molar. A periosteal elevator was tunneled to expose the mental nerve and protect it superiorly while the mucosal incision was completed to connect the inferior, anterior mandibular incision through the posterior on the left side. Dissection was then carried out to expose the medial portion of the ascending ramus to the level of the lingula. Lingula was identified using a nerve hook. Seldin retractor was placed posteriorly to protect the inferior alveolar nerve at the entry of the lingula.

A reciprocating saw was then used to create an osteotomy that extended 22 mm posteriorly from the ascending portion of the ramus. This osteotomy saw was then used to extend the osteotomy vertically anteriorly and down the ascending portion of the ramus and then laterally on the external oblique ridge to the level of the first molar. A vertical osteotomy was then carried inferiorly down to the level of the first molar. The inferior border osteotomy was then confirmed using osteotomes as well as the other portion of the osteotomy. A fiberglass handled osteotome was then used to complete the sagittal splits. Left side of the mandible was then sagittal split completely with the inferior alveolar nerve totally within the bony portion of the distal segment. This then completed the bilateral sagittal split of the osteotomy of the mandible. All bony edges were smoothed with bone file and was irrigated with normal saline numerous times and suctioned. Of note, we did place a throat pack in the posterior oropharynx at the beginning of our incision. At this point, the bilateral sagittal split osteotomies were completed.

Using the genioplasty jig for the computer modeling program, a jig was placed and a pencil was used to mark the planned osteotomy sites. This was then completed using a reciprocating saw in a bicortical manner to remove the anterior-inferior border of the mandible. A wedge of bone was resected from the left side of the genioplasty area. The bone was then placed in saline and saved for future grafting. At this point, we then used an intermediate splint provided by medical surgical modeling company. This was then used to stabilize the cut mandible to the maxilla. Once the splint was placed and the mandible and maxilla were wired together, we then proceeded to plate the mandible. 1 mm plates were then used to fixate the BSSO portion of the left side using 5-mm monocortical screws for a total of 6 screws that were placed on that side. We then used a 1.5 mm plate to stabilize the large sagittal split osteotomy site on the right side of the mandible using 4 screws. We then fixated the genioplasty segment using the prefabricated jig, using plates and screws as well. At this point, this concluded our sagittal split osteotomy, genioplasty, inferior border osteoplasty. The mandible appeared to be symmetric at this time.

The patient was released from IMF and the splint was set aside. A bone graft was placed into the osteotomy sites, sagittal osteotomies on both the right and left side. The mentalis muscle was resuspended using 3-0 polyglactin 910 and the mucosa was closed using 3-0 chromic suture to close the mandibular vestibular incision in a running fashion. Once the mandibular wounds were then closed, we turned our attention to the maxilla. Local anesthesia was infiltrated into the maxillary vestibule for a total of 6 mL of 4% lidocaine with 1:100,000 epinephrine.

A Keen incision was made in the maxillary vestibule from the first molar to first molar bilaterally 5-mm above the mucogingival junction extending in a full-thickness mucoperiosteal fashion along the maxillary vestibule. The dissection was then carried out to expose the anterior maxillary wall and the malar eminence and the infraorbital rim bilaterally. The piriform aperture was then also exposed as well as the anterior nasal spine. Dissection was also carried out posteriorly on both sides of the Le Fort incision to the area of the pterygomaxillary junction. A

submucosal dissection was then carried out along the nasal floor bilaterally along the piriform apertures as well as the lateral nasal walls as well. Dissection was carried posteriorly along the nasal floor to the area of the choana bilaterally.

A reciprocating saw was then used to create an osteotomy from the pterygomaxillary area extending anteriorly towards the piriform rim. This was followed by osteotome separation of the lateral nasal walls, as well as separation of the nasal septum from the maxilla and palate and bone posteriorly. Using fiber handle osteotomes, we then proceeded to separate the maxilla from the pterygoid plates using a curved osteotome. We separated the maxilla from the pterygoid plates bilaterally. One fracture was then down fractured and all bony edges were curetted with a rongeur. The osteotomy was optimized with an osteotome as needed and freed with a Seldin retractor. Descending palatine artery was identified bilaterally and protected. The maxilla was mobilized to seat passively into the new position of the mandible. Using a final surgical splint, the maxilla and mandible were held together and wired with the splint in place using 26-gauge wire.

Plates and screws were then used to fixate the maxilla in the seated position. Monocortical 4 mm self-tapping screws were used. We placed bone grafts into the left maxillary down fractured area due to a large osseous gap for correction. These grafts were secured using screws as well. The maxilla and mandible were noted to be in good relation with the midline correct.

A 2-0 chromic suture was placed into the fiber alveolar tissue of the lateral nasal areas bilaterally. This was then followed by V-Y mucosal closure of the upper lip mucosal incision site. We then placed midline closing sutures of 3-0 chromic in the upper lip incision area mucosal site followed by running 3-0 chromic as closure of the maxillary vestibular Le Fort incisions bilaterally. At this point, all mucosal wounds were closed. Mouth was irrigated numerous times and suctioned. Throat pack was removed. The patient was extubated in the operating room without complications and taken to PACU in stable condition with stable vital signs.

**Notes:**

## 21) Genioplasty

### a. Indications for Treatment

1. Correction of horizontal microgenia
2. Significant microgenia
3. Isolated chin excess
4. Isolated vertical excess
5. Horizontal or vertical deficiency
6. Alloplastic augmentation

### b. Complications of Treatment

1. Wound dehiscence and infection
2. Hematoma
3. Tooth devitalization
4. Neurosensory loss
5. Soft tissue chin ptosis
6. Root exposures
7. Asymmetry
8. Step deformities

### c. Key Steps in Treatment

1. Evert lower lip to expose gingivo-labial sulcus
2. Infiltrate local anesthesia
3. Incision made from canine to canine leaving a 1 cm cuff of mucosa beyond the gingivo-mucosal junction
4. Subperiosteal dissection to expose both mental foramina and lower border of mandible
5. Leave soft tissue pedicle for long term viability
6. Mark midline with drill by making groove w/ fissure bur
7. Curvilinear horizontal osteotomy - begin lower border as posterior as possible, passing 6 mm below the mental foramen
8. Proceed across midline below tooth roots to the lower border of opposite side
9. Position free segment as desired (sliding, pushback, sideways, etc.)
10. Fixate segments with miniplates bent to shape with a bicortical anti-rotational screw
11. Palpate lower border of mandible and remove step deformities with burr
12. Close mentalis
13. Close mucosa
14. Chin support dressing

## GENIOPLASTY

### PREOPERATIVE DIAGNOSIS

1. Microgenia (ICD M26.06)

### POSTOPERATIVE DIAGNOSIS

1. Microgenia (ICD M26.06)

### PROCEDURE PERFORMED

1. Genioplasty (CPT 21121)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Upon verification of tube placement and inflation of the cuff, the tube was secured with silk tape. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. Eye lubricant was placed bilaterally in the eyes and protective goggles/occlusive dressing were placed over the patient's eyes.

The patient was then prepped and draped in the standard sterile fashion. Lidocaine 2%, 0.5 mL, with 1: 100,000 epinephrine was infiltrated into anterior mandibular vestibule. Ten minutes elapsed prior to the incision. A mucosal incision was made with electrocautery anterior to the depth of the vestibule. This incision was carried through the subcutaneous tissue and both bellies of the mentalis muscle, through periosteum and down to bone. The anterior and inferior aspect of the mandibular symphysis and parasymphysis region was exposed. The mental foramina were exposed bilaterally and the periosteum overlying the nerve was released to facilitate exposure. The midline was marked with a bur or sterile pencil. A cut was made horizontal to the occlusal plane below the mental foramina with a reciprocating saw under saline irrigation. Once the segment was detached from the adjacent bone it was repositioned anteriorly with the posterior attachments remaining intact. An 8 mm genioplasty advancement plate was positioned with the midline matching and screwed into place with bicortical screws. A drill was then used to place a positional anti-rotational screw in the genioplasty segment. All sites were thoroughly irrigated and the mentalis muscle was re-suspended with 3-0 polyglactin 910 sutures. The mucosa was closed with 4-0 chromic gut suture and a chin support dressing was secured. The patient tolerated the procedure well and the throat pack was removed. The patient was extubated in the operating room without complications and taken to PACU in stable condition with stable vital signs.

### Notes:

## 22) Surgically Assisted Rapid Palatal Expansion

### a. Indications for Treatment

1. A skeletal maxillomandibular transverse discrepancy greater than 5mm
2. Significant transverse maxillary deficiency associated with a narrow maxilla and a wide mandible
3. Failed orthodontic expansion
4. The need for a large amount (>7mm) of expansion

### b. Complications of Treatment

1. Hemorrhage
2. Devitalization of maxillary teeth
3. Pain
4. Dental tipping
5. Periodontal breakdown
6. Palatal tissue impingement
7. Post-orthodontic relapse

### c. Key Steps in Treatment

1. Injection of vasoconstrictor
2. Incision 3 to 5mm superior to the mucogingival junction
3. Subperiosteal dissection of anterior maxilla and zygoma
4. Submucosal dissection of nasal cavity
5. Bilateral maxillary osteotomy from the pyriform rim to the pterygomaxillary fissure
6. Release of the nasal septum
7. Midline palatal osteotomy extended interdentially between the maxillary incisors and from the nasal spine through the posterior nasal spine
8. Osteotomy of the anterior 1.5mm of the lateral nasal wall
9. Bilateral of the pterygoid plates
10. Activation of the appliance with a total widening of 1 to 1.5mm with evaluation for symmetric expansion
11. Soft tissue closure, including alar base cinch with non-resorbable suture and V-Y closure, to control the soft tissues of the nasal base and upper lip
12. Closure

**SARPE (SURGICALLY ASSISTED RAPID PALATAL EXPANSION)**

## PREOPERATIVE DIAGNOSIS

1. Maxillary hypoplasia (ICD M26.02)

## POSTOPERATIVE DIAGNOSIS

1. Maxillary hypoplasia (ICD M26.02)

## PROCEDURE PERFORMED

1. Surgically assisted rapid palatal expansion (CPT 21142 with modifier 52)

## PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

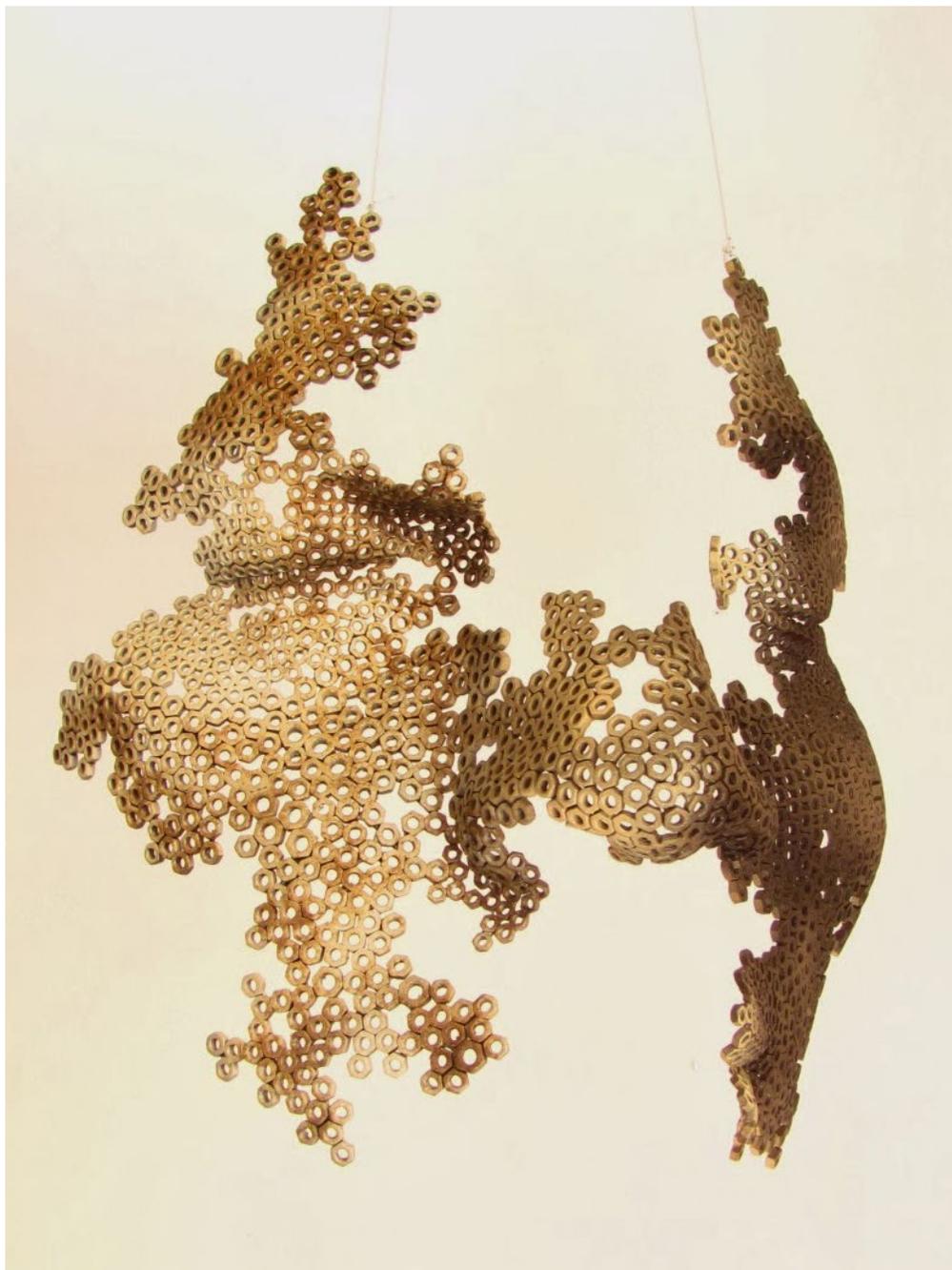
The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Upon verification of tube placement and inflation of the cuff, the tube was secured with silk tape. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. Eye lubricant was placed bilaterally in the eyes and protective goggles/occlusive dressing were placed over the patient's eyes.

The patient was then prepped and draped in the standard sterile fashion. A vestibular incision was made from premolar to premolar. The lateral and medial buttress of the maxilla was exposed and the dissection continued posteriorly to the pterygomaxillary fissure. Cottonoids were placed in these sites. The anterior nasal spine was dissected free from the septal cartilage and removed using a rongeur. The floor of the nasal mucosa was elevated and separated as well as the lateral nasal walls and septal mucosa attachments. Oxymetazoline soaked cottonoids were placed in the floor of the nose to aid in hemostasis.

Next, the interdental osteotomies were initiated. A reciprocating saw was used to make the LeFort I osteotomy bilaterally at a level more horizontal and superior than in a classic LeFort I osteotomy and a guarded osteotome was used to separate the septum from the palatine bone. Next, the palatine bone was evaluated for mobility and was scored using a reciprocating saw to complete separation of the palate. The palatal expander was applied and activated to demonstrate separation without significant resistance.

A thin suture was placed into the fiber alveolar tissue of the lateral nasal areas bilaterally extending submucosal to bring the two areas together. This was then followed by V-Y mucosal closure of the upper lip mucosal incision site. We then placed midline closing sutures of 3-0 chromic in the upper lip incision area mucosal site followed by running 3-0 chromic as closure of the maxillary vestibular Le Fort incisions bilaterally. At this point, all mucosal wounds were closed. Mouth was irrigated numerous times and suctioned. Throat pack was removed. The patient was extubated in the operating room without complications and taken to PACU in stable condition with stable vital signs.

**Notes:**



**SECTION V**  
**CRANIOFACIAL SURGERY**

## 23) Cleft Lip and Palate Cheiloplasty

### a. Indications for Treatment

1. Cleft lip

### b. Complications of Treatment

1. Infection and bleeding
2. Paresthesia of lips
3. Post-operative asymmetry
4. Contraction of lips

### c. Key Steps in Treatment

1. Vary depending on the indication
2. Make incision at or slightly behind the wet line of lip
3. Incision may involve more than mucosa depending on what bulk of tissue needs to be removed
4. Excise equal amount of vermilion tissue on each side of the wet line of lip
5. Over-resect to compensate to accommodate post op recoiling of lip
6. Re-establish white roll
7. Close incisions with resorbable sutures

## UNILATERAL CLEFT LIP AND PALATE SECONDARY CHEILOPLASTY

### PREOPERATIVE DIAGNOSIS

1. Unilateral cleft lip and palate (ICD Q37.1)

### POSTOPERATIVE DIAGNOSIS

1. Unilateral cleft lip and palate (ICD Q37.1)

### PROCEDURES

1. Secondary cheiloplasty (CPT 40702)
2. Nasal tip reconstruction (CPT 30460)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Upon verification of tube placement and inflation of the cuff, the tube was secured with silk tape. The patient's head was wrapped and care was taken to avoid compression of the ears bilaterally. Eye lubricant was placed bilaterally in the eyes and protective goggles/occlusive dressing were placed over the patient's eyes.

Upon the completion of the alveolar bone grafting and palatoplasty the patient was then repped having been injected again with 0.5% lidocaine 1: 100,000 epinephrine and pledgets and placed with oxymetazoline. The lip was marked creating the high point and low point of the philtral column and the white roll. After adequate time was allowed for hemostasis, throat pack was placed. The patient was sterilely draped and prepped in the usual fashion. A Rethi incision was connected to marginal incisions, exposing the lower lateral cartilages. The lower lateral cartilage on the cleft side was depressed and this was freed from its attachment all way down to the piriform aperture. Once this was freed it was then advanced on the lower lateral cartilage on the opposite side. In order to maintain the tip elevation a 1.5 mm absorbable plate was placed between the feet of medial crura and sutured in place using 4-0 poliglecaprone 25 and 4-0 plain suture. Interdomal and intradomal sutures were then used to recreate the tip. Wound was closed in layers using 5-0 chromic and 5-0 fast absorbing suture and sterile adhesive strips were applied. Attention was then directed to the lip. The lip was then recut in entirety through the muscle with an 11 blade creating a rotation flap and an advancement flap. The muscle was freed from the overlying skin and the underlying mucosa. The muscle and the advancement flap was also split in the middle. This allowed for the lowering of the white roll on the advancement flap side. Once this was done, the muscles were then sutured together using 4-0 polydioxanone suture. Gingivolabial sulcus was closed using 5-0 chromic. The nasal sill was closed using 5-0 chromic suture. The dry vermilion and white roll was closed using 5-0 fast absorbing suture. Dermabond was placed. Patient tolerated the procedure well and was sent to PACU in stable condition.

### Notes:

## 24) Palatoplasty

### a. Indications

1. Congenital cleft palate
2. Closure of oronasal communication
3. Creation of a dynamic soft palate with functions well for speech

### b. Complications

1. Fistula
2. Poor speech outcomes
3. Mid-facial growth impediment
4. Failure to achieve velar competence

### c. Key Steps

1. Creation of a flap of the vomerine mucosa on each side of the defect with undermining and advancement of the mucosa
2. Closure of the vomerine mucosa
3. Management of the mucosa of hard and soft palate
4. Creation of two bipediced mucoperiosteal flap with lateral releases
5. Combination of the flaps either with von Lagenbeck, Veau-Wardill-Kilner or Bardach two-flap palatoplasty

## UNILATERAL CLEFT LIP AND PALATE ALVEOLAR BONE GRAFT

### PREOPERATIVE DIAGNOSIS

1. Unilateral cleft of the lip and palate (ICD Q37.1)

### POSTOPERATIVE DIAGNOSIS

1. Unilateral cleft of the lip and palate (ICD Q37.1)

### PROCEDURE PERFORMED

1. Palatoplasty for repair of alveolar cleft with iliac crest bone graft (CPT 42210)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The patient was taken to the operating room and after satisfactory level of general anesthesia; she was prepared in the following manner. The endotracheal tube was wired to the mandibular 2nd molar using a 24-gauge wire loop. A throat pack was placed in the oropharynx and the mouth was prepared with chlorhexidine gluconate 0.12%. The surgical site was infiltrated with lidocaine 1% and 1:100,000 epinephrine. Also, using a nasal speculum, we infiltrated with local anesthesia around the nasal mucosa and the nose was packed with a single cottonoid soaked in 4% cocaine; approximately 1 mL of the solution was utilized. Afterwards, the patient's face and hip were prepped and draped.

Surgery began by harvesting bone from the left hip. The anterior superior iliac spine and the iliac crest were palpated and marked. An incision measuring about 3 cm in length was made one centimeter posterior to the iliac spine and one centimeter lateral to the iliac crest. The incision was made with a #15 blade. It was carried down through the fascial layers to the perichondrium of the ilium. A cartilaginous cap of the ilium was exposed. It was dissected into a medial and lateral half using a 15 blade. Two perpendicular releasing incisions were made at each end. We then reflected cartilaginous flaps, 1 lateral and 1 medially, exposing the cancellous bone of the ilium. Then, we utilized bone curettes to harvest the cancellous bone. Afterwards, we packed Avitene into the marrow cavity for hemostasis. Excellent hemostasis was achieved. We then closed the cartilaginous flaps and the fascia together using 2-0 Polyglactin 910. The remaining of the fascia was also closed with 2-0 Polyglactin 910. A pain pump pain catheter was placed into the wound. It was secured with an occlusive dressing. Scarpa's fascia was closed with 3-0 Polyglactin 910 on the dermis and the dermis was closed with 4-0 polyglactin 910. Surgical glue was placed over the wound, and at the exit site of the pain catheter. Attention then was directed to the oral cavity. An incision was made at the margin of the alveolar cleft buccally. A releasing incision was made in the minor segment. A gingival buccal incision was made in the minor segment and a gingivobuccal sulcus incision was made in the lateral and central incisor regions. Buccal and labial flaps were reflected around the alveolar cleft. The periosteum was scored to allow for a tension-free repair.

Intranasal dissection was then completed, separating the nasal mucosa from the lateral nasal wall and the nasal floor and the caudal aspect of the nasal septum. Two palatal flaps then were reflected on each side of the alveolar clefts. The palatal flaps were separated from the nasal flaps with scissors. Two palatal flaps were reflected cranially and sutured to each other, creating a new nasal floor.

The two palatal flaps were reflected caudally, were trimmed and sutured to each other creating a new hard palate. Afterwards, the wound was irrigated with antibiotic solution. A gelatin foam sponge was packed at the end of the

defect. The cancellous bone was morselized and packed into alveolar cleft and the buccal and labial flaps were approximated to each other and to the palatal mucosa, suturing them together with interrupted 4-0 Polyglactin 910 suture. An excellent repair was achieved. Good hemostasis was also achieved at the end of surgery. The patient tolerated the procedure well, was extubated in the OR and transferred to the PACU in stable condition.

**Notes:**

## BILATERAL CLEFT ALVEOLUS GRAFTING

### PREOPERATIVE DIAGNOSES

1. Bilateral cleft lip and palate with unrepaired alveolar cleft and large anterior fistula (ICD Q37.4)
2. Malposed teeth numbers D and 7 (ICD K00.6)

### POSTOPERATIVE DIAGNOSES

1. Bilateral cleft lip and palate with unrepaired alveolar cleft and large anterior fistula (ICD Q37.4)
2. Malposed teeth numbers D and 7 (ICD K00.6)

### PROCEDURES PERFORMED

1. Palatoplasty for repair of cleft alveolar processes, soft tissue only (CPT 42205)
2. Extraction of teeth D and 7 (CDT D7140) (CPT 41899)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The nasal mucosa was infiltrated with lidocaine 1% and 1:100,000 epinephrine. Two cottonoids were packed in the nose. The palatal expander was removed. The mouth was prepared with chlorhexidine gluconate and the teeth were brushed. Throat pack was placed in the oropharynx. The surgical site was infiltrated with lidocaine 1% and 1:100,000 epinephrine. The patient was prepped and draped; these included the face, the oral cavity, and the left hip.

The surgery began by making incisions on the left side. First, using a 15-blade, we made a marginal incision on the alveolar cleft margin on the posterior segment side. Then, we made a vertical releasing incision in the area of the first molar. A buccal gingival sulcus incision joined the first two incisions. A full-thickness mucoperiosteal flap was reflected. Then, we made a vertical incision on the cleft margin in the side of the premaxilla. Minimal palatal and labial dissections were completed enough just to expose the bone on the side of the alveolar cleft. The periosteum was then scored to allow for a tension-free repair completing a keyhole incision around the alveolar cleft. Then, we proceeded to perform an intranasal dissection separating the nasal mucosa from the lateral nasal wall, the nasal floor, and the caudal aspect of the septum. The palatal flap was also reflected around the alveolar cleft from right posterior segment. A minimal dissection was made on the hard palate of the premaxilla. The palatal mucosa was separated from the nasal mucosa, creating two nasal flaps and two palatal flaps. The two nasal flaps were reflected cranially and they were sutured to each other with interrupted 4-0 polyglactin 910 sutures. This resulted in a tension-free nasal repair. The two palatal flaps were reflected. The palatal flap in the right posterior segments was reflected backwards exposing the hard palate bone of the secondary palate. There was minimal dissection on the premaxillary side.

Afterwards we turned our attention to the left side. Because there was a large lateral dehiscence from the repair, there was concern with blood supply to the premaxilla. A buccal flap was not reflected and the palatal flap was at all times connected to the buccal gingiva to the interproximal dental papilla. The incision was made with a 15-blade at the margin of the alveolar cleft. An incision was carried down to bone. The limited subperiosteal dissection was made on the premaxillary side as well as on the posterior segment side and the palatal flaps were released and reflected with minimal reflection on the premaxillary side. The nasal mucosa was separated from the lateral nasal wall, the nasal floor, and the caudal aspect of the septum. The two nasal flaps were separated from the palatal mucosa, creating two palatal flaps and two nasal flaps. The two nasal flaps were reflected cranially and they were sutured to each other with interrupted 4-0 polyglactin 910 sutures. The two palatal flaps then were also reflected and sutured; before suturing the hard palate of the secondary palate to the premaxilla we repaired the lateral fistula

with horizontal mattress sutures. At this point, tooth #7 was removed at the palatal position that prevented repair of the alveolus. Tooth D was at the margin of the premaxilla was also carious and it was also removed. Finally, we placed horizontal mattress sutures between the palatal mucosa and the premaxilla and the palatal flaps of the posterior segment creating a tension-free repair. After this repair, we noticed a slight congestion of the distal aspect of the right palatal flap; thus, both we decided not to place the bone graft. At this point, we irrigated the wounds with antibiotic solution. The two buccal flaps were sutured to each other and to the palatal mucosa, creating a watertight tension-free repair. At the end of surgery, the cottonoids and throat pack were removed. All the sponge counts were correct. An orogastric tube was placed and the stomach was suctioned. The patient tolerated the procedure well, was extubated in the OR and transferred to the PACU in stable condition.

**Notes:**

## 25) Cleft Distraction Osteogenesis

### a. Indications for Treatment

1. Severe maxillary deficiency secondary to orofacial clefts
2. Unilateral or bilateral cleft lip and palate
3. Horizontal maxillary advancement in excess of 8 mm
4. Airway obstruction and sleep apnea

### b. Complications of Treatment

1. Infection and bleeding
2. Dental injury
3. Avascular necrosis
4. Device failure
5. Facial scarring
6. Damage to nerves

### c. Key Steps in Treatment

1. Prepare customized orthodontic splint
2. Insert and cement intraoral splint to first permanent or second primary molars
3. Le Fort 1 osteotomy
4. The height of the transverse osteotomy varies depending on chronological age/dental age of patient
5. Transitional dentition
  - a. A high transverse osteotomy just below level of infraorbital rim circumvents infraorbital nerve and all permanent tooth buds
6. Mobilize maxillary segment including pterygomaxillary and septal disjunction
7. No internal fixation or grafting performed
8. Soft tissue closure in layers
9. If rigid external fixation, place halo of extraoral device immediately after closure
10. Distraction 1 mm a day
11. After distraction period, external device kept in place 3-4 weeks for rigid fixation
12. Night time face mask elastics for 4-6 weeks followed
13. If external face mask utilized, a 4-5-day latency period performed before activation of device

## MAXILLARY DISTRACTION OSTEOGENESIS

### PREOPERATIVE DIAGNOSES

1. Severe maxillary hypoplasia (ICD M26.02)
2. History of bilateral cleft lip and palate (ICD Q37.8)

### POSTOPERATIVE DIAGNOSES

1. Severe maxillary hypoplasia (ICD M26.02)
2. History of bilateral cleft lip and palate (ICD Q37.8)

### PROCEDURES PERFORMED

1. Le Fort I osteotomy, one piece, no graft (CPT 21141)
2. Installation of internal maxillary distraction device in the right maxilla (CPT 21110)
3. Installation of internal maxillary distraction device in the left maxilla (CPT 21110)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The nose was packed with 4 cottonoids soaked in 4% cocaine. A throat pack was placed in the oropharynx. The mouth was prepared with chlorhexidine gluconate 0.12%. The patient was prepped and draped in sterile manner. The maxillary vestibule was infiltrated with lidocaine 1% and 100,000 epinephrine.

Due to a bilateral cleft lip and palate, two separate incisions were made: one on the right maxilla and one on the left. A Bovie electrocautery was used to make the incision on the right into the posterior segment posterior to the premaxilla. An incision was made in the buccal vestibule extending from anterior at the end of the premaxilla and posteriorly to the zygomatic buttress. A similar incision was made on the contralateral side. Then, a periosteal elevator was used to develop a subperiosteal plane in the maxilla, exposing the anterior maxilla and the tuberosity. Tissue was tunneled underneath the labial mucosa exposing the anterior nasal spine and anterior aspect of the premaxilla. Intranasal dissection was then completed to separate the nasal mucosa from the lateral nasal wall, nasal floor, and the caudal aspect of the septum. An ultrasonic handpiece was utilized to osteotomize the septum. The LeFort I osteotomy was marked with a pencil. Following the same outline as it was done on the stereolithography model, the LeFort I osteotomy was completed with the ultrasonic handpiece. Lateral nasal walls were osteotomized with single-guarded osteotomes. The pterygomaxillary junctions were osteotomized with a slightly curved Epker chisel. The maxilla was mobilized. Hemostasis was achieved.

In the next step, we placed the intermediate splint between the maxilla and mandible and put 4 wire loops to place the patient in maxillomandibular fixation. We then rotated the maxillomandibular complex until the vertical distance between a K-wire that had been placed in the nasal bones to the anterior teeth was 1 mm longer than before. The prebended distractor was installed on the right side, placing it in its corresponding holes that had been drilled into the lateral aspect of the intermediate splint. It was installed aligning the superior part to the zygomatic arch and zygomatic buttress. At the correct vertical dimension, 3 holes were drilled into the superior plate placing one screw for temporary stabilization. We then performed the same maneuver on the contralateral side. We then removed the right device and changed the inferior arm through the bone carrying arm. Then we placed the device back into the oral cavity reinstalling it into the midface holes. This aligned the inferior plate to the maxilla.

The splint was wired to each one of the maxillary teeth with 28-gauge wires. The devices were replaced into the

wound. We installed the right and then the left. We placed the screws in the mid face (zygomatic arch and zygomatic buttress) and then inferiorly on the splint. 4 mm and 6-mm long screws were utilized for this purpose. We found excellent purchase of bone in the zygoma and inferiorly excellent purchase into the splint. At the end, we tested the construct by advancing the maxilla 5 mm forward. We saw excellent distraction without any interference. Therefore, we set the maxilla back to its original position, irrigated the wound with antibiotic solution, closed the wounds with interrupted 3-0 chromic sutures and then placed the silicone covers over the activating arms of the distractor. The cottonoids were removed and counted. The count was correct. The throat pack was removed also. The patient was extubated and transferred to recovery room.

**Notes:**



**SECTION VI**  
**HEAD AND NECK PATHOLOGY SURGERY**

## 26) Ameloblastoma Resection

### a. Indications for Treatment

1. Pain
2. Malocclusion
3. Swelling
4. Tumor

### b. Complications of Treatment

1. Facial deformity
2. Hemorrhage
3. Neurosensory disturbance
4. Fistula
5. Recurrence
6. Jaw fracture
7. Jaw dislocation

### c. Key Steps in Treatment

1. Transcervical approach vs. intraoral approach
2. Contour and pre-drill reconstruction plate to establish previous occlusion in dentate patient
3. Segmental cuts at least 1 cm from involved bone using sagittal saw
4. Soft tissue cuts completed and segment delivered
5. Initiate reconstruction
6. Closure

**AMELOBLASTOMA RESECTION AND RECONSTRUCTION**

## PREOPERATIVE DIAGNOSES

1. Right mandibular ameloblastoma (ICD D16.5)
2. Morbid obesity due to excess calories (ICD E66.01)

## POSTOPERATIVE DIAGNOSES

1. Right mandibular ameloblastoma (ICD D16.5)
2. Morbid obesity due to excess calories (ICD E66.01)

## PROCEDURES PERFORMED

1. Resection of right mandible (CPT 21047)
2. Joint reconstruction (CPT 21243)

## PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The neck was marked with skin marker, identifying the angle of the mandible, the location of the tumor, the skin crease for incision and end points of incision and the sternocleidomastoid muscle. At this point 1% lidocaine, 1:100,000 episodes, 4 cc were administered along the incision line. Incision was made through skin and subcutaneous tissues to adipose. Neck was dissected by layers using hemostats, nerve stimulator, and ultrasonic instrument. The marginal mandibular branch was identified as being abnormally low, approximately 3 cm from the inferior border of the mandible.

Dissected at the level of the submandibular gland, entered the capsule of the submandibular gland, and then proceeded superiorly towards the inferior border of the mandible on top of the gland, dissected until we had reached the inferior border of the mandible. Using Bovie electrocautery along the inferior border of the mandible to separate the periosteum and pterygomasseteric sling, dissected the medial surface up to the front of the mandible and then over the tumor. There were small perforations noted on the buccal aspect of the cortex of the mandible.

Soft tissue was left overlying the mandible and remained with the specimen. Tissue was dissected along the lateral aspect of the ramus, including sigmoid notch. An Obwegeser retractor was placed in sigmoid notch to help retract. All attachments to the coronoid processes were removed.

Next, an incision was made along sulcus from the distal buccal of the second molar, extending posterior, and then cutting lateral in distal wedge shape. Subperiosteal dissection up to the lateral surface of mandible was performed. At the level of the premolar, the incision coursed apically and then curvilinear, advanced anteriorly just past midline to the contralateral canine. Bovie electrocautery was used to divide the mentalis. Once the soft tissue envelope was released, a right mandibular premolar was removed with an Ash forceps.

The resection guide was secured to the mandible and a malleable was placed lingually to protect the soft tissues. Under normal saline irrigation using the guide premeasured to the margin, the mandible was sectioned with a reciprocating saw. At this point the proximal segment of the mandible was held with a Dingman clamp to help positioning, and dissection was continued on the lingual surface posteriorly, separating all muscle attachments. Electrocautery was used minimally to separate any tenuous fibers. Eventually only the TMJ capsule attachments were present. These were dissected and the entire section specimen was removed, while leaving the

articular disc and all attachments present in the glenoid fossa. X-rays were taken of the specimen which demonstrated good radiographic margins. The specimen was then sent for gross pathology. Frozen specimens were taken from medial epicondyle and buccal to and lateral to the tumor over sites suspicious for perforation. All sites were negative except for medial condyle, which was questionable due to artifact. A subsequent sample taken from the same site was found to be negative. At this time, the site was irrigated. The remaining bony margins were smoothed with a reciprocating rasp. Arch bars were placed on the maxillary and mandibular teeth. At this point a prefabricated reconstruction plate with the condylar head attached was placed into the defect.

The condylar head was attached with 2 screws and plates to the reconstruction plate, and plate was secured to the anterior mandible with good contouring. At this point, using a drill guide, all holes were drilled and the screws were affixed using bicortical drilling and multiple screws. Occlusion was checked with opening and closing, and found to be in good position. At this point, wounds were closed intraorally. There were 2 small perforations on the lingual tissues that were closed with 3-0 chromic, and the previous biopsy site on the lateral buccal mucosa was excised in an elliptical fashion and submitted as specimen as well with margins. That site was also closed with 3-0 chromic gut suture, and the entire length of the mucosal incision was closed after suspending the mentalis and the periosteum which had previously been in intimate contact with the inferior border of the mandible to the reconstruction plate at site 28, and the mentalis was resuspended with 3-0 polyglactin 910. Attention was turned to the neck. A 7.0 flat drain was placed using a trocar incision and secured with 3-0 silk suture.

The pterygomasseteric sling was reattached using 3-0 polyglactin 910. At this point the platysma was closed with 3-0 polyglactin 910, and subcutaneous sutures with 3-0 polyglactin 910, and finally the skin was closed with 5-0 interrupted polypropylene. A drain was placed to bulb suction and was found to be watertight. Bacitracin was placed over the neck wound, along with non-stick covering and tape for dressing. Foam tape was placed on the chest to secure the drain. The patient was placed in heavy elastics. A facio-plasty dressing was placed over the jaw. The patient was extubated in the OR and transferred to the PACU in stable condition.

**Notes:**

## 27) Keratocystic Odontogenic Tumor Enucleation

### a. Indications for Treatment

1. Functional disturbance
2. Cosmetic disturbance
3. Altered sensation
4. Pathology

### b. Complications of Treatment

1. Recurrence
2. Facial deformity
3. Dehiscence
4. Infection

### c. Key Steps in Treatment

1. Incision
2. Full thickness mucoperiosteal flap
3. Aspirate
4. Removal of overlying bone
5. Removal of associated tooth and lesion taking care not to disrupt the cystic wall
6. Curette the site +/- Carnoy's/laser/liquid nitrogen
7. Irrigate
8. Closure of mucosa
9. Send to pathology

## KERATOCYSTIC ODONTOGENIC TUMOR DECOMPRESSION

### PREOPERATIVE DIAGNOSIS

1. Right mandibular ramus/angle keratocystic odontogenic tumor (ICD D16.5)

### POSTOPERATIVE DIAGNOSIS

1. Right mandibular ramus/angle keratocystic odontogenic tumor (ICD D16.5)

### PROCEDURES PERFORMED

1. Marsupialization of the lesion of the keratocystic odontogenic tumor (CPT 40801)

### PROCEDURE DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

Attention was directed to the right mandible. A Bovie electrocautery was used to make an incision through mucosa down to the anterior border of the mandibular ramus in a subperiosteal plane. The subperiosteal plane was reflected both laterally and medially. Of note on the medial side of the ramus, there was noted to be a perforation through bone; although the cyst lining did not appear to be attached to the soft tissue. An osteotomy was made with a 702 bur which extended the previously made osteotomy for the extraction. Once this was completed, a portion of the anterior portion of the cyst was curetted out and sent for pathological review for final diagnosis as well. Keratinaceous fluid inside the cyst was flushed out, after which a pediatric nasal trumpet was inserted into the cyst. This was wired to the mandibular molar with a 26-gauge wire, and the previously made incision was sutured with 3-0 chromic gut suture. We flushed the drain with approximately 200 mL of irrigant. At this point in time, the oral cavity was suctioned. The throat pack was removed. The patient was turned back over to the anesthesia team who extubated the patient in the operating room and took the patient to the PACU in good condition.

### Notes:

## 28) Dentigerous Cyst Enucleation

### a. Indications for Treatment

1. Pathology
2. Tooth displacement
3. Jaw swelling

### b. Complications of Treatment

1. Recurrence
2. Neurosensory disturbance
3. Jaw fracture
4. Infection

### c. Key Steps in Treatment

1. Incision
2. Full thickness mucoperiosteal flap
3. Aspirate
4. Removal of overlying bone
5. Removal of associated tooth and lesion taking care not to disrupt the cystic wall
6. Curette the site
7. Irrigate
8. Closure of mucosa
9. Send for pathology



## DENTIGEROUS CYST EXCISION

### PREOPERATIVE DIAGNOSIS

1. Dentigerous cyst associated with impacted tooth #17 (ICD K09.0)

### POSTOPERATIVE DIAGNOSIS

1. Dentigerous cyst associated with impacted tooth #17 (ICD K09.0)

### PROCEDURES PERFORMED

1. Excision of dentigerous cyst (CPT 21040)
2. Extraction of tooth #17 (CDT D7240) or (CPT 41899)

### PROCEDURE DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

Attention was first directed to the left mandible where a distobuccal releasing incision was made from the posterior lateral aspect of tooth #18. The incision was carried superiorly to the anterior border of the ramus exposing the entire lateral aspect of the mandible. An egg shaped bur was used to decorticate the lateral aspect of the mandible exposing the superficial aspects of the cyst lining. A curette was used to remove the cyst lining from the wall of the cavity down to the cemento enamel junction of the impacted tooth. A 702 bur under irrigated was used to create a buccal trough around the impacted tooth #17 which was then luxated and extracted. The cavity was irrigated thoroughly and cyst lining remnants were removed and small invaginations were smoothed with an egg shaped bur to remove entrapped lining. The patient tolerated the procedure well and the cyst and impacted tooth were removed in their entirety.

### Notes:

## 29) Odontoma Excision

### a. Indications for Treatment

1. Symptoms of pain swelling, malocclusion, obstruction
2. Pathology

### b. Complications of Treatment

1. Damage to adjacent teeth
2. Neurosensory disturbance
3. Recurrence
4. Jaw fracture

### c. Key Steps in Treatment

1. Incision
2. Full thickness mucoperiosteal flap
3. Remove of overlying bone
4. Enucleation and curettage
5. Irrigate
6. Closure
7. Send for pathology

## ODONTOMA EXCISION

### PREOPERATIVE DIAGNOSIS

1. Complex odontoma left mandible (ICD D16.5)

### POSTOPERATIVE DIAGNOSIS

1. Complex odontoma left mandible (ICD D16.5)

### PROCEDURES PERFORMED

1. Excision of complex odontoma (CPT 21048)

### PROCEDURE DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

Attention was first directed to the right mandible where an incision was made lateral to the external oblique line. The incision was carried superiorly to the anterior border of the ramus exposing the entire lateral aspect of the mandible and through the buccinators and periosteum.

A football bur was used to decorticate the lateral aspect of the mandible exposing the superficial aspects of the odontoma. A 702 bur was then used to begin the process of unroofing and sectioning the mass. This was continued until the entire lesion was excised and no additional tooth-like structures remained. The patient tolerated the procedure well and the odontoma was removed in its entirety. The patient was extubated in the OR and transferred to the PACU in stable condition.

### Notes:

## 30) Mucocele Excision

### a. Indications for Treatment

1. Mucocele recurrence
2. Failure of mucocele marsupialization

### b. Complications of Treatment

1. Recurrence of mucocele
2. Bleeding
3. Damage to adjacent structure

### c. Key Steps

1. Epithelial incision
2. Enucleation of mucocele by detaching it from its surrounding soft tissue
3. Removal of adjacent enlarged or involved minor salivary glands
4. Closure

## MUCOCELE EXCISION

### PREOPERATIVE DIAGNOSIS

1. Mucocele of lower lip (ICD K13.0)

### POSTOPERATIVE DIAGNOSIS

1. Mucocele of lower lip (ICD K13.0)

### PROCEDURE PERFORMED

1. Excision of mucocele of lower lip (CPT 40812)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

After sound anesthesia was obtained a 15 blade was used to make an elliptical incision around the lesion. The incision was placed to avoid perforation of the entrapped liquid. Next a hemostat was used to dissect the surrounding tissue delivering the mucocele in its entirety with associated inflamed salivary glands. The mucocele and glands were sent for histopathological analysis. Additional dissection revealed 3-4 additional associated minor salivary glands which were then also sent for histopathological analysis. The site was made hemostatic and closed with 4-0 chromic gut sutures. The patient tolerated the procedure well.

### Notes:

## 31) Submandibular Gland Excision

### a. Indications for Treatment

1. Sialolithiasis
2. Sialoadenosis

### b. Complications of Treatment

1. Hemorrhage
2. Damage to lingual nerve
3. Damage to hypoglossal nerve
4. Damage to marginal mandibular branch of the facial nerve
5. Fistula

### c. Key Steps in Treatment

1. Marking the incision
2. Injection of vasoconstrictor
3. Incision 1.5-2.0 cm inferior to the inferior mandibular border anterior to the mandibular notch
4. Incising the platysma muscle
5. Incision through the superficial layer of the deep cervical fascia
6. Exposure of the gland, the facial vein and artery
7. Ligature of vessels and electrocauterization
8. Submandibular gland excision
9. Closure

## SUBMANDIBULAR GLAND EXCISION

### PREOPERATIVE DIAGNOSES

1. Right submandibular sialolith (ICD K11.5)
2. Right submandibular sialadenitis (ICD K11.2)

### POSTOPERATIVE DIAGNOSES

1. Right submandibular sialolith (ICD K11.5)
2. Right submandibular sialadenitis (ICD K11.2)

### PROCEDURES PERFORMED

2. Excision of right submandibular gland (CPT 42440)
3. Removal of sialolith (CPT 42330)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

A throat pack was placed and the oral cavity was cleansed with a 0.12% chlorhexidine gluconate solution. Subsequently, the patient was prepped and draped in the standard sterile fashion. 2 mL of 2% lidocaine with 1:100,000 epinephrine was used to obtain local anesthesia and aid in hemostasis in a resting skin tension line of the right neck. A nerve stimulator was tested and inserted near the right mastoid process.

A 3 cm incision was made using a 15 blade in the right neck through skin, subcutaneous tissue until the platysma was exposed. A linear incision was made through the platysma and superficial layer of the deep cervical fascia. Blunt dissection continued using the nerve stimulator and ultrasonic instrument until the facial vein was identified. The vessel was exposed in its entirety, clamped, ligated and divided. The vein was retracted superiorly, protecting the marginal mandibular branch of the facial nerve which had been identified with the nerve stimulator and marked. Dissection continued circumferentially around the submandibular gland releasing it from the surrounding fascia while retracting it using a Babcock. The lingual nerve, submandibular ganglion and submandibular duct were identified medially. The ganglion was incised free from the gland and the nerve was retracted superior and posterior. At this time, the Fogarty serial dilators were used to cannulate the submandibular duct intraorally while palpating transcervically to appreciate the junction between the gland and the submandibular duct. A sialolith was removed from the duct. The duct was incised free from the gland which was removed in its entirety and the duct was flushed with 100 cc of saline and bacitracin irrigation. The wound was irrigated thoroughly with 500 cc of saline and bacitracin and a 7 JP flat drain was placed. 3-0 polyglactin 910 sutures were used to close the platysma and a 6-0 running polypropylene was used to close the superficial layer. Bacitracin was placed over the incision site and a coverlet was placed as a dressing. The oropharynx and gastric contents were suctioned.

At the conclusion of the procedure, all sponge counts were verified. The patient was extubated in the operating theater without complication and transferred to the PACU in stable condition. The patient tolerated the procedure well.

### Notes:

## 32) Sialoendoscopy

### a. Indications for Treatment

1. Non-neoplastic disorders
2. Sialolithiasis
3. Diagnostic evaluation of recurrent swelling of the major salivary glands
4. Ductal stenosis
5. Intraductal masses
6. Radioiodine-induced sialadenitis
7. Recurrent sialadenitis
8. Sjogren syndrome

### b. Complications of Treatment

1. Duct wall perforation
2. Basket entrapment/device failure
3. Infection
4. Ranula
5. Temporary lingual nerve paresthesia
6. Duct avulsion
7. Ductal stenosis

### c. Key Steps in Treatment

1. Cannulation of papilla
2. Peripheral injection of local anesthetic
3. Dilation of salivary duct
4. Introduction of sialoendoscope
5. Use of the working channel

## SIALOENDOSCOPY

### PREOPERATIVE DIAGNOSIS

1. Left parotid sialadenitis (ICD K11.2)<sup>23</sup>
2. Sialolithiasis (ICD K11.5)

### POSTOPERATIVE DIAGNOSIS

1. Left parotid sialadenitis (ICD K11.2)
2. Sialolithiasis (ICD K11.5)

### PROCEDURES PERFORMED

1. Sialoendoscopy of left parotid gland (CPT 70390)
2. Dilation and catheterization of the salivary duct with or without injection (CPT 42660)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

Throat pack identified with a silk suture was placed. The oral cavity was cleaned with chlorhexidine gluconate 0.12% and toothbrush, thoroughly suctioned. The patient was then prepped and draped in a normal fashion. Karl Storz sialoendoscope was tested and white balanced. At this point, a bite block was placed in the right side, and a Weider retractor was placed for traction. Stenson's duct was cannulated with a progressive series of dilators, gently dilating. Once we reached a size 2 dilator, the 1.3 mm Karl Storz sialoendoscope was inserted. Once it was inserted, we followed the canal using light pressure from a saline syringe attached. The other port was capped, and scope was advanced to the bifurcation. Noted 1 canal appeared to be obstructed. Attempted to clear other branch using barbed wire and the wire baskets. No stone was retrieved or noted. Scope and wires were removed. 40mg of triamcinolone was injected. A 20 gauge angiocatheter was then placed and secured with 3-0 silk sutures x4. The patient had oropharynx thoroughly suctioned. A throat pack was removed. The patient was turned over to anesthesia, was awakened uneventfully and extubated.

### Notes:

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<sup>23</sup> It is important to note whether the sialadenitis is acute, chronic or recurrent.

### 33) Sialodochoplasty/Sialolithotomy

**a. Indications for Treatment**

1. Non-neoplastic disorders
2. Neoplastic disorders
3. Floor of mouth resection
4. Sialolithiasis

**b. Complications of Treatment**

1. Infection
2. Ranula
3. Temporary lingual nerve paresthesia
4. Duct avulsion
5. Ductal stenosis
6. Migration or loss of stent

**c. Key Steps in Treatment**

1. Cannulation of papilla
2. Peripheral injection of local anesthetic
3. Dilatation of salivary duct
4. Incision of duct 1 cm posteriorly
5. Retrieval of stone, resection of lesion
6. Securing of stent/ suturing of duct orifice to surrounding mucosa

## SIALOLITHOTOMY/SIALODOCHOPLASTY

### PREOPERATIVE DIAGNOSIS

1. Left submandibular sialolithiasis (ICD K11.5)
2. Left submandibular sialadenosis (ICD K11.2)

### POSTOPERATIVE DIAGNOSIS

1. Left submandibular sialolithiasis (ICD K11.5)
2. Left submandibular sialadenosis (ICD K11.2)

### PROCEDURE PERFORMED

1. Sialolithotomy (CPT 42335)
2. Sialodochoplasty, Primary/Simple (CPT 42505)<sup>24</sup>

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

A throat pack was placed. Subsequently, the patient was prepped and draped in the standard sterile fashion. 2 mL of 2% lidocaine with 1:100,000 epinephrine was used to obtain local anesthesia and aid in hemostasis.

Attention was first directed to the left submandibular duct where serial dilators were used to expand the opening of Wharton's duct. A 15 blade was then used to incise the duct performing the sialolithotomy. Several small 2-3mm stones were removed from the duct with purulence. The larger ~6mm was not visualized but was palpable. There was extensive fibrosis and inflammation of the submandibular duct and surrounding tissues which blocked removal of the larger stone. The incision was extended posteriorly and the stone was removed with a hemostat. A 20 gauge angiocatheter was then inserted into the left submandibular duct and was sutured in place using a 3-0 silk suture. Wounds were hemostatic; the floor of mouth was soft without evidence of swelling or hematoma.

At the conclusion of the procedure, all sponge counts were verified. The patient was extubated in the operating theater without complication and transferred to the PACU in stable condition. The patient tolerated the procedure well.

### Notes:

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<sup>24</sup> Secondary/Complicated Code is 42505

## 34) Selective Neck Dissection

### a. Indications for Treatment

1. Oral cavity squamous cell carcinoma
  - a. Drainage pattern: Level I – III/IV
  - b. Clinically negative nodal disease
    - i. 15%-20% chance of occult metastases
    - ii. Tumor thickness > 2mm
2. Bilateral selective neck dissection
  - a. Midline lesions
3. Supraomohyoid neck dissection
  - a. Oral cavity carcinoma with N0 neck
  - b. T2-T4 N0 or moveable N1 in levels I or II
4. Posterolateral neck dissection
  - a. Cutaneous malignancies, melanoma, and soft tissue carcinomas of the scalp and neck
5. Lateral neck dissection
  - a. N0 carcinomas of the oropharynx, hypopharynx, supraglottic
6. Anterior neck dissection
  - a. Subglottic, parathyroid, laryngeal and selected thyroid carcinoma

### b. Complications of Treatment

1. Nerve Injury (CN V, VII, XI, XII, G. auricular n.)
2. Seroma
3. Chyle leak
4. Air embolism due to injury to the IJV
5. Hemorrhage
6. Lymphedema
7. Hypertrophic scar
8. Dysphagia

### c. Key Steps in Treatment

#### Selective Neck dissection I – III

1. Incision (skin, subcutaneous tissue, platysma)
2. Raise subplatysmal flap
  - a. Superiorly to level of the inferior border of mandible
  - b. Inferiorly to the clavicle
3. Identification of landmarks to delineate boundaries of neck dissection
  - a. Sternocleidomastoid m.
  - b. Spinal Accessory n.
  - c. Cervical rootlets
  - d. Omohyoid m.
  - e. Posterior belly of digastric m.
  - f. Internal jugular v.
  - g. Anterior belly of digastric m.
4. Identify structures to be preserved
  - a. Spinal accessory n.
  - b. Marginal mandibular n.
  - c. Lingual n.
  - d. Hypoglossal n.
5. Mobilization of fibrofatty adipose tissue in a subfascial plane

6. Irrigate, confirm hemostasis, consider Valsalva maneuver
7. Place drains subplatysmal plane
8. Layered closure

## SELECTIVE NECK DISSECTION

### PREOPERATIVE DIAGNOSIS

1. Squamous cell carcinoma, right lateral border of the tongue, cT1N0, Stage I (ICD C02.1)

### POSTOPERATIVE DIAGNOSIS

1. Squamous cell carcinoma, right lateral border of the tongue, cT1N0, Stage I (ICD C02.1)

### PROCEDURES PERFORMED

1. Right tongue partial glossectomy with unilateral radical neck dissection (CPT 41135)
2. Alternative for neck dissection: Modified radical neck dissection (CPT 38724)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. The head and neck was prepped and draped in the usual manner, exposing the face, and neck following the stabilization of the nasal endotracheal tube. All pressure points were padded, and appropriate monitors were placed. Next the attention was directed toward the right selective neck dissection I - IV. A natural skin crease was selected extending from the mastoid tip to cricoid region. Epinephrine 1:50,000 solutions was administered along the planned incision in an intradermal fashion. Approx. 5 cc was administered. Skin was incised with a No 10 blade to the level of the platysma. A subplatysmal flap was raised in a superior and inferior fashion to expose the inferior border of the mandible superiorly and the clavicle inferiorly. The external jugular vein and great auricular nerve were identified and preserved. Anterior jugular vein was clipped and ligated.

The fibrofatty tissue was raised off of the sternocleidomastoid in a subfascial plane exposing the anterior and medial aspect of the SCM. The fibrofatty tissue was mobilized to expose and remove the lymph node basins of levels 2a, 2b, 3, and 4. Care was taken to identify the spinal accessory nerve CN 11, confirmed with a nerve stimulator on 1mA. The superior and inferior aspects of the internal jugular vein were identified, and exposed. Posterior belly of digastric, omohyoid and vertebral muscle was exposed to delineate the extent of dissection.

The fibrofatty tissue is mobilized in a subfascial plane in a posterior to anterior fashion. Levels 1A, B were completed with care to identify and protect the marginal mandibular nerve. Fascia overlying the submandibular gland was raised, and the facial vein was identified, and clipped/ligated with silk suture and raised superiorly to protect the marginal mandibular nerve. Submandibular gland was mobilized, with care to protect the lingual nerve, hypoglossal nerve, and to ensure ligation of the proximal stump of facial artery, and submandibular duct. Level 1a was harvested following the identification of the contralateral anterior belly of digastric. The neck dissection specimen was notable for several enlarged lymph nodes in the location of Levels 1B and 2A. No frank enlargement of the lymph nodes was identified. The specimen was oriented and sent to pathology for permanent specimen. The neck was then irrigated with sterile water, followed by saline. Hemostasis was achieved. A Valsalva was performed by anesthesia to 30mmHg identify for areas susceptible to bleeding. The neck was closed in a layered fashion with 3-0 polyglactin 910 to reapproximate the platysma and subcutaneous tissues, and staples were used to secure the skin layer. Two drains 19 round Blake drains were utilized. These were secured to the skin with 2.0 nylon and attached to bulb suction. The patient tolerated to procedure well and was transferred to the PACU without complications.

### Notes:



## 35) Partial Glossectomy

### a. Indications

1. Oral cancer
  - a. T1/T2 - partial glossectomy with transoral approach
  - b. T3/T4 - hemiglossectomy or total glossectomy

### b. Complications

1. Loss of tongue bulk
2. Scar contracture
3. Impaired articulation
4. Difficulties with propulsion of food bolus
5. Lingual nerve paresthesia

### c. Key Steps

1. Place silk suture midline 1 cm back to retract tongue
2. Mark specimen with sutures and ink
3. Remove specimen with a 15 blade w/ 1 cm margins of normal tissue
4. Send frozen sections
5. Hemiglossectomy is the same except incision started at midline raphe and carried forward, posterior and lateral cuts then made to complete the excision w/ appropriate margins
6. If primary closure not possible with hemiglossectomy, split thickness skin graft may be used
7. Total glossectomy - midline mandibulotomy
8. Lip incision along midline, curve incision around chin pad
9. Incision on floor of mouth undermining periosteum
10. Tongue released with incision along vallecula
11. Total glossectomy - suprahyoid pharyngotomy approach
12. Identify hyoid bone
13. Divide suprahyoid muscles
14. Total glossectomy - lateral pharyngotomy approach - useful for neck dissections
15. Hyoid bone resected at greater cornu
16. Retraction of superior laryngeal nerve, hypoglossal nerve, lingual nerve
17. Resect tongue
18. Closure or reconstruction with free flap

## PARTIAL GLOSSECTOMY

### PREOPERATIVE DIAGNOSIS

1. Squamous cell carcinoma, right lateral border of the tongue, cT1N0, Stage I (ICD C02.1)

### POSTOPERATIVE DIAGNOSIS

1. Squamous cell carcinoma, right lateral border of the tongue, cT1N0, Stage I (ICD C02.1)

### PROCEDURES PERFORMED

1. Right tongue partial glossectomy with unilateral radical neck dissection (CPT 41135)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The head and neck was prepped and draped in the usual manner, exposing the face, and neck following the stabilization of the nasal endotracheal tube. All pressure points were padded, and appropriate monitors were placed.

The oral cavity was first addressed; a mouth prop was used to facilitate retraction and mouth opening. A throat pack was placed under direct visualization with the aid of a sweetheart retractor. The lesion was identified on the right lateral aspect of the tongue as a pedunculated ulcerated mass approximately 1.5cm with a red/white appearance. With a marking pen, the clinical lesion was outlined, and a resection outline was marked approximately 1.5cm around the lesion. Lugol's iodine was utilized to stain the immediate surrounding mucosa of the lesion to stain the mucosa for further delineation of possible dysplastic tissue.

With a Colorado tipped electrocautery, the mucosa of the resection margin was incised. Next with a tenotomy scissors, a frozen margin was obtained from the non-specimen side of the incision of approximately 3mm around the periphery of the planned resection. Four margins were sent for analysis which included superior, anterior, inferior, and posterior margins. All returned as negative for carcinoma. The inferior margin was noted to demonstrate dysplasia and an additional inferior margin was obtained.

During the time the frozen sections were evaluated, the specimen was removed to a depth of 1.5cm, with care to ensure parallelism during the resection and to avoid undercutting the mucosa edges. The use of a harmonic focus scalpel was used to maintain hemostasis. The resection specimen was identified and tagged with silk suture. Long stitch anterior and short stitch superior. Wound was irrigated with sterile saline. Closure of the partial glossectomy was completed in a layered fashion with 3.0 polyglactin 910 in a horizontal mattress fashion.

### Notes:



## 36) Coronoidectomy

### a. Indications for Treatment

1. Coronoid hyperplasia
2. Trismus
3. Pathology

### b. Complications of Treatment

1. Hemorrhage
2. Fibrosis
3. Continued trismus
4. Loss of coronoid into infratemporal fossa

### c. Key Steps in Treatment

1. BSSO incision
2. Expose ascending mandibular ramus and coronoid
3. Detach the temporalis
4. Firmly grasp coronoid
5. Horizontal osteotomy from sigmoid notch to anterior border of ascending ramus
6. Manipulation of mandible
7. Smooth/file bone
8. Irrigate
9. Closure of mucosa

## CORONOIDECTOMY, EXTRACTION OF TEETH, ALVEOLOPLASTY, PLACEMENT OF IMPLANTS

### PREOPERATIVE DIAGNOSES

1. Pharyngeal mass (ICD C14.0)
2. Acquired edentulism (ICD K08.102)
3. Bilateral torus mandibularis (ICD K10.0)
4. Impacted #32 (ICD K01.1)

### POSTOPERATIVE DIAGNOSES

1. Pharyngeal mass (ICD C14.0)
2. Acquired edentulism (ICD K08.102)
3. Bilateral torus mandibularis (ICD K10.0)
4. Impacted #32 (ICD K01.1)

### PROCEDURES PERFORMED

1. Extraction of #1,2,3,4,5,6,7,8,9,10,11,12,13,15,16, 17,18,19,20,21,22,23,24,25,26,27,28,29,31,32 (CPT 41899) or CDT D7140 or D7210)
2. Reduction of mandibular torus (CDT D7473/CPT 21031) report twice
3. Alveoloplasty x 4 quadrants (CDT D7310/CPT 41874)
4. Bilateral coronoidectomy (CPT 21070)
5. Incisional biopsy of pharyngeal mass (CPT 42800)
6. Placement of 2 maxillary dental implants 4.5 x 11.5 (1), 3.5 x 11.5 (1) (CPT 21248) (CDT D6010)
7. Placement of 4 mandibular dental implants 4.5 x 11.5 (2), 3.5 x 11.5 (2) (CPT 21249) (CDT D6010)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

Two incisional biopsies were taken from the ~4cm x 4cm pharyngeal mass. The first biopsy taken was approximately 8mm x 8mm was incised from the anterior and superior aspect of the oral portion of the tumor with a 15 blade. The second biopsy was taken from the lateral aspect of the lesion and was approximately 5mm x 5mm in size. Both biopsies were sent for pathological identification.

Attention was first directed to the right mandibular ramus where a 2.5 cm incision was made parallel and lateral to the ramus and continued deep until the bony external oblique ridge. Tissue was dissected superiorly until the sigmoid notch was appreciated and temporalis attachments to the coronoid were released with Bovie and periosteal dissection. A Kocher on a chain was attached to the superior aspect of the coronoid process, a channel retractor was used to isolate the coronoid and a reciprocating saw was used to make the coronoid osteotomy under saline irrigation. A pneumatic rasp was used to smooth the remaining sharp bony edges. Minimal bleeding was appreciated and gauze was packed.

Next, attention was directed to the left mandibular ramus where a 2.5 cm incision was made parallel and lateral to the ramus and continued deep until the bony external oblique ridge. Tissue was dissected superiorly until the sigmoid notch was appreciated and temporalis attachments to the coronoid were released with Bovie and periosteal dissection. A Kocher on a chain was attached to the superior aspect of the coronoid process, a channel retractor was used to isolate the coronoid and a reciprocating saw was used to make the coronoid osteotomy under saline

irrigation. A pneumatic rasp was used to smooth the remaining sharp bony edges. Minimal bleeding was appreciated and gauze was packed.

Next, a full thickness mucoperiosteal flap was reflected in the maxilla and teeth/ root tips of #1-16 were elevated and extracted without complication. Teeth #6,11 required buccal and interdental bone ostectomy to remove the teeth. An egg shaped bur was used to reduce the maxillary alveolar bone in preparation for dental implants and to perform right and left upper quadrant alveoloplasty. Upon completion of alveolar ridge preparation, gauze was packed and attention was directed to the mandibular teeth. Teeth and retained root tips #17-31 were elevated and extracted without complication. # 32 required buccal ostectomy and tooth sectioning. All root tips were accounted for. Tooth #22 abnormally possessed three roots and required extensive alveolar bone removal for extraction. The mandibular ridge was reduced using a pneumatic rasp under irrigation. A full thickness mucoperiosteal flap was reflected on the lingual aspect of the mandible anteriorly to expose the bilateral mandibular tori.

A Seldin was used to protect the lingual tissue as the egg shaped bur was used to reduce the mandibular tori bilaterally. Next, the mental foramina were exposed bilaterally and marked superiorly to avoid damage to the nerve when placing implants. A sequential drilling protocol was utilized for implant placement. An implant was placed near the mandibular canine sites bilaterally and in the mandibular central incisor sites bilaterally. Two 3.5mm x 11.5mm implants and two 4.5 mm x 11.5 mm implants were placed in the mandible. A pneumatic rasp was used to perform alveoloplasty in the mandibular right and left quadrants. Demineralized bone matrix bone graft was placed on the buccal aspect of two mandibular implants. Primary stability was achieved in all mandibular implants. After saline irrigation and hemostasis, the mandibular wound was closed with 3-0 chromic gut suture in a running fashion.

Next, two sites were selected for implant placement in the maxilla. Again a sequential drilling protocol was utilized and one 3.5 mm x 11.5 mm implant and one 4.5mm x 11.5 mm implant was placed in the maxilla. Upon confirmation of primary stability, the maxilla was irrigated and the wound was closed using a 3-0 chromic gut suture in a running fashion.

At the conclusion of the procedures, the oropharynx was suctioned. The throat pack was removed. At the conclusion of the procedure, the drapes were taken down and the 6-0 Shiley cuffed tracheostomy tube was exchanged for a 6-0 Shiley cuffless. He was transferred to PACU in stable condition.

**Notes:**

## 37) Medication Related Osteonecrosis Debridement

### a. Common Indications

1. Stage III medication related osteonecrosis of maxilla or mandible
2. Presence of mobile segments of bone

### b. Complications

1. Defect enlarged
2. Site refractory from treatment
3. Jaw fracture
4. Fistula

### c. Key Steps

1. Expose area of necrosis
2. Debridement of area until bleeding bone reached
3. Extract any symptomatic teeth exposed in necrotic bone
4. Irrigate the wound and round any sharp edges
5. Primary closure of mucosa

## MRONJ DEBRIDEMENT

### PREOPERATIVE DIAGNOSES

1. Bisphosphonate related osteonecrosis of the jaws bilateral maxilla and mandible (ICD M87.180)
2. Buccal Exostoses (ICD M27.0)

### POSTOPERATIVE DIAGNOSES

1. Bisphosphonate related osteonecrosis of the jaws bilateral maxilla and mandible (ICD M87.180)
2. Buccal Exostoses (ICD M27.0)

### PROCEDURES PERFORMED

1. Surgical debridement of mandible, maxilla (CPT 21026)
2. Alveoloplasty x 4 quadrants (CDT D7310 w/extractions per quad/CPT 41874 per quad), (CDT D7320 w/o extractions per quad/CPT 41874 per quad)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. The patient underwent nasal intubation uneventfully and the tube was secured. A throat pack was placed and the oral cavity was cleansed with a 0.12% chlorhexidine gluconate solution. Subsequently, the patient was prepped and draped in the standard sterile fashion. 7 mL of 2% lidocaine with 1:100,000 epinephrine was used to obtain local anesthesia and aid in hemostasis.

Attention was first directed to the maxilla where a mid-crestal incision was made the length of the maxilla. A full thickness mucoperiosteal flap was reflected and necrotic bone was debrided. The patient was given 100mg of doxycycline preoperatively and a veloscope was utilized to distinguish areas of necrotic bone from healthy bone based on fluorescence. The debridement continued using a football bur under saline irrigation until all necrotic bone was removed clinically and visually with veloscope assistance. Bony irregularities were reduced and alveoloplasty was performed in the maxilla. The maxilla was irrigated thoroughly and primary closure was achieved using 3-0 chromic gut suture.

Attention was next directed to the mandible where a mid-crestal incision was made. A full thickness mucoperiosteal flap was reflected and necrotic bone was debrided. The Veloscope was again utilized to distinguish necrotic from normal healthy bone. Buccal exostoses were reduced and the soft tissue was closed with 3-0 chromic gut suture. The oropharynx was irrigated; the throat pack was removed. An orogastric tube was passed and the gastric contents suctioned. The patient tolerated the procedure well, was extubated in the OR and taken to PACU in stable condition.

### Notes:

## 38) Parotidectomy

### a. Indications for Treatment

1. Superficial parotidectomy
  - a. Benign conditions / tumors
  - b. Low-grade malignant tumors
2. Total parotidectomy
  - a. High-grade malignant tumors

### b. Complications of Treatment

1. Facial nerve injury
2. Frey's syndrome
3. Numbness in the distribution of the great auricular nerve
4. Sialocele

### c. Key Steps in Treatment

1. Pre-op assessment (MRI, CT, FNA)
2. Incision design
  - a. Face lift
  - b. Modified Blair
3. General anesthesia
  - a. Paralytics
4. Facial nerve monitoring
  - a. Nerve stimulator
  - b. Nerve monitoring system
5. +/- Neck dissection
6. Identification and preservation of facial nerve
7. Removal of gland or gland parts

## SUPERFICIAL PAROTIDECTOMY

### PREOPERATIVE DIAGNOSIS

1. Pleomorphic adenoma of left parotid (ICD D11.0)

### POSTOPERATIVE DIAGNOSIS

1. Pleomorphic adenoma in left parotid (ICD D11.0)

### PROCEDURES PERFORMED

1. Superficial parotidectomy with facial nerve dissection and preservation (CPT 42415)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The patient was orally intubated and the bed rotated 90 degrees. A 4 channel Nerve Integrity Monitoring System was applied for intraoperative monitoring of the frontalis, orbicularis oculi, orbicularis oris, and mentalis distribution of facial expression and corresponding facial nerve branches. These leads were secured with steri-strips, in addition to the application of a grounding and stimulation lead to the anterior chest wall.

The patient was prepped and draped in the usual fashion with the placement of a shoulder roll, and the head positioned with a slight yaw to expose the left aspect of his face and neck. A xeroform pledget was placed into the external auditory meatus. A thousand drape was secured to isolate the oral cavity and anterior aspects of the face from the operative field.

Attention was directed to the preauricular incision that was placed into a preauricular crease extending inferiorly into a natural neck crease as a modified Blair incision. Dilute solution of epinephrine 1:100 000 was administered along planned incision for hemostasis. No paralysis was confirmed with 4 twitches in train of four stimulation per anesthesia evaluation.

Incision with a number 15 blade through the skin and subcutaneous tissue was completed extending the length of the incision. An anterior skin flap was developed with a Metzenbaum scissors in a plane superficial to the parotid fascia and deep to the subcutaneous tissue was created to expose the area of the parotid tumor. At the level of the neck, the plane of the anterior skin flap was raised in a subplatysmal plane, superficial to sternocleidomastoid muscle, greater auricular nerve, and external jugular vein tributaries.

Dissection was performed along the external auditory canal to expose the tragal pointer. Care was taken to ensure meticulous hemostasis with a bipolar electrocautery. The sternocleidomastoid, and posterior belly of digastric was identified. Dissection between tragal pointer and the posterior belly digastric was completed to identify the facial nerve trunk. This was confirmed with stimulation and recognition by the NIMS monitoring.

Next, a fine McCabe dissectors were used to release the superficial lobe of the parotid from the branches of the facial nerve. All branches of the facial nerve were identified and dissected from the superficial lobe of the parotid gland. The tumor mass was palpable and no obvious exposure or disruption of the tumor mass identified. The specimen was removed and tagged for pathology evaluation.

The wound was irrigated with saline. A Valsalva maneuver was performed to check for bleeding and control bleeding as needed. A 10 French Jackson Pratt drain was placed to bulb suction. The neck and face wound was closed in a layered fashion with care to address the reestablishment of lobule of the ear. Polyglactin 3.0 for deep and poliglecaprone 25 sutures for the skin. The wound was dressed with fluffs and parotid dressing. The patient was extubated in the OR without facial weakness, breathing spontaneously and was transferred to the PACU without incident

**Notes:**



**SECTION VII**  
**INFECTION SURGERY**

## 39) Incision and Drainage

### a. Indications for Treatment

1. Infection
2. Pain
3. Swelling
4. Trismus

### b. Complications of Treatment

1. Hemorrhage
2. Nerve damage
3. Damage to teeth
4. Mandible fracture
5. Oral cutaneous fistulae

### c. Key Steps in Treatment

1. Incision of the mucosa
2. Blunt dissection toward purulent collection
3. Drainage, culture and irrigation
4. Insertion of drain
5. Secure drain

## INCISION AND DRAINAGE OF LEFT VESTIBULAR ABSCESS ASSOCIATED WITH MAXILLARY CYST

### PREOPERATIVE DIAGNOSES

1. Left maxillary cyst (ICD D16.4)
2. Left facial cellulitis (ICD L03.211)
3. Carious teeth #1,3,11,12,13,15,16 (ICD K02.9)

### POSTOPERATIVE DIAGNOSES

1. Left maxillary cyst (ICD D16.4)
2. Left facial cellulitis (ICD L03.211)
3. Carious teeth #1,3,11,12,13,15,16 (ICD K02.9)

### PROCEDURES PERFORMED

1. Extraction of teeth number 1, 3, 11, 12, 13, 15, and 16 (CPT 41899) (CDT D7140/D7210)
2. Enucleation and curettage of left maxillary cyst (CPT 21030)
3. Incision and drainage of left facial abscess (CPT 40800)

### DESCRIPTION OF PROCEDURE

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

6 mL of 1% lidocaine with 1:100,000 concentrations of epinephrine was injected into the maxilla. Attention was first directed towards the maxillary left quadrant where a sulcular incision with a vertical bridge from the anterior was performed roughly 1 cm vertical release from the anterior maxillary gingiva. This was reflected superiorly and posteriorly to expose the bony wall of the cyst. This bony wall was removed using a rongeur. A molt curette was used to remove the cyst in its entirety from the bony contents of the maxilla. The site was irrigated with normal saline and a bone rasp was used to smooth the irregular edges. Next, teeth number 1, 3, 11, 12, 13, 15, and 16 were elevated and extracted without complication. The remnants of the cystic cavity extended laterally into the soft tissues where a small amount of purulent discharge was obtained and sent for cultures, both aerobic and anaerobic as well as antibiotic sensitivities. There were no complications. The patient tolerated the procedure well. She was extubated and transferred to the PACU in good condition.

### Notes:

## 40) Submandibular Abscess

### PREOPERATIVE DIAGNOSES

1. Right submandibular space infection (K12.2)
2. Carious teeth #19,31 (K02.63)

### POSTOPERATIVE DIGNOSES

1. Right submandibular space infection (K12.2)
2. Carious teeth #19,31 (K02.63)

### PROCEDURE PERFORMED

1. Incision and drainage of right submandibular space abscess (CPT 41017)
2. Extraction of teeth #19 and 31 (CPT 41899) (CDT D7140)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The patient was taken to an adequate level of conscious sedation to tolerate placement of transtracheal anesthesia as well as awake fiberoptic evaluation. The patient was intubated atraumatically via the right naris. Placement of the tube was verified and the tube secured both with a head wrap. The patient was then turned over to surgeons. The patient was then prepped and draped for an intraoral and extraoral surgical procedure. Attention was directed to the intraoral site where a throat pack was placed and the patient was scrubbed intraorally with a chlorhexidine solution 0.12%. Then attention was directed extraorally where an incision was made with a 15 blade proximally 2 cm inferior to the right angle of the mandible. This incision was approximately 2 cm in length. This incision was made with a 15 blade through skin, subcutaneous tissue and through the platysma. Following this layer, blunt dissection was carried to the superficial layer of the deep cervical fascia where upon meeting this layer, blunt dissection was taken to the inferior border of the right mandible using the Kelly. The Kelly was then directed in a sweeping motion to the inferior border of the mandible on the right side, sweeping lingually as well as laterally over the body of the mandible. This was then carried more medially to the lingual aspect of the mandible in a sweeping fashion detaching the medial pterygoid as well as the masseteric muscle on the lateral aspect. This was carried through the mylohyoid muscle on the floor of the mouth and carried up the medial aspect of the ascending ramus. This was also carried deeply into the soft tissue of the lateral pharyngeal space. A small perforation was made through the lateral pharyngeal space and to the oral cavity. The dissection was carried anteriorly as well approximating the space of the sublingual area. This area was not violated anteriorly through the floor of the mouth or through the mylohyoid. The area was contained within the submandibular space on the right side. This area was then loosely packed and attention was directed intraorally through a circular incision and a distal releasing hockey stick incision made with a 15 blade and with electrocautery a full-thickness mucoperiosteal flap was elevated distal to tooth #31. This area was then freed on the buccal aspect as well as the lingual aspect and tooth #31 was extracted in an atraumatic fashion. No purulence was noted through the extraction site. Upon dissection on the extraoral site, moderate amount of purulence was collected using Yankauer suction. This material was sent to the laboratory for culture and sensitivity and aerobic and anaerobic specifically. The patient's right side was irrigated with sterile saline and attention was then directed to the patient's left side where tooth #19 which was deemed clinically nonrestorable was extracted. A #7 Blake drain was placed via the extraoral incision. This Blake drain tracked posteriorly and medially on the lingual aspect of the ascending ramus. It was noted that this Blake drain was indeed patent and was irrigated with sterile saline. The Blake drain was placed on an uncharged Jackson-Pratt and this was

sutured into place loosely with a 2-0 silk suture. The throat pack was removed. No incisions were closed intraorally. The neck was dressed with a loosely packed gauze roll. The patient tolerated the procedure well and was extubated in the OR and taken to the PACU in stable condition.

**Notes:**





**SECTION VIII**  
**HEAD AND NECK RECONSTRUCTION**

## 41) Free Fibula Flap

### a. Indications

1. Reconstruction of composite defects (bone, muscle, skin)
2. Reconstruction of defects in compromised recipient sites
  - a. Radiated tissue
  - b. Significant scarring

### b. Complications

1. Compartment syndrome
2. Weakness in dorsiflexion of the great toe
3. Paresthesia/anesthesia of donor site
4. Free flap failure
5. Partial flap loss
6. Limb ischemia
7. Hematoma formation

### c. Key Steps

1. Preoperative angiography or CTA/ MRA / Ultrasound of the lower extremities
  - a. Assess for 3 vessel run off in lower leg
2. Presurgical planning to establish reconstructive plan and template
3. Preparation of surgical site; positioning of desired leg.
  - a. Hip bump
  - b. Passive positioning of the leg in a dorsiflexed position
    - i. Secure with foot bump
4. Outline and mark landmarks for surgical access
  - a. Fibular head
  - b. Superficial peroneal
  - c. Inferior aspect of fibula
  - d. Anterior and posterior border of the fibula
  - e. Predicted skin paddle design
5. Thigh tourniquet 350 mmHg with exsanguination
6. Place a tourniquet around the thigh and inflate the tourniquet to 350mmhg
7. Entry and dissection within the lateral compartment
8. Subfascial dissection
9. Identify perforator to skin paddle in the posterolateral intermuscular septum
10. Entry and dissection within the anterior compartment
11. Release the interosseous membrane
12. Osteotomy – proximal and distal aspects of fibula.
  - a. Protect pedicle at proximal site.
13. Entry and dissection within the posterior compartment
14. Isolation of the vascular pedicle
15. Identify and protect tibial nerve, anterior tibial a., posterior tibial a.
16. Maintain free flap at donor site until recipient site is prepared



## FREE FIBULA FLAP

### PREOPERATIVE DIAGNOSES

1. T3N0M0 Squamous Cell Carcinoma of the left oral cavity (ICD C14.8)
2. Dental attrition (ICD K03.0)

### POSTOPERATIVE DIAGNOSES

1. T3N0M0 Squamous Cell Carcinoma of the left oral cavity (ICD C14.8)
2. Dental attrition (ICD K03.0)

### PROCEDURES PERFORMED

1. Tracheostomy (CPT 31600)
2. Left selective neck dissection Ia, Ib, IIa, IIb, III, IV (CPT 38724)
3. Left mandibulectomy (CPT 21045)
4. Right fibula free flap (CPT 20955)
5. Extraction of teeth 2-13,20-29,31 (CPT 41899) (CDT D7140/D7210)
6. Intermaxillary fixation with IMF screws (CPT 21497)
7. Split thickness skin graft (CPT 15100)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The bed was turned 180 degrees. Eyes were prepped with eye lubricant and occlusive dressing. A shoulder roll was placed and the right leg was exposed and supported with a sand bag. The patient was draped and prepped in the standard sterile fashion. Two tables separated contaminated oral cavity sets with the fibula harvest set.

Attention was first directed to the anterior neck where the sternal notch, thyroid cartilage and cricoid cartilage were drawn out on the skin. A 15 blade was used to make the skin incision. Hemostats were used to dissect through the skin, subcutaneous tissue, and superficial layer of the deep cervical fascia, strap muscles, thyroid and pretracheal fascia. The patient was maintained at an FiO<sub>2</sub> of 100% for several minutes prior to instrumenting the airway. A cricoid hook was placed into the cricoid cartilage and the trachea was elevated. A 15 blade was used to make an incision in the trachea. Dilators were used to expose the lumen of the trachea. The ETT was withdrawn and an 8-0 reinforced tube was placed into the stoma. It was secured with 2-0 silk sutured. ETCO<sub>2</sub> and good tidal volumes were confirmed.

The patient was prepped and draped for a fibular free flap harvest. This included circumferential prep of the right leg extending from the anterior iliac crest to the toes. A hip bump and foot rest was secured to the operating room table to allow passive positioning of the lower leg in a flexed position. The contralateral leg is prepped in preparation for a split thickness skin graft with exposure of the upper thigh.

Surgical landmarks to assist in harvest are identified and outlined. The proximal end, fibular head, is outlined and a mark 7cm from this landmark is used to delineate the proximal osteotomy. Also, the common peroneal nerve is palpated and marked to avoid injury. The anterior and posterior edge of the fibula is traced. The inferior aspect of the fibula is outlined and a 7 cm mark from this landmark is identified to delineate the distal osteotomy. A Doppler ultrasound unit is used to identify the presence of the skin perforators. These are generally in the vicinity of the distal 1/3rd of the posterior border of the fibula. The skin paddle was outlined with the dimensions of 6x 4 cm.

Following the sterile preparation of the lower extremity, a tourniquet is placed to the upper thigh. Care was used to ensure webroll dressing or a stocking is placed beneath the tourniquet to protect the underlying skin. The tourniquet is raised to 325 mmHg with a total time limit of 120 minutes. An Esmarch elastic bandage is applied from distal to proximal direction to exsanguinate the leg followed by the activation of the tourniquet.

An incision was then made down the lateral aspect of the lower leg overlying the outlined fibula traveling inferior along the anterior aspect of the planned skin paddle. The incision was made down through the fascia to expose the muscles of the lateral compartment, peroneus longus and peroneus brevis. A subfascial dissection is completed in a posterior direction to visualize the posterolateral intermuscular septum to identify the septocutaneous perforators. A 4-0 dyed suture is used to secure the fascia to the overlying skin to avoid inadvertent damage to the perforators. The muscles of the lateral compartment are dissected off of the lateral surface of the fibula in a posterior to anterior direction to expose the anterior intermuscular septum. Exposure extends from the proximal to distal fibular osteotomy site. Care was taken to avoid injury to the periosteum overlying the fibula.

The anterior intermuscular septum was incised and the muscles of the anterior compartment were dissected off of the fibula with care to avoid injury to the periosteum of the fibula. The interosseous membrane is then identified and incised along the length of planned fibula harvest. Incision is completed with care to avoid inadvertent injury to the underlying vascular pedicle.

Next, attention is directed towards the creation of the proximal and distal osteotomy at the predetermined sites, 7cm proximal and 7cm distal to the ends of the fibula. A subperiosteal pocket is created, baby Holman retractors placed and a sagittal saw under copious irrigation is used to create osteotomies and to free the fibula segment.

The posterior border of the skin paddle is incised down to the level of the fascia. Care is taken to identify the sural nerve and lesser saphenous vein. An incision through the soleus fascia just anterior to these structures to facilitate a subfascial dissection to the interface of the soleus and flexor hallucis long muscle is completed. Care is taken to avoid injury to the perforator vessels that lie in the posterior lateral intermuscular septum during the dissection of the soleus from the flexor hallucis longus. Dissection proceeds in a distal to proximal direction. Dissection of the pedicle is completed until the bifurcation of the peroneal artery and posterior tibial artery is visualized.

#### Osteotomy

The planned surgical guides are fitted to the prepared fibula flap while attached to the pedicle to reduce ischemia time. The excess is truncated from the desired fibula flap. The guide is attached to the fibula with monocortical screws and the cutting slots are utilized and identify areas to release the periosteum to allow protection of the pedicle with a freer, or thin malleable retractor. Osteotomies are completed with a reciprocating saw with copious irrigation. Next, the prepared mandibular plate, 2.5mm profile, is adapted to the cut fibular segments to form the neomandible. Monocortical screws are used to secure the fibula to the mandibular hardware. Prior to harvest of the fibula, a minimum of 30 minutes is elapsed to allow revascularization of the tissue following ischemia time. The skin paddle and fibula flap is evaluated for viability, in addition to evaluation of the lower leg for signs of vascular compromise, and for hemostasis.

#### Head and Neck Defect

The surgical defect is evaluated to ensure adequate preparation for placement of the fibula neo mandible construct. Vessels for anastomosis were identified and include the facial artery and facial vein and external jugular vein. Adventitia for all vessels was removed with care to maintain hemostasis when manipulating these vessels. The fibula remained attached to the vascular pedicle at this time and attention was again directed to the neck.

Subplatysmal superior and inferior flaps were raised. The dissection was left lateral neck dissection encompassing zones 1a, 1b, 2a, 2b, 3, and the superior portion of 4. The sternocleidomastoid muscle was elevated at its fascial attachment and this was continued posteriorly to the XI cranial nerve into the superior posterior most triangle of the neck inferior to the posterior belly of the digastric. This was carried forward off of the muscles including the splenius capitis and anterior and middle scalenes taken medially off of these muscles including the fascia of the muscles, stripped from the carotid artery, the X cranial nerve, the internal jugular vein and then carried anteriorly to the lateral most extent of the cervical lymphofatty tissue. The X, XI, and XII cranial nerves were preserved. The internal jugular vein and carotid artery were preserved as well. The submandibular gland was cut free from its underlying attachments and the facial vein was ligated and raised superiorly to protect the marginal mandibular branch of the facial nerve. The omohyoid muscle was exposed and fascia and fat was elevated superiorly. The facial artery divided near the submandibular gland and tagged for use in the arterial anastomosis. The cervical lymphadenectomy specimen was sent to pathology.

Next, attention was directed intraorally where a 1 cm margin was delineated around the tumor. An incision was made through buccal, lingual, retromolar and gingival mucosa. This margin was continued anterior, posterior, medial and lateral until the inferior aspect of the mandible was encountered. Frozen specimens were sent at this time from the margins of the lesion, which were all reported to be negative. The preplanned cutting jigs were attached to the mandible with 2.0 mm screws. A reciprocating saw was used to make the osteotomies at the planned margins. The specimen was removed en bloc with the epithelial portion of the tumor attached to the mandible.

The fibula flap was then separated from the perfusing vessels in the order of peroneal artery followed by the venae comitantes. A 24 g catheter on a heparinized solution is irrigated to ensure patent flow through of the fibula flap. The fibula neomandible was placed into position and the corresponding regions for securing the mandible to the native mandible was completed with bicortical screws.

Next the microvascular anastomosis was completed including the suture approximation for artery and coupling for the veins. With regards to the arterial anastomosis, the two ends of the vessels, peroneal artery and facial artery. A double yellow bulldog clamp is applied to approximate the vessel ends. A blue background is placed and the anastomosis is completed with interrupted sutures. With each pass of the needle the lumen is irrigated with heparinized saline.

Following the completion of the arterial anastomosis, venous blood should be observed from the venous outflow of the free flap. The veins are measured for size diameter, and the corresponding coupler is used to approximate and adapt the ends of the coupler to produce a venous coupled anastomosis. The use of flow couplers was used to monitor venous outflow from the fibula free flap.

Attention was directed to the wound closure where the skin paddle was secured to native remaining tissue along the buccal mucosa, floor of mouth and surrounding attached gingiva along the anterior aspect of the reconstruction. A suture was used to identify the Doppler signal location for better post-operative monitoring.

The lower leg fibula harvest site was closed in a layered fashion with 3-0 suture and staples for the skin. Two 19 round Blake drains are placed along the superior aspect of the incision.

A skin graft was harvested in the usual manner with a dermatome with mineral oil. The skin graft was pie crusted and adapted to the expose muscle and tendon of the fibular free flap. Next, attention was directed toward the left neck where a curvilinear incision was made from 2 cm anterior to the tip of the mastoid to 4cm past the anterior midline in an existing skin rhytid.

At this time, 6 IMF screws were placed and the patient was placed in maxillomandibular fixation. A prebent 2.0 mm plate was adapted to the mandible in the predetermined configuration. A bicortical screw was placed in the

proximal segment insuring complete seating of the condyles and good position and bony adaptation of the fibula. The remaining holes were drilled in the distal mandibular segment using bicortical screws (4 -14mm locking screws). The proximal segment received 3 8mm locking screws and 1 non-locking screw. The fibula was secured using 3 monocortical locking screws.

The flap was checked with Doppler at regular intervals during the flap in setting and was found to have a robust signal. The soft tissue paddle, however, was found to have no significant bleeding and it was determined that this flap would fail and had to be removed. The skin paddle was excised and primary intraoral closure was achieved after undermining mucosa with care to avoid violation of the Stenson's duct.

Next, the remaining teeth 2,3,4,5,6,7,8,9,10,11,12,13,20,21,22,23,24,25,26,27,28,29,30 were elevated and extracted without complication. Gelatin foam was placed in the right anterior maxilla and the gingiva was closed with 3-0 chromic gut sutures. The oral cavity was irrigated and found to be hemostatic at this time. Good jaw mobility was appreciated. The neck was thoroughly irrigated at this time and found to be hemostatic. Two 7 round neck drains were placed and a suture loop was placed to prevent migration of the drain near the graft. 3-0 polyglactin 910 sutures were used to reapproximate the subcutaneous tissues and the skin was closed with polypropylene. A Dobhoff tube was placed for enteral feeding. The 8-0 reinforced tube was replaced with a Shiley cuffed 8 tracheostomy tube.

The patient tolerated the procedure well and was transferred to the transplant ICU at the conclusion of the procedure.

## 42) Radial Forearm Flap

### a. Indications for Treatment

1. Restoration of oral mucosal defects following tumor resection or trauma
2. Defects that require less bulk

### b. Complications of Treatment

1. Aesthetic deformity of the skin-grafted donor site
2. Tendon exposure with delayed wound healing
3. Compartment syndrome
4. Objective decrease in absolute strength can often be measure
5. Radius fracture
6. Lack of collateral circulation to the hand, leading to ischemia
7. Flap failure

### c. Key Steps in Treatment

1. Determine dominant hand of the patient
2. Perform the Allen's Test- normal reperfusion ~15-20 second
3. Outline the dominant subcutaneous veins, the palpable or Doppler pulse of the radial artery, and the outline of the skin paddle centered over the radial artery
4. Place elastic bandage and place tourniquet to approximately 250 mm Hg
5. Make distal skin incision to gain exposure of the radial artery and its adjacent venae comitantes
6. Find, ligate, and divide the radial artery
7. Begin dissection from the ulnar or radial direction
8. Ligate and transect the distal portion of the cephalic vein
9. Elevate the skin flap with the deep fascia to the level of the lateral intermuscular septum marked by the border of the brachioradialis
10. Isolate and preserve the superficial branches of the radial to maintain sensation to the dorsum of the hand
11. Carry out the ulnar dissection in a subfascial plane, elevating the flap off the tendons of the muscles in the flexor compartment maintaining the integrity of the paratenon
12. Elevate the skin flap in a subcutaneous plane to preserve the integrity of the subcutaneous veins and the adjacent sensory nerves
13. Dissect the radial artery distally to proximally by transecting and cauterizing the deeper branches that supply the muscles of the forearm and the radius
14. Dissect along the intermuscular septum proximally until the point of overlap of the brachioradialis and the flexor carpi radialis
15. Expose the proximal radial artery and the venae comitantes by separating the brachioradialis from the flexor carpi radialis
16. Trace the radial artery to the brachial artery for extended length of pedicle
17. Ensure proper preparation of recipient site
18. Harvest the flap
19. Ischemia time-2-3 hours
20. Reapproximate the proximal skin flap and close the remainder of the he remainder of the defect with a split thickness skin graft

## RADIAL FOREARM FLAP

### PREOPERATIVE DIAGNOSIS

1. Left lateral tongue squamous cell carcinoma cT2N2bM0, Stage II (ICD C02.1)

### POSTOPERATIVE DIAGNOSIS

1. Left lateral tongue squamous cell carcinoma cT2N2bM0, Stage II (ICD C02.1)

### PROCEDURES PERFORMED

1. Left radial forearm free flap (CPT 20969)
2. Split-thickness skin graft from left thigh to left wrist (CPT 15100)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

#### Harvest of Left RFFF

Attention was drawn towards the left upper extremity. The left upper arm was prepped and draped in the usual fashion. A webroll dressing and sterile tourniquet was placed upper left arm.

The left thigh was prepped and draped in preparation for split thickness skin graft harvest.

Surgical land marks were drawn onto the arm which included boundaries of desired harvest; an area of 6 cm x 5 cm was labelled on the left forearm, in addition to the cephalic vein, radial artery, brachial radialis, flexor carpi radialis, antecubital fossae; and the predicted releasing incision in a curved S pattern. Harvest site is noted to be 3cm proximal to the wrist. The arm was exsanguinated with an Esmarch bandage; and the tourniquet was activated to 250 mmHg.

The skin paddle was outlined with the distal extent at the second skin crease of the wrist. The skin paddle was outlined measuring 6x5cm in dimension. An incision with #15 blade was made along the distal boundary and a straight releasing incision overlying the distal aspect of vascular pedicle was made through skin/subcutaneous tissue. Sharp and blunt dissection permitting definition of the radial artery and its venae comitantes. The vascular pedicle was clamped with a bulldog clamp. The tourniquet was released and the right hand was inspected and good capillary blood flow was seen to the hand, of note the 1st and 2nd digit was well perfused. The tourniquet was then re inflated to 250mmHg. Dissection continued along the distal boundary to ligate and divide the vascular pedicle, and the cephalic vein. The ulnar and radial boundaries of the skin paddle were incised with a 15 blade down to the subfascial layer to allow subfascial plane dissection. The cephalic vein and vascular pedicle were protected and care was taken to isolate and incorporate these structures along with the skin paddle. The superficial branch of the radial nerve identified and retracted out of the field to facilitate flap harvest. Dissection of the skin paddle proceeded in the subfascial plane proximally. A curvilinear incision was made at the proximal aspect of the skin paddle extending to approximately 2 finger breadths beneath the antecubital fossae. The skin paddle along with vascular pedicle and cephalic vein were dissected free from the surrounding soft tissues proximally. Tourniquet time totaled approximately 2-0 hours. The graft was allowed to perfuse while the neck vessels were prepared.

## FLAP INSET

Attention was drawn towards the exposed left neck. Hemostasis was maintained; Flap was approximated to resection wound bed of the left hemiglossectomy. The defect was covered with the 6 cm x 5 cm radial flap. pedicle was delivered along the medial aspect of the left body of mandible. The facial artery was dissected and prepared for anastomosis; the common facial br. of the internal jugular venous was dissected and prepared for anastomosis in addition to the external jugular vein

Next the radial forearm free flap was delivered to the head and neck, approximately 3x2 cm of the flap was de-epithelialized with an iris scissor with care to avoid injury to the vascular pedicle.

Next the microvascular anastomosis ensued. Attention was directed towards the arterial anastomosis. A yellow double clamp bulldog was used to approximate the radial artery and the facial artery and approximated. The vessels were prepared for anastomosis with removal of surrounding adventitia, mechanical dilation and inspection of the lumen for removal of any clot or debris. The arterial anastomosis was conducted with 8.0 nylon interrupted to join the radial artery with the facial a. The venous anastomosis was conducted with an end to end anastomosis with a 4.0mm vein coupler between the cephalic v and common facial v. A 3mm was used to couple the external jugular with the common draining branch of the venae comitantes.

Close inspection of the neck wound ensured hemostasis, and for adequate flow through the left neck microvascular arterial and venous anastomosis, Doppler probe was used to mark location of signals on the skin paddle, in addition to verifying flow at the sites of anastomosis and throughout the skin paddle. Strip tests were conducted to ensure adequate flow of the distal ends of the anastomosis.

Vessel geometry was closely monitored to ensure no acute kinks, or bends that would serve as areas of thrombosis.

A Split thickness skin graft was taken from the Left upper thigh and secured to recipient site with 4-0 chromic suture. The skin graft was pie crusted and secured to site.

The left arm donor site was irrigated and hemostasis was achieved. The wound was closed in a layered fashion after a round Blake drain was placed in the wound and secured with 2-0 nylon suture. The deep layer of the wound was closed with 2-0 polyglactin 910 and the skin layer was closed with staples. A split thickness skin graft was harvested from the left thigh and secured to the distal part of the left forearm where the skin paddle was harvested with 4-0 chromic gut. A sterile bolster dressing was then placed on the left arm consisting of xeroform gauze, gauze roll and ace bandage.

The neck was closed in the usual layered fashion with 3-0 polyglactin 910 subcuticular and staples for the skin. A penrose drain was delivered along the inferior aspect of the left neck and secured with 3-0 nylon.

**Notes:**

## 43) Squamous Cell Carcinoma of the Lip Excision

### a. Indications for Treatment

1. Biopsy proven tumor in the lip

### b. Complications of Treatment

1. Recurrence of squamous cell carcinoma
2. Scarring
3. Lip incompetence
4. Nerve damage
5. Mucocele
6. Hemorrhage/hematoma

### c. Key Steps in Treatment

1. Incisional biopsy ensuring to obtain a small amount of normal tissue
2. Wedge incision most commonly used with .5-1cm margins
3. Frozen sections should be sent to ensure clear margins
4. +/- neck dissection depending on depth of invasion and pre-operative workup
5. Closure of the lip primarily if defect <25% lower lip and <30% upper lip
6. Local flap if defect too large

## WEDGE EXCISION OF LOWER LIP

### PREOPERATIVE DIAGNOSES

1. Squamous cell carcinoma of the lip (ICD C44.02)
2. Actinic keratosis (ICD L57.0)
3. Carious teeth 6-11,13-15,21-29 (X18 teeth) (ICD K02.63)

### POSTOPERATIVE DIAGNOSES

1. Squamous cell carcinoma of the lip (ICD C44.02)
2. Actinic keratosis (ICD L57.0)
3. Carious teeth 6-11,13-15,21-29 (X18 teeth) (ICD K02.63)

### PROCEDURES PERFORMED

1. Wedge excision of the lip (CPT 40520)
2. Full mouth extraction with alveoloplasty (CPT D7310 x 4) (CPT 41899/CDT D7140 and/or D7210 x 18 total teeth)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The oral cavity was prepared with a throat pack and a 0.12% solution of chlorhexidine gluconate. The teeth were brushed. The face was then prepped with a povidone-iodine solution. As the surgeons scrubbed and returned from scrubbing, 3 ml of 1% lidocaine with 1: 100,000 epinephrine was injected into the lower lip to provide sound anesthesia as well as hemostasis for the wide local excision of the lower lip squamous cell carcinoma. Two skin hooks were placed in the mucosa of the lower lip, thus everting and elevating the lower lip. A 15 blade was used to make a V-shaped wedge incision in the midline lower lip in the area adjacent to and 0.5 cm from where the biopsy was performed. A suture was placed in the inferior, superficial aspect in the skin, demonstrating the inferior portion of the specimen. This portion was sent to the pathology lab for frozen section and identification of margins. The margins were found to be negative. The wound was thus irrigated thoroughly. Any bleeding was stopped using Bovie electrocautery. Two 4-0 polyglactin 910 deep sutures were placed to reapproximate the orbicularis oris muscle. Next, 5-0 polypropylene was used to reapproximate the superficial tissues, first lining the vermilion border, then suturing the remainder of the defect until the tissue was well approximated. Bacitracin was placed around the lips and on this site. Next, attention was directed towards the teeth, where local anesthesia of roughly 6 ml was injected in the bilateral maxilla and mandible. Next, teeth 6, 7, 8, 9, 10, 11, 13, 14, 15, 21, 22, 23, 24, 25, 26, 27, 28, 29 were elevated and extracted without complication. The remaining bony ridges were smoothed using a bone rasp. normal saline irrigation was used. The extraction sites were closed using a 3-0 chromic gut suture in a running fashion. Next, the oral cavity was irrigated thoroughly and suctioned. The throat pack was removed. Patient was extubated in the operating room uneventfully and taken to the PACU for recovery in good condition. Overall, the patient tolerated the procedure very well. There were no complications.

### Notes:

## 44) BMP/BMAC Mandibular Resection/Reconstruction

### a. Indications for Treatment

1. Large continuity defect of the mandible
2. BMP with no donor site morbidity
3. Alveolar defects
4. Enhance allogenic bone grafts

### b. Complications of Treatment

1. Graft failure
2. Recurrence of tumor
3. Swelling
4. Dehiscence of incision
5. Separation of trocar
6. Slight ambulation disturbance

### c. Key Steps in Treatment

1. Transcervical approach to the mandible
2. BMAC Anterior hip
  - a. Puncture site should be 2-6cm posterior to the anterior superior spine.
  - b. Place the aspirating trocar between the cortices and 1-4mm within the
  - c. Posterior hip
  - d. Puncture site should be into the ilium in the area of the triangular insertion of the gluteus maximus muscle
  - e. Place the aspirating trocar between the cortices and 1-4mm within the bone
3. General technique
  - a. BMAC must remain anticoagulated
  - b. Trocar, aspirating syringe, and plunger are wetted with a solution of heparin 1000 U/mL
  - c. 2mm incision through skin in proper location as mentioned above
  - d. Dissection made to the cortex
  - e. The sharp heparin prepared trocar punch with hollow aspiration sleeve is inserted into the marrow space
  - f. Remove the sharp trocar leaving the hollow aspiration sleeve in the marrow space
  - g. Attach the heparin coated syringe with .5mL heparin
  - h. Inject .5mL heparin into the marrow space
  - i. Pull back on the syringe to draw the bone marrow aspirate
  - j. Once appropriate amount of BMAC s obtained (60mL-120mL) inject the BMAC into the marrow chamber of the BMAC container
  - k. Ensure the second chamber contained 2mL of ACDA-A solution to prevent clumping of the concentrated cell components
    - l. Place the BMAC container into a centrifuge capable of a double spin
    - m. The bottom layer is the BMAC and can be added to bone graft prior to inserting the graft into the recipient site

BMP:

- a. Add sterile water into the BMP and allow 5 minutes for the BMP to dissolve
- b. Next add to the acellular collagen sponges until each one is completely saturated
- c. Wait 15 minutes to allow the rh-BMP to bind with the collagen sponge
- d. Must place in recipient site within 2 hours
- e. Primary water tight closure is essential
- f. Evaluate the mucosa for any tears. Mucosal tears must be repaired.

## BMP/BMAC RECONSTRUCTION

### PREOPERATIVE DIAGNOSES

1. Mandibular continuity defect (ICD M84.88)
2. Ameloblastoma mandible (ICD C41.1)

### POSTOPERATIVE DIAGNOSES

1. Mandibular continuity defect (ICD M84.88)
2. Ameloblastoma mandible (ICD C41.1)

### PROCEDURES PERFORMED

1. 120 cc bone marrow aspirate concentrate harvested from right hip (CPT 21215)
2. Bone morphogenic protein application (CPT 99070)
3. Scar revision of right neck (CPT 11440)
4. Maxillomandibular fixation, placement of Erich arch bars (CPT 21110)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The patient was prepped and draped in the normal fashion for a hip procedure. The anterior superior iliac spine was palpated and the anticipated trocar site was marked. A trocar was introduced into this area; palpation was noted of the patient's right hip, anterior iliac spine and crest. Incision was made with a 15 blade in the skin and the overlying tissue. The patient then had a hemostat placed to find the superior aspect of the ridge 2 cm posterior to the anterior iliac spine. A trocar was introduced deep to bone. The trocar was removed with stylet remaining in place. Locking syringe was attached and 60 cc of bone marrow aspirate was withdrawn relatively easily. Syringe was removed and another 60 cc syringe was placed and then removed with easy withdrawal of the bone marrow aspirate. Trocar was replaced and entire apparatus was removed. Two interrupted 5-0 fast absorbing gut sutures with skin adhesive were placed over the hip.

Attention was next directed to the patient's head and neck. The oropharynx was suctioned. A throat pack identified with silk suture was placed. Arch bars were placed in the maxilla and mandible; Erich arch bars were placed with 24-gauge stainless steel wire. A 1:50,000 epinephrine solution was administered along the scar in the neck. An incision was made along the superior aspect of the previous scar. Dissection in the previous plane of dissection toward the reconstruction plate was performed in layers. There was a moderate amount of bleeding from the surface of the submandibular gland, which was controlled with Bovie electrocautery. Once the inferior plate was appreciated, a Bovie electrocautery was used to incise through the remaining tissues, exposing the plate from two to three holes posterior to the angle to three holes anterior to the bony mandible. Scar tissue surrounding the plate and superficial scar tissue in the neck was excised. Portions of the excised scar tissue were sent to for histopathological analysis. The proximal aspect of the mandibular bone was fully exposed proceeding superiorly towards the oral cavity.

A cavity to accept the bone graft was expanded; a resorbable plate was cut and formed to the appropriate size to cover the lateral and inferior aspects of the bony region. Sterile water was used to reconstitute the rhBMP-2 and 5 minutes were allowed for dissolution. After waiting 15 minutes to allow the rhBMP-2 to adhere to the collage

sponge the BMP was ready for implantation. At this point, the large BMP soaked collagen carrier was cut into small pieces, BMAC, and 90 cc of cortical cancellous bone, which had been run through a mill to a fine grind, were placed into the bony defect. Once it was fully packed, 3-0 polyglactin 910 sutures were used to close the wound and an incision was made over the sternocleidomastoid muscle, placing a 7-0 Jackson Pratt flat drain.

The skin was closed using a running 5-0 Polypropylene suture. Bacitracin was applied to the skin. A gauze dressing was placed over the drain. Attention was then turned to the oropharynx, which was suctioned. The throat pack was removed. An orogastric tube was passed to suction with gastric secretions removed with no blood. Wire loops were placed to secure the patient in maxillomandibular fixation.

The patient was extubated in the OR without complication and transferred to the PACU in good condition.

**Notes:**

## 45) Anterolateral Thigh Flap

### a. Indications for Treatment

1. Reconstruction with defects of the tongue, buccal mucosa, palate, and lips
2. Reconstruction of the pharyngoesophageal segment and reconstruction of soft tissue defects of the skull base, midface, and scalp
3. Large soft tissue defects

### b. Complications of Treatment

1. Aesthetic deformity of the skin-grafted donor site
2. Free flap failure
3. Ischemic necrosis
4. Hematoma formation

### c. Key Steps in Treatment

1. Surgical landmarks are outlined: A line between the anterior superior iliac spine and the superior lateral border of the patella. Detect and mark the cutaneous vessels with an ultrasound Doppler
2. Design the flap according to the locations of the skin vessels
3. Make a medial incision above the rectus femoris muscle and dissect down to the subfascial plane
4. Raise the flap laterally to expose the skin vessels that pierce the deep fascia
5. Find the septocutaneous vessel in the intermuscular septum between the rectus femoris and the vastus lateralis muscles
6. Then retrograde intramuscular dissection of the perforators to the desired pedicle length is necessary
7. Include the anterior branch of the lateral femoral cutaneous nerve if an innervated flap is planned
8. If some vastus lateralis muscle needs to be included in the flap, split the muscle tangentially on its long axis in a proximal to distal dissection from the pedicle, until the required size is harvested
9. Avoid a circumferential incision of the flap at the vascular pedicle and the skin vessels are identified
10. If the main pedicle is absent or the skin vessels get injured, convert the planned anterolateral thigh flap into an anteromedial thigh flap or a tensor fascia lata flap
11. Ensure proper preparation of recipient site
12. Harvest the flap
13. Ischemia time-2-3 hours
14. Close wound primarily for defects up to 8 cm in width and even up to 13 cm in width in older patients with redundant skin

## ANTEROLATERAL THIGH FLAP

### PREOPERATIVE DIAGNOSIS

1. Base of tongue squamous cell carcinoma (ICD C02.9)

### POSTOPERATIVE DIAGNOSIS

1. Base of tongue squamous cell carcinoma, stage IVA T4N2M0 (ICD C02.9)

### PROCEDURE PERFORMED

1. Right anterolateral thigh free flap reconstruction of the oral cavity and pharynx (CPT 41155)
2. Full mouth extraction (3,5,6,7,9,10,11,12,13,17,22,23,24,25,26,27,28) x17 (CPT 41899) (CDT D7140/D7210)
3. Alveoloplasty x4 quadrants (CDT D7310) (CPT 41874)
4. Bilateral mandibular tori reduction (CPT 21031) (CDT D7473)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The chest was prepped, the neck was prepped, the face was prepped, and the bilateral anterior-superior spine to just below the patella was prepped for the anterolateral thigh harvest bilaterally.

The attention was first directed to the right leg where a Doppler was used to map out the descending branch of the lateral femoral circumflex artery. Next, the right anterior-superior iliac spine was marked, and the right lateral aspect of the patella was marked. A line tracking these two points was made, and this was bisected, and a dopplerable signal was found within approximately 3 cm of this mark. The medial incision to the anterolateral thigh flap was made first through skin and subcutaneous tissue down to Scarpa's fascia until the rectus femoris was exposed underlying these tissue planes. Once the rectus femoris was exposed, the septum was identified and continued posteriorly to expose the descending branch to the lateral femoral circumflex artery. Once this was exposed, the perforators were identified, and the vastus lateralis was also identified from inferiorly. Dissection continued superiorly along the medial aspect of the vastus lateralis identifying all perforators several of which were myocutaneous perforators. A superiorly enlarged tensor fascia lata vascular pedicle was identified and preserved. The central portion of the vastus lateralis required dissection of the perforators and removal of the muscular tissue to facilitate raising the flap. Once adequate exposure of the perforating vessels was performed, attention was directed to the lateral aspect of the wound where again a full-thickness incision was made using Bovie electrocautery to the skin and subcutaneous tissue down to the Scarpa's fascia with care protecting the vascular pedicle to the flap. This continued in an elliptical pattern approximately 20 cm in length and approximately 9 cm in the width to the superior aspect of the wound. At this time, the dopplerable signals in the flap were excellent. There was bleeding at the distal most periphery of the flap. At this time, sites were irrigated. Two stay sutures were placed, and the flap was covered for later retrieval.

Next, attention was directed to the head and neck region where the remaining teeth were elevated and extracted including the maxilla and the mandible. These teeth included teeth number 3, 5, 6, 7, 9, 10, 11, 12, 13, 17, 22, 23, 24, 25, 26, 27, 28 were elevated and extracted. Tooth number 16 was not extracted. The alveoloplasty was performed. Mandibular tori were reduced with a 703 bur and egg-shaped carbide bur under saline irrigation. The maxilla and mandible were smooth, and bicortical perforations were made to the extraction site into the lingual

aspect of the mandible using a 702 bur to suspend the ALT flaps to the floor of the mouth. After this was completed, facial vessels were dissected to expose a branch of the common facial vein as well as the facial artery. These were prepared and clipped and identified for future use. Next, the surgeons changed cloths and went down to the right anterolateral thigh region where the vascular pedicle was separated from the flap itself and was taken up to the neck. The lateral aspect of the flap was inset first using 2-0 Polyglactin 910 sutures in an interrupted pattern which was sutured to the proximal end of the esophagus. At this point, this was sutured to the lateral aspect to prevent avulsion of the flap and to facilitate the microvascular anastomosis. Once the flap was harvested, ischemia time began, and the flap was irrigated thoroughly with approximately 15 cc of heparinized saline. The flap was set aside for future use. Once the vessels were found to be adequate, the flap was then inset as previously described. The microscope was brought into the room, and vascular anastomosis was initiated. A double bulldog clip was used to reapproximate the two facial arteries and the ascending branch of the lateral circumflex artery of the lateral femoral circumflex. This was reapproximated with a 9-0 nylon suture in an interrupted fashion. The bulldog was released from the proximal end of the feeding vessel, and flow was appreciated to the flap with good outflow from the venous portion of the flap.

Next, a vein cover was used to attach the common facial vein to the vena comitantes from the flap. This was found to have good approximation, and no gross leaks were appreciated. Doppler signal was found to be robust, and there was flap perfusion at the distal most aspect of the flap in the oral cavity. The total ischemia time was approximately 96 minutes. The flap appeared healthy without any evidence of gross necrosis. The remaining margins of the wound were sutured to the proximal end of the esophagus and continued up the lateral aspect of the posterior pharyngeal wall into the region of the soft palate extending into the retromolar trigone region and sutured with 2-0 polyglactin 910 interrupted sutures. Next, 2-0 suture was used to resuspend the ALT flap in the floor of the mouth. This assisted in immobilizing the flap intraorally as well as laterally for an adequate margin to secure the gingival mucosa too. The maxilla was previously sutured with a 3-0 chromic gut suture in a running fashion. Intraorally, the flap was inset using a 2-0 polyglactin 910 suture in an interrupted pattern and continued until a tight watertight seal was appreciated. At this time, the Doppler of the flap was checked from the venous to the arterial as well as the distal side within the oral cavity, and all were found to have good dopplable flows and bled with mild manipulation of the wound margin. The neck was then irrigated thoroughly. Drains were placed; 8-French round drains were placed in the neck and secured with silk suture bilaterally. Three drains were placed in total; one at the inferior border of the mandible, and two behind the sternocleidomastoid bilaterally and extending down into the defect. Several subdermal sutures were placed engaging the platysma, and then, the superficial skin was closed with a 5-0 nylon suture. The posterior aspect of the stoma was matured and formalized using 2-0 polyglactin 910 suture in an interrupted pattern. At the end of the closure, the Doppler signal was again verified and found to be robust. Next, the right anterolateral thigh leg wound was closed using 2-0 Polyglactin 910 sutures. Two drains were placed in the lower extremity, and the closure was accomplished with surgical staples. At this time, bacitracin was placed over all the wounds, and the patient was breathing spontaneously and tolerated oxygen well. The patient was taken to the PACU and eventually to ICU without any complications. The patient tolerated the procedure well.

**Notes:**

## 46) Costochondral Graft

### a. Indications for Treatment

1. Ramus reconstruction
2. Mandibular continuity defect
3. Temporomandibular joint reconstruction (pediatrics)
4. Nasal Reconstruction

### b. Complications of Treatment

1. Scarring
2. Pneumothorax
3. Chest wall deformity
4. Breast deformity
5. Graft failure

### c. Key Steps in Treatment

1. Supine with roll under the left or right hemithorax (contralateral to the site of reconstruction)
2. Draw landmarks: ribs, line from inframammary crease and carried from the midaxillary region toward the sternum (medial extent is determined by the size of the graft needed)
3. Administer local anesthetic
4. Incision: skin, subcutaneous tissue, pectoralis, rectus muscles, fascia (young female avoid breast tissue)
5. Incise the periosteum at the height of contour of the rib in longitudinal fashion (If reconstructing the TMJ leave a cuff of periosteum and perichondrium intact to avoid separation at the costochondral junction)
6. Circumferentially dissect the remainder of the rib staying subperiosteal to avoid the neurovascular bundle located at the inferior border of the rib
7. Perform the osteotomy ensuring to protect the underlying periosteum and pleura
8. Check for pleural injury by asking the anesthesiologist to inflate the lung maximally while irrigating and checking for bubbles that may represent a pleural tear
9. If no pleural tear, then perform layered closure

## COSTOCHONDRAL GRAFT

### PREOPERATIVE DIAGNOSIS

1. Ameloblastoma of the left mandible (ICD D16.5)

### POSTOPERATIVE DIAGNOSIS

1. Ameloblastoma of the left mandible (ICD D16.5)

### PROCEDURE PERFORMED

1. Rib harvest (CPT 20902)
2. Exparel intercostal nerve block (diluted with 50 mL of NS) (CPT 64421)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The chest was then prepped and draped in the usual sterile fashion. An 8 cm skin incision was made in the right mammary fold with a #10 blade; subcutaneous tissues were dissected with electrocautery. The chest wall muscles were also divided with electrocautery. The 7th rib was identified. The rasp and Doyen elevator was used to free the rib from the surrounding tissues, and the Doyen to free the rib from the posterior periosteum. A 7 cm segment of rib was isolated in this fashion. The anterior portion of the 7th rib was then incised with electrocautery at its cartilaginous/periosteal junction. The distal portion of the rib was incised with rib cutters. The wound was filled with saline and a valsalva performed. No air leaks were noted. Hemostasis was achieved with electrocautery and gelatin foam placed onto the cut surfaces of the rib. An exparel intercostal nerve block was done in the 5th, 6th, and 8th rib spaces. The muscle layers were closed with a 2-0 polydioxanone suture in a running fashion. The subcutaneous tissues were approximated with 3-0 polydioxanone and the skin closed with 4-0 poliglecaprone 25. Dermal glue was applied to the wound. The patient was extubated in the OR without complication and taken to the PACU in stable condition.

### Notes:



**SECTION IX**  
**TEMPOROMANDIBULAR JOINT SURGERY**

## 47) Arthrocentesis

### a. Indications for Treatment

1. TMJ arthralgia
2. Chronic pain with good range of motion and anterior disc displacement with reduction
3. Acute and chronic limitation of opening due to anteriorly displaced disc without reduction
4. Degenerative osteoarthritis

### b. Complications of Treatment

1. Iatrogenic scuffing of fibrocartilage, articular disc, and/or retrodiscal tissues
2. Injury to temporal vessels or maxillary artery causing hemorrhage
3. Damage to cranial nerves
4. Intra-articular fibrosis and adhesions formed after hemorrhage
5. Ear injury from middle-ear penetration

### c. Key Steps in Treatment

1. Document pre-operative maximal incisal opening, excursive movements, and subjective details of pain and dysfunction
2. Identify landmarks referencing the Holmlund–Hellsing line (10mm-2mm point, 20mm-10mm point)
3. Confirm landmarks with patient TMJ functioning
4. Administer local anesthetic
5. Apply an antibiotic-soaked cotton pellet into the external auditory canal
6. In an anterior-medial-inferior direction insert an 18-gauge needle attached to a 10 mL syringe containing normal saline
7. Insufflate the superior joint space with enough normal saline to obtain back pressure with the syringe and movement of the jaw
8. Leave the 18-gauge needle in place and remove the syringe
9. Insert a second 18-gauge needle slightly anterior to the first 18-gauge needle along the same angulation. A small amount of backflow of saline will exit through the needle when in the correct position
10. Pass approximately 100 mL of normal saline through the superior joint space
11. At the end of the procedure +/- inject 1 mL of betamethasone or sodium hyaluronate with 1 mL of 0.5% bupivacaine with epinephrine into the superior joint space
12. Examine the lateral pharyngeal walls for swelling
13. Remove the 18 gauge needles
14. Manipulate patient into maximal incisal opening and excursive movements

## ARTHROCENTESIS

### PREOPERATIVE DIAGNOSIS

1. Right temporomandibular joint arthralgia (ICD M26.62)

### POSTOPERATIVE DIAGNOSIS

1. Right temporomandibular joint arthralgia (ICD M26.62)

### PROCEDURE PERFORMED

1. Right temporomandibular joint arthrocentesis (CPT 20605)<sup>25</sup>

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked.

A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to nasal intubation.

The patient was initially prepped for the TMJ arthrocentesis. The right ear and face were evaluated. A line was drawn between the tragus and the lateral canthus of the right eye. The external auditory canal was palpated and a point was made 10 mm anterior to this end of the cartilaginous portion of the auditory canal anteriorly on the face and 10 mm inferior to that. A 20-gauge needle was then inserted in the posterior aspect and a second 20-gauge needle was placed in the anterior aspect of the joint, which the mandible was being manipulated open. Approximately 150 cc of lactated ringers was irrigated through the joint and good outflow was appreciated between both ports. Approximately 1 cc of triamcinolone and hyaluronic acid was injected into the right temporomandibular joint at the conclusion of the arthrocentesis portion of the procedure. The patient was found to be hemostatic at the conclusion of the procedure. An intraoral examination was performed without evidence of lateral pharyngeal swelling. The patient tolerated the procedure well, was extubated in the OR and transferred to the PACU in stable condition.

### Notes:

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<sup>25</sup> Right temporomandibular joint steroid injection (CPT 20550), Right temporomandibular joint hyaluronic acid injection (CPT 20550).



## 48) Arthroplasty

### a. Indications for Treatment

1. Disabling joint conditions refractory to medical management and primary arthroscopy alone that require internal structural modifications of the temporomandibular joint (TMJ)
2. Wilkes stage II, stage III, and/or early stage IV of arthroscopic discopexy

### b. Complications of Treatment

1. Facial nerve damage
2. Pre-auricular anesthesia or paresthesia
3. Iatrogenic scuffing of the fibrocartilage lining
4. Damage to the middle ear
5. Perforation of the glenoid fossa
6. Intracapsular hemorrhage
7. Instrument failure or loose bodies within the joint

### c. Key Steps in Treatment

1. Place xeroform in ear canal
2. Preauricular incision
3. Find temporalis fascia
4. Dissect deep to temporalis fascia until the zygomatic arch is encountered
5. Utilize the nerve stimulator to avoid damage to the frontal and zygomatic branches of the facial nerve
6. Subperiosteal dissection on the zygomatic arch
7. Enter the TMJ capsule
8. Reduce/excise superior aspect of the condyle
9. Insert temporalis/fat graft into the fossa
10. Closure

## ARTHROPLASTY TMJ

### PREOPERATIVE DIAGNOSES

1. Right TMJ ankylosis with severe trismus (ICD M26.61) (ICD M26.52)
2. Right TMJ arthralgia (ICD M26.61)
3. Carious non restorable teeth (on pit and fissure) 2, 30 (ICD K02.53)

### POSTOPERATIVE DIAGNOSES

1. Right TMJ ankylosis with severe trismus (ICD M26.61) (ICD M26.52)
2. Right TMJ arthralgia (ICD M26.61)
3. Carious non restorable teeth 2, 30 (ICD K02.53)

### PROCEDURES PERFORMED

1. Right TMJ arthroplasty with fat graft (CPT 21240)
2. Extraction of teeth 2, 30 (CDT D7140) or (CPT 41899)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

Preoperatively, the patient was not able to open mouth and MIO was 0mm. After satisfactory general anesthesia the patient was able to open 5 mm. We proceeded with a brisement procedure. Manipulation of the mandible and opening with side action mouth gag. The patient was opened to a measured MIO of 30mm. A throat pack was placed.

1%lidocaine with 1:100,000 epinephrine solution was administered to the pre-auricular incision area marked anterior to the tragus in a crease line with temporal extension with care to avoid placing the incision over the course of the facial nerve and superficial temporal vessels. The right external auditory canal was packed with xeroform gauze. A 15 blade was used to make incision through skin and subcutaneous tissue. Dissection was carried down to the level of temporalis fascia in the temporal extension area. Sharp dissection was carried deep and vessels were ligated as encountered. Incision thorough the temporalis fascia was made with 15 blade. A periosteal elevator introduced into a pocket created through the incision and bluntly down to the zygomatic arch which was scored to expose the superior region of the glenoid fossa. Tenotomy scissors were used to dissect the pre-auricular part of the incision with care not to damage the tragal cartilage and avoid injury to the facial nerve. At this point the superior joint space was accessed and reflected subperiosteally to the medial aspect of the glenoid fossa.

The superior aspect of the condyle at this time was resected using an ultrasonic scalpel. The removed condylar head was sent to histopathological examinations. Manipulation of the jaw showed improved in the range of motion of the condyle and increased joint space noted. Scar tissue and remnants of the discal tissue was and irrigated with normal saline. The wound was packed with moist gauze. MIO was measured at 35mm at this time.

Attention was given to the periumbilical area. A 15 blade used to make linear incision 2cm inferior portion of the umbilicus and dissection down to the fatty subcutaneous tissue performed. Fat was obtained and was kept in moist gauze. Closure of the wound was performed with a subcuticular 4-0 poliglecaprone. The abdomen was covered with a towel and attention was again directed to the pre-auricular incision. The fat harvest was used to augment the

joint space to prevent future scarring and re-ankylosis. A portion of the temporalis muscle was dissected free and rotated into the space between the resected condylar head and the glenoid fossa. This was sutured to the medial pterygoid muscle. Wound was closed with 3-0 polyglactin 910 interrupted sutures approximating the periosteum over the lateral joint area. Temporalis fascia closed also closed with 3-0 polyglactin 910 sutures. Layered closure of the subcutaneous tissue with 3-0 polyglactin 910 sutures performed and skin closure with 5-0 fast absorbing gut suture. Dressings were applied to the abdomen and pre-auricular incision.

Attention was then directed to the oral cavity where teeth #2 and 30 were extracted using elevators and delivered with forceps without complications. The sites were irrigated with normal saline and curetted free of granulation tissue.

A right buccal vestibule incision was then made to expose the external oblique ridge and dissection was carried to expose the lateral ramus body of mandible superiorly to the sigmoid notch. And placement of sigmoid notch retractor. The coronoid process was exposed and curved Kocher was used to secure the coronoid process. An ultrasonic scalpel was used to perform the coronoidectomy. The temporalis attachments were released and coronoid was removed. Hemostasis was achieved and the site was irrigated with normal saline. Closure was accomplished with 3-0 chromic gut sutures.

The left buccal vestibule incision was made to expose the external oblique ridge and dissection was carried to expose the lateral ramus body of mandible superiorly to the sigmoid notch. And placement of sigmoid notch retractor. Coronoid process was exposed and curved Kocher was used to hold it in place. An ultrasonic scalpel used to perform the coronoidectomy. The temporalis attachments were released and coronoid was removed. Hemostasis was achieved and sites were irrigated with normal saline. Closure was achieved with 3-0 chromic gut sutures. The throat pack was removed and oropharyngeal suction was used to empty stomach content without success.

The patient was successfully extubated and was transferred to PACU for recovery in preparation for admission to the surgical floor.

**Notes:**

## 49) Disc Repositioning/Anchoring

### a. Indications for Treatment

1. Disc displacement
2. Symptomatic disc dislocation without recapture

### b. Complications of Treatment

1. Possibility of recurrent joint noises
2. Hemorrhage
3. Auriculotemporal nerve injury
4. Facial nerve injury
5. Fibrous adhesion formation
6. Persistent pain
7. Occlusal changes
8. IAN injury
9. Lingual nerve injury
10. Long buccal nerve injury
11. Heterotopic bone formation
12. Joint ankylosis
13. Infection

### c. Key Steps in Treatment

1. Obtain pre-op diagnostic imaging
2. Evaluate need for eminectomy or condyloplasty to improve disc anchoring
3. Exposure of the disc through a pre-auricular incision or endaural incision
4. Capsular incision
5. Dissection of disc
6. Inspection of the disc before repositioning
7. Disc should not be distorted or placed under tension
8. Partial thickness plication of the disc

## DISC ANCHORING OF THE RIGHT TEMPOROMANDIBULAR JOINT

### PREOPERATIVE DIAGNOSES

1. Temporomandibular joint articular disc disorder (ICD M26.63/M26.62)
2. Ehlers-Danlos syndrome (ICD Q79.6)

### POSTOPERATIVE DIAGNOSES

1. Temporomandibular joint articular disc disorder (ICD M26.63/ M26.62)
2. Ehlers-Danlos syndrome (ICD Q79.6)

### PROCEDURES

1. Arthroplasty (disc anchoring procedure) of the right temporomandibular joint (CPT 21240)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. 2 mL of 0.5% bupivacaine with epinephrine, followed by 1 mL of 40 mg of triamcinolone was injected into the joint. The joint was mobilized and a dressing was placed over the wound.

An endaural incision was marked and made with a 15-blade. Hemostasis was achieved with the Bovie electrocautery. Dissection was carried over the tragal cartilage down to the capsule of the joint. Above the zygomatic arch, the temporoparietal fascia was incised, ligating small branch of the superficial temporal vein. The temporalis fascia then was exposed. Then, tissues above the capsule anteriorly were reflected and a vertical incision was made in the temporalis fascia at the root of the zygoma, following the hockey-stick extension of the skin incision. The dissection then was carried anteriorly underneath the temporalis fascia and subperiosteally on the zygomatic arch, exposing the whole zygomatic arch to a point just in front of the articular eminence. After exposing the zygomatic arch and the eminence on the capsule, the superior joint space was entered through a horizontal incision. A vertical incision was made in the lateral recess, opening the lateral capsule in the shape of a letter T. Stay sutures were placed at the corners of the capsule flaps for closure afterwards. The mandible was mobilized and the disc was found to be anteriorly displaced. Pressure in the retrodiscal tissue reduced the disc. We made an incision at the junction of the posterior band of the disc and the retrodiscal tissue entering, exposing the inferior joint space and the mandibular condyle.

It is important to note that both the glenoid fossa articular eminence and the mandibular condyle had normal articular cartilage. The micro Mitek anchor was placed in the posterior aspect of the condyle at the neck. The suture used with the anchor was a 3-0 Ethibond. A horizontal mattress suture was placed from the anchor to the posterior band of the disc. Mandibular movement was tested in all directions, and demonstrated excellent function of the disc without displacement. The wound was irrigated. The capsule was closed with 3-0 polyglactin 910. Temporalis fascia was closed with 2-0 polyglactin 910 suture. The temporoparietal fascia was closed with 2-0 polyglactin 910. Dermal sutures were placed with 4-0 polyglactin 910 and the skin was closed with 6-0 polypropylene in a running fashion. At the end of the procedure, the area was irrigated and a pressure dressing was applied. All the sponge counts were correct. The patient was extubated in the OR and transferred to the PACU in stable condition.

## 50) Total Joint Replacement

### a. Indications for Treatment

1. Ankylosis
2. Degenerative joint disease
3. Condyle loss (trauma, pathology, advanced disease)
4. Not responsive to other more conservative therapies

### b. Complications of Treatment

1. Persistent TMJ symptoms
2. Malocclusion
3. Frey's syndrome
4. Scarring
5. Otologic changes
6. Perforation into cranial base
7. CN VII weakness
8. Damage to sensory nerves
9. Infection

### c. Key Steps in Treatment

1. Obtain stereolithographic model
2. Access the temporomandibular joint: Preauricular, Submandibular/ Retromandibular approaches
3. Condylar head and neck resection with or without coronoidectomy
4. Prepare the glenoid fossa
5. Inset the glenoid fossa prosthesis
6. Place the patient in MMF
7. Recontour ramus if indicated
8. Seat the condylar prosthesis
9. Check for gapping
10. Fixate the condylar prosthesis
11. Release MMF
12. Recheck prosthesis position and function of the prosthesis
13. Guiding elastics
14. Avoid cross contamination with the oral cavity

## BILATERAL TOTAL JOINT REPLACEMENT

### PREOPERATIVE DIAGNOSIS

1. Advanced TMJ arthritis (ICD M26.69)

### POSTOPERATIVE DIAGNOSIS

1. Advanced TMJ arthritis (ICD M26.69)

### PROCEDURE PERFORMED

1. Custom alloplastic reconstruction of the bilateral temporomandibular joints (TMJ Concepts) (CPT 21243)
2. Autogenous periumbilical fat grafting to bilateral temporomandibular joints (CPT 20926)
3. Placement of Erich arch bars (CPT 21110)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. The head of bed was then rotated away from the anesthesia team 180° clockwise and care of the patient was turned over to the oral surgical team. Otoscopic examination revealed some hyperemia of the posterior tympanic membrane on the left which matched the right. Otoscopic exam at the end of the case revealed no changes.

Attention was first directed to placement of maxillary and mandibular Erich arch bars using standard technique and 24-gauge surgical wire after throat pack placed. The arch bars were noted to be stable.<sup>26</sup> Xeroform was placed in the bilateral EACs for the duration of the case.

Next, the patient was prepped and draped in standard fashion for a sterile total joint procedure, as well as a periumbilical fat grafting harvest procedure. An occlusive dressing was placed to isolate the nose and mouth. Next, the proposed incisions, both on the patient's right and left were marked. The incisions were through a previous preauricular incision extending from the temporal area down to the lobule. The retromandibular incisions were marked to be approximately 2 cm below the inferior border of the mandible and behind the angle within a resting skin tension line. The incision extended from the angle to roughly 5 cm anterior along the trajectory. The incisions on the right side were infiltrated with a total of 2% lidocaine with 1:100,000 epinephrine. Attention was directed to the retromandibular incision. Incision was made through skin and subcutaneous tissue, and then blunt dissection with nerve testing was used through the platysma layer. Bovie electrocautery was also used.

The parotid was retracted superiorly, and the capsule was not invaded. Incision was made through the fibrous part of the pterygomasseteric sling just anterior to the angle and subperiosteal dissection was extended through the neck of the condyle and sigmoid notch. Attention was directed to the right preauricular incision. An incision was made extending from the temporal region to the lobule of the ear. The incision was carried along the tragus of the ear to expose the tragal cartilage. Dissection to the dermal plane was then made bluntly. Bleeding was controlled with Bovie electrocautery set at 20/20. The superior aspect of the dissection was carried down to the superficial layer of the temporalis fascia. The correct plane was evident by the fibrous white appearance of the temporalis fascia. At this point, dissection was made onto the zygomatic arch, following the progression of the previous made incision. Below the area of the arch, dissection was made down through the temporoparietal fascia following the external auditory canal cartilage. The confluence of this plane was coincidence with that of the plate superior to the arch.

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<sup>26</sup> In cases of severe ankylosis, arch bar placement may not be possible at this time.

The incisions were packed with surgical sponges. Hemostasis below the arch was achieved with bipolar electrocautery.<sup>27</sup>

Next, attention was directed to the patient's left side where nearly an identical procedure was performed. The preauricular and retromandibular incisions were completed in the exact same manner as the right. These incision accesses connected in the subperiosteal plane on the lateral side of the ramus.

Starting on the right side, the mandibular condyle was dissected free and then the most superior 2cm of the condyle were sectioned free using the 701 bur and T-handle osteotome<sup>28</sup> with curved retractors placed around the medial side of the condyle and condylar neck to protect the maxillary artery. The condylar segment was then delivered after dissection of its tenacious muscle attachments. Following this the remaining disc and fibrous tissue in the glenoid fossa were removed on the medial aspect not to cause uncontrollable bleeding. Following this, the glenoid fossa and the eminence were clear of fibrous tissue; additionally, they were hemostatic. The medial pterygoid was injected with local anesthetic with epinephrine. Coronoideotomy was performed with an oscillating saw from the submandibular approach with visualization from the preauricular approach.

On the left side, an identical procedure was performed for the condylectomy and coronoideotomy. All of the soft tissue from the fossa was removed like the right side. Then, both glenoid fossa implants were inserted and noted to be seated appropriately. Two 6mm screws were used to preliminarily fixate these implants. Using a non-contaminating technique, the oral cavity was then accessed by two members of the surgical team and placed the patient into maxillomandibular fixation using 24-gauge wire. The members of the surgical team that entered the oral cavity were then rescrubbed and the patient was then repped prior to the next portion of the procedure with occlusive dressing replaced. The surgical instruments used in the oral cavity were kept on a mayo stand, separate from the surgical field.

Next, attention was directed to the right submandibular incision where the condylar portion was then inserted and positioned on the lateral aspect of the mandible. The condylar portion was seated a the superior-posterior direction and secured with a 8-10 mm 2.0 mm screw as per the TMJ Concept's protocol A total of nine screws were used. Attention was paid to keep each screw osteotomy centered in the ramus component. Prior to this placement, posterior and superior seating of the condyle was ensured.

Attention was next directed to the left condylar segment which was seated in a similar fashion as to that described for the right. It was adapted and secured with 8 mm - 10mm screws that were placed through the submandibular incisions as per the TMJ Concepts protocol, nine were used. At this point, the remaining two 6mm screws were placed in each fossa implant for final fixation of the fossa implants.

Next, the patient's oral cavity was re-entered using a sterile technique and the MMF was released. The patient's occlusion was noted to be Class I molar and canine bilaterally. The surgical sites were then irrigated with normal saline and then attention was then directed to the periumbilical region. The inferior aspect of the umbilical region was then anesthetized with 2% lidocaine with 1:100,000 epinephrine. Incision was made in the inferior aspect of the umbilicus to gain access into the subdermal plane. Blunt dissection was made in this area to expose some small portions of fat. Roughly 3 cubic centimeter of fat were then harvested and placed around the heads of the TMJ condylar prostheses. The periumbilical incision was then irrigated and then closed with 4-0 poliglecaprone 25 suture and interrupted deep and subcuticular fashion. The incision was then covered with bacitracin and skin adhesive.

Attention was then directed to the preauricular and submandibular incisions. The right and left preauricular incisions were then irrigated with bacitracin and normal saline irrigation. A 701 bur was used to make osteotomies of the bilateral mandibular angle borders and the masseters were sutured to the holes using 2-0 polydioxanone suture to

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<sup>27</sup> It is important to use bipolar cautery near neural tissue as the Bovie may result in a penumbra of tissue damage.

<sup>28</sup> A sagittal saw may be used here.

reconstitute the pterygomasseteric sling. 4-0 poliglecaprone 25 suture to reapproximate the capsular ligament, the TMJ capsule and then the SMAS was closed with interrupted 4-0 poliglecaprone 25 suture and the skin was closed with interrupted deep dermal 4-0 poliglecaprone 25 suture, followed by a running 5-0 polypropylene suture. The submandibular incisions were closed with 4-0 poliglecaprone 25 to reapproximate the platysma, 4-0 poliglecaprone 25 deep dermal sutures, and running 5-0 polypropylene suture in the skin.

Finally, attention was directed to the oral cavity where the patient's occlusion was noted to be unchanged. The patient's oral cavity and oropharynx was thoroughly suctioned free of saliva and debris the throat pack removed. An orogastric tube was passed. Heavy elastics were placed on the Erich arch bars. The dressings were removed from the bilateral EACs. The left submandibular incision site was injected with Exparel for post-operative anesthesia. Bilateral EACs were examined with no EAC injury noted. The patient's Foley catheter was removed and a Jobst head compression dressing was placed around the patient's head to allow for postoperative compression. The head of the bed was then rotated back to the anesthesia team. The patient was extubated in the operating room and transferred to the PACU in stable condition.

**Notes:**



**SECTION IX**  
**DENTOALVEOLAR SURGERY**

## 51) Single Tooth Extraction

### a. Indications for Treatment

1. Caries
2. Fractured/cracked tooth
3. Malposed tooth
4. Impacted tooth
5. Failed root canal therapy

### b. Complications of Treatment

1. Nerve damage
2. Jaw fracture
3. Hemorrhage
4. Osteomyelitis
5. Sinus exposure
6. Tooth displacement
7. Aspiration
8. Ingestion
9. Gingival laceration
10. Osteonecrosis
11. Root tip fracture/displacement
12. Damage to adjacent teeth

### c. Key Steps in Treatment

1. Anesthetize the patient
2. +/- Reflect the papilla
3. Elevate the tooth
4. Forcep extraction
5. Irrigation of extraction site
6. Placement of collagen plug/bone graft
7. +/- Suture
8. Gauze pack placement

## SURGICAL EXTRACTION OF A SINGLE TOOTH

### PREOPERATIVE DIAGNOSIS

1. Carious tooth involving the pulp #18 (ICD K02.63)

### POSTOPERATIVE DIAGNOSIS

1. Carious tooth involving the pulp #18 (ICD K02.63)

### PROCEDURE PERFORMED

1. Surgical extraction of tooth #18 (CDT D7210)
2. Deep sedation/general anesthesia (CDT D9223)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

All appropriate leads and monitors were placed.

A 24-gauge IV was started in the right antecubital fossae. IV sedation induction was achieved using 5mg of midazolam and 30mg of propofol. 4mg of ondansetron and 8mg of dexamethasone was administered. A bite block was placed. 1 carpules of 2% lidocaine with 1:100,000 epinephrine and 1 carpules of 0.25% bupivacaine was used to achieve local anesthesia in the mandible.

The mesial and distal papillae were reflected using a No. 9 periosteal elevator. The tooth was elevated with limited movement. A 701/702/703 bur was used to remove bone on the buccal aspect of the tooth under sterile saline irrigation. Next, the crown was sectioned between the roots and the root tips were elevated and extracted. A piece of gelatin foam was placed in the extraction site and the wound was closed with 4-0 chromic gut suture.

All root tips were accounted for. Two gauze packs were placed bilaterally and the patient began the process of recovery from anesthesia. The patient tolerated the procedure well and will be discharged once discharge criteria are met.

### Notes:

## 52) Third molar extraction

### a. Indications for Treatment

1. Caries
2. Fractured/cracked tooth
3. Malposed tooth
4. Impacted tooth
5. Failed root canal therapy

### b. Complications of Treatment

1. Nerve damage
2. Jaw fracture
3. Hemorrhage
4. Osteomyelitis
5. Sinus exposure
6. Tooth displacement
7. Aspiration
8. Ingestion
9. Gingival laceration
10. Osteonecrosis
11. Root tip fracture/displacement
12. Damage to adjacent teeth

### c. Key Steps in Treatment

1. Anesthetize the patient
2. +/- Reflect the flap
3. 702/703 bur bone reduction
4. Split tooth
5. Extraction of tooth segments
6. Irrigation of extraction site
7. Placement of collagen plug/bone graft
8. +/- Suture
9. Gauze pack placement

## EXTRACTION OF IMPACTED THIRD MOLARS

### PREOPERATIVE DIAGNOSES

1. Carious teeth occlusal surface #1,16,17,32 (ICD K02.53)
2. Impacted teeth #17,32 (ICD K01.1)

### POSTOPERATIVE DIAGNOSES

1. Carious teeth occlusal surface #1,16,17,32 (ICD K02.53)
2. Impacted teeth #17,32 (ICD K01.1)

### PROCEDURE PERFORMED

1. Forcep extraction #1, 16 (CDT D7140) or (CPT 41899)
2. Extraction of partial bony impacted teeth #17, 32 (CDT D7230)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. All appropriate leads and monitors were placed.

A 24-gauge IV was started in the right antecubital fossae. IV sedation induction was achieved using 5mg of midazolam and 30mg of propofol. 4mg of ondansetron and 8mg of dexamethasone was administered. A bite block was placed. 4 carpules of 2% lidocaine with 1:100,000 epinephrine and 2 carpules of 0.25% bupivacaine was used to achieve local anesthesia in the maxilla and mandible. Attention was first directed to the maxillary right quadrant where a distal releasing incision was made and bone distal and buccal to tooth #2 was removed with a rongeur. The crown of the impacted tooth was visualized and luxated using a #303 elevator. The tooth was removed, excess bony fragments were removed and the site was irrigated thoroughly with normal saline. A 4-0 chromic gut suture was placed, approximating the papillae distal to tooth #2. Next, a 15 blade was used to make a buccal release adjacent tooth #32. A 703 bur under saline irrigation was used to trough the bone around the tooth. Tooth #32 was sectioned and removed in two pieces. The site was irrigated free of granulation tissue and the follicle was removed. A 4-0 chromic gut suture was placed in the site to reapproximate the tissue. Two gauze packs were placed and the bite block was transferred from the left to the right side. Attention was then directed to the maxillary left quadrant where a distal releasing incision was made and bone distal and buccal to tooth #15 was removed with a rongeur. The crown of the impacted tooth was visualized and luxated using a #303 elevator. The tooth was removed, excess bony fragments were removed and the site was irrigated thoroughly with amounts of normal saline. A 4-0 chromic gut suture was placed, approximating the papillae distal to tooth #15. Finally, attention was directed to the mandibular left quadrant where a distobuccal release was made adjacent tooth #17. A buccal trough was made under saline irrigation with a 703 bur. The tooth was sectioned and extracted in two pieces. A 4-0 chromic gut suture was placed.

All root tips were accounted for. Two gauze packs were placed bilaterally and the patient began the process of recovery from anesthesia. The patient tolerated the procedure well and will be discharged once discharge criteria are met.

### Notes:

## 53) Full mouth extraction

### a. Indications for Treatment

1. Non-restorable dentition
2. Pre-radiation therapy
3. Severe periodontitis
4. Rampant caries

### b. Complications of Treatment

1. Retained root tip
2. Sinus exposure
3. Trigeminal nerve injury
4. Remaining undercuts

### c. Key Steps in Treatment

1. Local anesthetic
2. Sulcular Incision (ensure 2mm on either side of desired area to limit tearing of the flap)
3. Elevate full thickness mucoperiosteal flap
4. Luxate the teeth
5. Extraction of the teeth in a sequential fashion
6. Check for root tips
7. Curette extraction sites
8. Perform alveoloplasty
9. Irrigate
10. Trim mucosal edges
11. Closure of mucosa

A full mouth extraction is performed in a similar manner to a single tooth extraction except that all remaining teeth are removed, four quadrants of alveoloplasty are performed and existing maxillary or mandibular tori or buccal exostoses are also removed. Refer to the single tooth extraction template for generating a template for full mouth extractions. It is important to include systemic conditions in the preoperative and postoperative diagnoses sections. For example: Type II diabetes mellitus with oral complications (ICD 10 E11.63), Type II diabetes mellitus with periodontal disease (ICD 10 E11.630), Type II diabetes mellitus with other oral complications (ICD 10 E11.638), history of radiation to the head and neck region (ICD 10 M27.8), history of methamphetamine abuse (ICD 10 F15.20), etc.

## 54) Impacted Tooth Exposure and Bonding

### a. Indications for Treatment

1. Impacted teeth
2. Orthodontist plan for facilitated eruption

### b. Complications of Treatment

1. Chain failure
2. Damage to tooth follicle
3. Failure of eruption
4. Damage to adjacent enamel/cementum

### c. Key Steps in Treatment

1. Exposure of the impacted tooth
2. Isolation of the field
3. Application of bonding agent
4. Placement of gold chain
5. Curing of composite material
6. Strength testing of the chain
7. Wound closure

## IMPACTED TOOTH EXPOSURE AND BONDING

### PREOPERATIVE DIAGNOSIS

1. Impacted tooth #22 (ICD K01.1)

### POSTOPERATIVE DIAGNOSIS

1. Impacted tooth #22 (ICD K01.1)

### PROCEDURE PERFORMED

1. Exposure of tooth #22 (CDT D7280)
2. Bracket placement tooth #22 (CDT D7283)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. All appropriate leads and monitors were placed.

A throat pack was placed and 3.6 cc of 2% lidocaine with 1: 100,000 epinephrine was used. A 1 cm incision was made in the mandibular vestibule. Dissection ensued through mucosa, mentalis muscle and deep to bone. The crown of tooth #22 was exposed. The enamel was acid etched; a gold chain was secured to the tooth with composite and light cured. The chain was sutured to the braces with a 3-0 silk suture. The mentalis muscle was closed with 4-0 polyglactin 910 suture and the mucosa was closed with 3-0 chromic gut suture. The patient tolerated the procedure well and was extubated at the conclusion of the procedure.

### Notes:

## 55) Alveoloplasty

### a. Indications for Treatment

1. Alveolar bone irregularities
2. Large undercuts

### b. Complications of Treatment

1. Bony spicules

### c. Key Steps in Treatment

1. Anesthesia
2. Incision mid-crestal or sulcular (ensure 2mm on either side of desired area to limit tearing of the flap)
3. Elevate full thickness mucoperiosteal flap
4. Beware of important anatomic structures
5. Remove large irregularities and bone spicules of excess bone with rongeur, football bur
6. Bone file to finish smoothing the bone
7. Palpate mucosa over the bone
8. Ensure no undercuts
9. Trim the excess edges of the mucosa
10. Irrigate
11. Closure of mucosa

## ALVEOLOPLASTY

### PREOPERATIVE DIAGNOSIS

1. Alveolar hyperplasia (ICD M26.72)

### POSTOPERATIVE DIAGNOSIS

1. Alveolar hyperplasia (ICD M26.72)

### PROCEDURE PERFORMED

1. Alveoloplasty x 4 quadrants (CDT D7310) or (CPT 41874)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. All appropriate leads and monitors were placed.

A throat pack was used and 3.6 cc of 2% lidocaine with 1: 100,000 epinephrine was used. An incision was made in the mid-crestal region of the left maxilla/right maxilla/left mandible/right mandible. A full thickness mucoperiosteal flap was reflected exposing the underlying bony irregularities. A bur was used to reducing the excess bone under saline irrigation until the bony ridge was acceptable for future denture placement. The site was irrigated thoroughly and the mucosa was closed with 3-0/4-0 chromic gut suture in a running fashion. The patient tolerated the procedure well.

\*It is important to note whether the alveoloplasty is performed in conjunction with extractions as the code differs. With extractions, one should use the code D7311, whereas, without extractions one should use the code D7310.

### Notes:

## 56) Maxillary Torus Reduction

### a. Indications for Treatment

1. To improve fit of prosthesis
2. To increase tongue space
3. To treat speech problems
4. To improve gingival health due to abrasive injuries

### b. Complications of Treatment

1. Wound dehiscence
2. Perforation into floor of nose
3. Palatal necrosis
4. Infection

### c. Key Steps in Treatment

1. Greater and lesser palatine block, local infiltration
2. Raise full thickness flap over torus
3. Throat pack
4. Use surgical carbide burr to score torus into segments close to contour of normal alveolar ridge/ if torus is smaller can use a round burr to remove.
5. Use chisel to fracture off segment of torus
6. Use round bur/bone file to smooth contour of bone
7. Irrigate
8. Close full thickness flap with sutures

## MAXILLARY TORUS REDUCTION

### PREOPERATIVE DIAGNOSIS

1. Maxillary torus (torus palatinus) (ICD M27.0)

### POSTOPERATIVE DIAGNOSIS

1. Maxillary torus (torus palatinus) (ICD M27.0)

### PROCEDURE PERFORMED

1. Removal of maxillary torus (CPT 21032) (CDT D7472)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. All appropriate leads and monitors were placed. A throat pack was used and 3.6 cc of 2% lidocaine with 1: 100,000 epinephrine was used to infiltrate the palatal mucosa.

A Double-Y incision was made over the palatal torus and full thickness mucoperiosteal flap was reflected exposing the underlying bony tumor. Care was taken to avoid perforation of the palatal flap. A 703 bur was used to trough the central aspect of the bony outgrowth and troughs were made extending radially from the center to the level of the palatal floor. A small 5mm straight chisel was used to remove the palatal torus in sections. An egg shaped bur was then used to smooth the remaining bony irregularities in preparation for a complete denture. The site was irrigated thoroughly with saline and the flaps were closed with a 4-0 chromic gut suture.

\*A retentive maxillary stent may be used to reduce postoperative pain or discomfort.

### Notes:

## 57) Mandibular Torus Reduction

### a. Indications for Treatment

1. To improve fit of prosthesis
2. To increase tongue space
3. To treat speech problems
4. To improve gingival health due to abrasive injuries

### b. Complications of Treatment

1. Wound dehiscence
2. Injury to floor of mouth, Wharton's Duct
3. Necrosis of tissue
4. Infection

### c. Key Steps in Treatment

1. IAN block, local infiltration
2. Sulcular incision and full thickness mucosal flap raised over torus
3. Protect floor of mouth w/ periosteal elevator/skin retractor
4. Use surgical carbide burr to score torus into segments close to contour of normal alveolar ridge
5. Use chisel to fracture off segment of torus
6. Use round bur/bone file to smooth contour of bone
7. Irrigate
8. Close full thickness flap with sutures

## MANDIBULAR TORUS REDUCTION

### PREOPERATIVE DIAGNOSIS

1. Torus mandibularis (ICD M27.0)

### POSTOPERATIVE DIAGNOSIS

1. Torus mandibularis (ICD M27.0)

### PROCEDURE PERFORMED

1. Excision of torus mandibularis (CPT 21031) (CDT D7473)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. All appropriate leads and monitors were placed. A throat pack was used and 3.6 cc of 2% lidocaine with 1: 100,000 epinephrine was used.

A lingual sulcular incision was made from the mandibular second molar to the canine bilaterally. A Seldin retractor was placed beneath the mandibular torus and 702/703 bur was used to trough the bone along the curvature the body of the mandible. This trough was deepened until a 5mm straight chisel was used to cleave the bony growth from the body of the mandible proper. The bone was excised and the lingual mucosal incision was closed with interdental sutures. Wounds were found to be hemostatic and there was no increased swelling of the floor of the mouth. The patient tolerated the procedure well.

### Notes:

## 58) Coronectomy

### a. Indications for Treatment

1. Prevention of injury to the IAN
2. Intimate relationship between the root of the tooth and the IAN

### b. Complications of Treatment

1. Damage to IAN
2. Infection
3. Root migration
4. Pulp necrosis
5. Osteomyelitis
6. Damage to lingual nerve

### c. Key Steps in Treatment

1. Exposure of third molar
2. Transection of the crown
3. Reduction of root until at least 3mm under the bony crest
4. Primary closure

## CORONECTOMY

### PREOPERATIVE DIAGNOSIS

1. Impacted tooth #17 (ICD K01.1)

### POSTOPERATIVE DIAGNOSIS

1. Impacted tooth #17 (ICD K01.1)

### PROCEDURE PERFORMED

1. Coronectomy intentional partial tooth removal #17 (CDT D7251)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. All appropriate leads and monitors were placed. A throat pack was placed and 3.6 cc of 2% lidocaine with 1: 100,000 epinephrine was used.

A distobuccal releasing incision was made adjacent to tooth #18. A full thickness mucoperiosteal flap was developed and superficial bone was removed exposing the crown of the mesioangular impacted tooth #17. Bone was removed to below the level of the cemento-enamel junction and the crown was sectioned from the roots. After removal of the crown of the tooth a 703 bur was used to further reduce tooth structure to insure at least a depth of 3mm of bone surrounded the tooth remnants in a coronal-apical dimension. Primary closure was achieved with 4-0 chromic gut suture. The patient tolerated the procedure well.

### Notes:

## 59) Caldwell- Luc Foreign Body Removal

### a. Indications for Treatment

1. Insufficient vertical height for maxillary implants
2. Chronic maxillary sinusitis

### b. Complications of Treatment

1. Dehiscence of the incision
2. Delayed-healing
3. Swelling and ecchymosis
4. Small membrane tear
5. Larger membrane tear
6. Presence of antral septum (make 2 windows)
7. Overpacking of the sinus
8. Infection

### c. Key Steps in Treatment

1. Local anesthesia
2. Crestal incision with vertical relaxing incision, elevation of mucoperiosteal flap
3. Quadrilateral or circular buccal osteotomy with round #6-8 bur
4. Elevation of the Schneiderian membrane
5. Grafting the osseous cavity, until cavity is loosely filled
6. Mucoperiosteal is then repositioned and sutured in place with or without a guided bone regeneration membrane
7. Post-op instruction and sinus precautions

## CALDWELL LUC FOREIGN BODY REMOVAL

### PREOPERATIVE DIAGNOSIS

1. Foreign body in left maxillary sinus (ICD T17.0)

### POSTOPERATIVE DIAGNOSIS

1. Foreign body in left maxillary sinus (ICD T17.0)

### PROCEDURE PERFORMED

1. Caldwell-Luc procedure (CPT 31030)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. All appropriate leads and monitors were placed. A throat pack was placed and \_\_\_cc of 2% lidocaine with 1:100,000 epinephrine was used.

Attention was next directed to left posterior maxilla where an incision was made from distal of tooth #15 to mid-facial of tooth #11 with mesial and distal releasing incisions extended to mucogingival junction. Dissection ensued superiorly to expose the lateral wall of left maxillary sinus. Next, a round bur was used to make opening window into the left maxillary sinus between apex of roots of teeth #13 & 15. Once the Schneiderian membrane was exposed and perforated, were able to visualize the foreign object in the left maxillary sinus. Foreign object was removed from left maxillary sinus. Left maxillary sinus was irrigated with 150 cc of normal saline with bacitracin and an endoscope was used to visualize left maxillary sinus. Schneiderian membrane was found to be inflamed and erythematous. A 3-0 chromic gut suture was used to close the maxillary incision. Next, the oral cavity was suctioned, the throat pack was removed and an orogastric tube was passed. The patient was extubated in the OR without complication and transferred to the PACU in good condition.

### Notes:



**SECTION X**  
**IMPLANTOLOGY AND BONE GRAFTING**

## ICD 10 and CPT codes for Intraoral Bone Grafting and Classification of Edentulism

21215 - Graft, bone; mandible (includes obtaining graft)

21210 - Graft, bone; nasal, maxillary or malar areas (includes obtaining graft)

21248 - Reconstruction of mandible or maxilla, endosteal implant (eg, blade, cylinder); partial

21249 - Reconstruction of mandible or maxilla, endosteal implant (eg, blade, cylinder); complete

K08.1 Complete loss of teeth

K08.111 Complete loss of teeth due to trauma, class I

K08.112 Complete loss of teeth due to trauma, class II

K08.113 Complete loss of teeth due to trauma, class III

K08.114 Complete loss of teeth due to trauma, class IV

K08.121 Complete loss of teeth due to periodontal disease, class I

K08.122 Complete loss of teeth due to periodontal disease, class II

K08.123 Complete loss of teeth due to periodontal disease, class III

K08.124 Complete loss of teeth due to periodontal disease, class IV

K08.131 Complete loss of teeth due to caries, class I

K08.132 Complete loss of teeth due to caries, class II

K08.133 Complete loss of teeth due to caries, class III

K08.134 Complete loss of teeth due to caries, class IV

K08.2 Atrophy of edentulous alveolar ridge

K08.21 - Minimal atrophy of the mandible

K08.22 - Moderate atrophy of the mandible

K08.23 - Severe atrophy of the mandible

K08.24 - Minimal atrophy of maxilla

K08.25 - Moderate atrophy of the maxilla

K08.26 - Severe atrophy of the maxilla

K08.3 Retained dental root

K08.4 Partial loss of teeth

K08.411 Partial loss of teeth due to trauma, class I

K08.412 Partial loss of teeth due to trauma, class II

K08.413 Partial loss of teeth due to trauma, class III

K08.414 Partial loss of teeth due to trauma, class IV

K08.421 Partial loss of teeth due to periodontal disease, class I

K08.422 Partial loss of teeth due to periodontal disease, class II

K08.423 Partial loss of teeth due to periodontal disease, class III

K08.424 Partial loss of teeth due to periodontal disease, class IV

K08.431 Partial loss of teeth due to caries, class I

K08.432 Partial loss of teeth due to caries, class II

K08.433 Partial loss of teeth due to caries, class III

K08.434 Partial loss of teeth due to caries, class IV

## 60) Indirect Sinus Lift

### a. Indications for Treatment

1. Need for additional bony vertical height (4 to 8mm) in preparation for implants placement
2. When teeth are present adjacent to edentulous site
3. When at least 6mm of alveolar bone is present

### b. Complications of Treatment

1. Infection
2. Membrane tear
3. Pushing of the bone core into the sinus

### c. Key Steps in Treatment

1. Palatal incision with sulcular flap elevation
2. Trephination using an appropriate diameter trephine drill (leaving a minimum of 2mm between adjacent teeth and trephine)
3. Loosely fill the sinus with bone graft material
4. Repositioning and suturing of mucoperiosteal flap

## INDIRECT SINUS LIFT

### PREOPERATIVE DIAGNOSIS

1. Acquired edentulism due to trauma class I partial edentulism (ICD K08.411)
2. Atrophy of maxillary ridge, severe (ICD K08.26)

### POSTOPERATIVE DIAGNOSIS

1. Acquired edentulism due to trauma class I (ICD K08.411)
2. Atrophy of maxillary ridge, severe (ICD K08.26)

### PROCEDURES PERFORMED

1. Indirect maxillary sinus lift bone graft (CPT 21210-52) (CDT D7951 and D4266)
2. Dental implant placement (CDT D6010)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. All appropriate leads and monitors were placed. A throat pack was placed and 3.6 cc of 2% lidocaine with 1: 100,000 epinephrine was used.

A full thickness mucoperiosteal flap was reflected and the pilot implant drill was drilled to the desired depth. Next, sequential increasing diameter drills were used to the desired depth approximately .5-1.0mm short of the sinus floor. A sinus osteotome was then used with a mallet to fracture in the floor of the sinus without perforating the Schneiderian membrane. A collagen membrane and bone allograft was placed into the site of the sinus lift. Next, the implant was placed into the site and torqued to 35 NcM. The site was closed with 3-0 chromic gut suture and the patient was placed on sinus precautions.

### Notes:

## 61) Implant Placement

### a. Indications for Treatment

1. Partial edentulism
2. Complete edentulism

### b. Complications of Treatment

1. Implant failure
2. Resorption of buccal plate
3. Dehiscence or fenestration
4. Unacceptable aesthetics
5. Non-restorable position

### c. Key Steps in Treatment

1. Crestal incision with a palatal approach that extends through sulci of the facial aspects of adjacent teeth with vertical releasing incisions on the distobuccal line angles
2. Elevate full thickness mucoperiosteal flap
3. Small round bur used to smooth the alveolar crest and mark the position of the implant
4. Initial prep with pilot drill
5. Check angulation
6. Enlarge the access with a round bur
7. Use the drill and extend to length
8. Check angulation
9. Widen the coronal aspect of the osteotomy
10. Complete implant site prep (Stay at least 1.5mm away from adjacent teeth and have at least 1mm of palatal and buccal bone)
11. Insertion of implant at least 1 mm apical to adjacent teeth CEJ
12. Place cover screw
13. +/- connective tissue graft to facial surface of implant site
14. Irrigate
15. Closure of flap
16. If prosthesis overlying trim to relieve excessive pressure
17. Wait at least 8 weeks
18. Uncover implant
19. Remove cover screw
20. Place healing abutment and fabricate provisional for tissue conditioning

## IMPLANT PLACEMENT

### PREOPERATIVE DIAGNOSIS

1. Acquired Edentulism site #8 (ICD K08.412)

### POSTOPERATIVE DIAGNOSIS

1. Acquired Edentulism site #8 (ICD K08.412)

### PROCEDURE PERFORMED

1. Implant placement site #8 (CDT D6010)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. All appropriate leads and monitors were placed. A throat pack was used and 1.7 cc of 2% lidocaine with 1: 100,000 epinephrine was used.

A full thickness paracrestal, palatally biased mucoperiosteal flap was reflected. The pilot implant drill was drilled to the desired depth. Next, sequential increasing diameter drills were used to the desired depth. Angulation was verified at each drilling step in the sequence. Next, the implant was placed into the site and torqued to 35 NcM. A prefabricated temporary crown was placed out of occlusion to assist in sculpting the soft tissues. The site was closed with 4-0 chromic gut suture.<sup>29</sup>

### Notes:

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<sup>29</sup> Chromic gut, vicryl and polypropylene suture may have a greater inflammatory effect than a gore-tex based suture material. Suture and needle selection is practitioner dependent.

## 62) Atrophic Mandible Transcervical Approach Implant Placement

### a. Indications for Treatment

1. Non-retentive denture
2. Atrophic mandible

### b. Complications of Treatment

1. Infection
2. Failure of implants
3. Failure of graft
4. Scarring
5. Intraoral communication
6. Asymmetry of the mandible

### c. Key Steps in Treatment

1. Outline mandible and incision
2. Approach the inferior approach to the mandible between the regions of the mental foramen
3. Reflect periosteum from buccal and occlusal surface
4. Expose the mental nerve (located more posterior in an atrophic mandible)
5. Extend buccal dissection to the anterior border of the masseter
6. Extend occlusal dissection to the retromolar pad and anterior border of the ascending ramus
7. The first implant should be placed 5mm anterior to the mental foramen
8. Place a total of 4-6 4.0 x 15mm implants 1cm apart and parallel to each other
9. Place desired bone graft posterior to the mental nerve first and compact
10. Place the remaining bone graft anterior to the mental nerve covering the implants
11. +/- Platelet rich plasma
12. Three months uncover implants and restore

## **TRANSCERVICAL “TENT POLE” PLACEMENT OF IMPLANTS and BILATERAL SINUS LIFTS**

### PREOPERATIVE DIAGNOSES

1. Severe atrophy maxilla (ICD K08.25)
2. Atrophic mandible (ICD K08.22)

### POSTOPERATIVE DIAGNOSES

1. Severe atrophy maxilla (ICD K08.25)
2. Atrophic mandible (ICD K08.22)

### PROCEDURE PERFORMED

1. Bilateral maxillary sinus lifts (CPT 21210-52) (CDT D7951 and D4266)
2. Mandibular implant placement x4 (CDT D6010) (CPT 21249)
3. Mandibular bone graft (CPT 21215-52)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. 1.7 cc of 2% lidocaine with 1: 100,000 epinephrine was injected in the submental region in the subcutaneous areas to achieve hemostasis.

An incision was marked and a 15 blade was used to go through skin and subcutaneous tissue. Bleeding was arrested with Bovie electrocautery. This incision was continued deep to the inferior aspect of the mandible. Periosteal elevator was used to reflect in the subperiosteal plane, exposing the entire anterior mandible from the symphysis to the symphysis. The mental nerves were identified bilaterally and noted to be at the superior aspect of the crest. The implant sites 5 mm anterior to the mental foramen were measured, as well as 2 sites lateral to the midline. A 2.0 mm pilot drill was used to drill, checking the anterior and posterior as well as medial and lateral dimensions to ensure good implant parallelism. Paralleling pins were then utilized and minor adjustments were made. Next drill used was a 2.8 mm drill, and then a 3.4 mm drill. After this, the implants were then placed into position with satisfactory parallelism and lingual tipping. Cancellous chips were then placed beneath the membrane and DBX putty was placed over that. At this time, whole blood was irrigated over the bone graft and bone putty. Small perforations were made in the anterior aspect of the mandible to stimulate bleeding and the wound was closed with 3-0 Polyglactin 910 suture in an interrupted dermal stitch, followed by a 4-0 polydioxanone in a running subcuticular. Mastisol and Steri-Strips were placed over this, followed by a Coverlet.

Attention was next directed intraorally where a throat pack had previously been placed. A 2 cm incision was made in the left maxillary vestibule. This was continued deep through mucosa, submucosa, through the periosteum to the bone. Tissue was reflected superiorly and inferiorly in the subperiosteal plane and a round bur was used to remove the anterior wall of the maxillary sinus, exposing the sinus membrane. The sinus membrane was raised from the anterior maxillary sinus wall. This was continued inferiorly and posteriorly until a pocket was made. The collagen sponge was placed underneath the sinus membrane and bone putty was placed within the defect. This was closed with a 3-0 chromic gut suture in a running fashion. Attention was next directed to the right maxilla and the anterior maxillary sinus wall, which was approached in a similar fashion with a football bur under copious saline irrigation until the sinus membrane was appreciated. A collagen membrane and bone graft was placed at this site. This side was also closed with 3-0 chromic gut suture. The oral cavity was irrigated and suctioned. Throat pack was removed. An orogastric tube was passed and the patient was extubated in the OR without complication and transferred to the PACU in good condition. There were no complications and the patient tolerated the procedure well.

## 63) Symphysis Graft

### a. Indications for Treatment

1. Atrophic maxilla
2. Atrophic mandible

### a. Complications of Treatment

1. Mental nerve injury
2. Dullness sensation of the lower anterior teeth
3. Meteorotropism

### b. Key Steps in Treatment

1. Sulcular or vestibular incision
2. Reflection of mucoperiosteal flap
3. Osteotomies (at least 5mm from roots and mental foramina)
4. Fracture of bone block
5. Harvest of additional cancellous bone with chisel
6. Hemostatic material (collagen or gelatin) or bone substitute is placed in the cancellous bone to maintain facial contour
7. Closure of mucoperiosteal flap
8. Pressure dressing

## MANDIBULAR SYMPHYSIS GRAFT

### PREOPERATIVE DIAGNOSIS

1. Maxillary bone defect (ICD M26.9)

### POSTOPERATIVE DIAGNOSIS

1. Maxillary bone defect (ICD M26.9)

### PROCEDURE PERFORMED

1. Mandibular symphysis graft (CPT 21215)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. Attention was first directed to anterior maxilla where a palatally biased incision was made and a flap was reflected exposing the bony defect. The site was prepared to receive a bone graft. Periosteal scoring was performed to increase flap length and mobility for a tension free closure.

Next, attention was directed to the mandibular midline where a mucosal incision was made  $\frac{1}{2}$  the distance to the lower lip wet line from the base of the anterior vestibule. The incision was carried through mucosa and the between the bellies of the mentalis muscle exposing the symphysis of the mandible. A 702 bur was used to perforate the cortex in a pattern to obtain a graft adequate to secure to the intended graft recipient site. Once the outline had been made the holes were connected and a curved osteotome was used to remove the bone block graft. The site was thoroughly irrigated and gelatin foam was placed in the defect. The portions of transected mentalis muscle were resuspended with 4-0 polyglactin 910 and the superficial mucosa was closed with 4-0 chromic gut suture.

The block was then secured to the anterior maxilla with 2 microfixation screws for antirotation. An allograft bone graft was placed around the graft and a membrane was placed over the graft. Primary, tension free closure was achieved.

### Notes:

## 64) Ramus Graft

### a. Indications for Treatment

1. Sinus grafting
2. Onlay bone grafting
3. Bone harvesting in conjunction with third molar removal
4. Veneer grafting for additional ridge width
5. Preferred area for harvesting large amounts of particulate bone with scraper device

### b. Complications of Treatment

1. Potential damage to IAN
2. Trismus
3. Osteomyelitis/infection

### c. Key Steps in Treatment

1. Sulcular incision with 45° lateral and posterior release
2. Reflection of mucoperiosteal flap
3. Reflection of masseter m. with large retractor
4. Osteotomies (external oblique, superior ramus, anterior body and inferior)
5. Removal of block graft with chisel angulated parallel to the lateral surface of the mandible
6. No augmentation of the donor site with bone substitutes to prevent irritation of IAN

## MANDIBULAR RAMUS ONLAY GRAFT

### PREOPERATIVE DIAGNOSES

1. Maxillary bone defect (ICD M26.89)
2. Moderate atrophy of the maxilla (ICD K08.25)

### POSTOPERATIVE DIAGNOSES

1. Maxillary bone defect (ICD M26.89)
2. Moderate atrophy of the maxilla (ICD K08.25)

### PROCEDURE PERFORMED

1. Mandibular ramus graft (CPT 21215)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

Attention was first directed to the anterior maxilla where a palatally biased incision was made and a flap was reflected exposing the bony defect. The site was prepared to receive a bone graft. Periosteal scoring was performed to increase flap length and mobility for a tension free closure.

Next, attention was directed to the mandibular left quadrant where a distobuccal releasing incision was made and a full thickness mucoperiosteal flap was reflected. Periosteum and temporalis fascia is reflected. The flap was reflected beyond the external oblique ridge and full exposure the lateral aspect of the mandibular angle and ramus was achieved. The intended graft site was identified and marked with a surgical marker. It is useful to start the osteotomy between the internal and external oblique ridge. A mark was made at the superior aspect of the external oblique was made and a 2cm x 1cm block was harvested using a saw/chisel/ultrasonic scalpel. The osteotomy ended 5mm posterior to the closest erupted tooth.

The block was then secured to the anterior maxilla with 2 microfixation screws for antirotation. An allograft bone graft was placed around the graft and a membrane was placed over the graft. Primary, tension free closure was achieved.

\*This graft may be extended to include the coronoid process for additional bone. Caution should be exercised with the presence of impacted third molars.

### Notes:

## 65) Tuberosity Graft

### a. Indications for Treatment

1. Softer consistency often favorable for filling bone defects
2. Sinus elevation with autogenous bone graft as it is in the same operatory field

### b. Complications of Treatment

1. Oro-antral communication
2. Damage to adjacent teeth
3. Hemorrhage from the greater palatine vessels
4. Hemorrhage from pterygoid plexus

### c. Key Steps in Treatment

1. Crestal incision with vertical releasing incision in lateral aspect
2. Harvest with chisel or rongeur
3. Primary closure

## MAXILLARY TUBEROSITY GRAFT

### PREOPERATIVE DIAGNOSES

1. Maxillary bone defect (ICD M26.89)
2. Moderate atrophy of the maxilla (ICD K08.25)

### POSTOPERATIVE DIAGNOSES

1. Maxillary bone defect (ICD M26.89)
2. Moderate atrophy of the maxilla (ICD K08.25)

### PROCEDURE PERFORMED

1. Maxillary tuberosity graft (CPT 21210)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified.

A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

Attention was first directed to anterior maxilla where a palatally biased incision was made and a flap was reflected exposing the bony defect. The site was prepared to receive a bone graft. Periosteal scoring was performed to increase flap length and mobility for a tension free closure.

Next, attention was directed to the maxillary left tuberosity region where a paracrestal incision was made and a full thickness mucoperiosteal flap was reflected. The tuberosity was identified and marked with a surgical marker. A mark was made at the superior aspect of the tuberosity below the sinus and anterior to the pterygomaxillary junction. A saw/chisel/ultrasonic scalpel was used to remove a portion of the tuberosity. Superiorly, an MX grafter/702 bur was used to remove additional particulate bone. The bone was then morselized and placed into the anterior hard tissue defect. The wound was closed with chromic gut suture.

### Notes:

## 66) Tibial Bone Graft

### a. Indications for Treatment

1. Maxillary bone defect
2. Mandibular bone defect

### b. Complications of Treatment

1. Ecchymosis of the leg distal to donor site
2. Hematoma
3. Wound dehiscence
4. Infection
5. Fracture
6. Nerve damage

### c. Key Steps in Treatment

1. Shave leg
2. Oblique incision directly over Gerdy's tubercle
3. Osteotomies
4. Bone curettes to harvest cancellous bone
5. Hemostatic agents such as microfibrillar collage
6. Avoidance of full weight bearing for a 2-3 days

## TIBIAL BONE GRAFT

### PREOPERATIVE DIAGNOSES

1. Acquired partial edentulism, missing teeth #12, 13, and 14 (ICD K08.412)
2. Maxillary bone defect (ICD M26.89)
3. Occlusal caries #30 (ICD K02.53)

### POSTOPERATIVE DIAGNOSES

1. Acquired partial edentulism, missing teeth #12, 13, and 14 (ICD K08.412)
2. Maxillary bone defect (ICD M26.89)
3. Occlusal caries #30 (ICD K02.53)

### PROCEDURE PERFORMED

1. Extraction of tooth #30 (CPT 41899) (CDT D7140/D7210)
2. Direct left maxillary sinus lift (CPT 21210) (CDT D7951)
3. Tibial bone harvest from right tibia (CPT 20900) (Do not bill, it is included in 21210)<sup>30</sup>

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available.

The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation (if general anesthesia is selected).

Attention was first directed to the left side of the oral cavity. The throat was suctioned, and a throat pack was placed. Approximately 3 mL of 1% lidocaine with 1:100,000 epinephrine was injected into the surgical sites to promote hemostasis and anesthesia. Next a crestal incision was made from approximately the area of tooth #12 to tooth #15. Anterior and posterior releasing incisions were made through the keratinized tissue. A Woodson periosteal elevator was used to elevate a full-thickness mucoperiosteal flap, exposing the left side of the maxilla in the planned region of the direct maxillary sinus lift. Once this flap had been elevated, the planned surgical osteotomy was identified and marked using a surgical marker. Using round diamond bur, an approximately 12 x 15 mm osteotomy was made. Next using sinus lift instruments, a small window of bone was in-fractured, and the Schneiderian membrane was lifted from inside the maxillary sinus. No tears were appreciated. Once the left maxillary sinus had been adequately visualized and no tears were seen under direct visualization, the surgical team turned their attention to the right tibia.

A surgical skin marker was used to again identify the appropriate landmarks, specifically Gerdy's tubercle on the lateral aspect of the proximal portion of the right tibia. Approximately 2 mL of 1% lidocaine with 1:100,000 epinephrine was injected into the subcutaneous plane. A #15 blade was used to make a full-thickness incision over the bone of the planned incision site in the right proximal tibia. A #9 was then used to elevate the periosteum off the tubercle. Weitlaner retractors were then used to expose the site. A 703 bur was used to dot the planned incision site. These dots were then connected, and a small segment of cortex from the right tibia was removed and placed into a cup. Orthopedic curettes were used to curette cancellous bone from the proximal portion of the tibia. After approximately 30 mL of cancellous bone had been obtained, a bone mill was used to morselize the graft. The right proximal tibia was then irrigated thoroughly. Cellulose hemostatic dressing was placed into the right proximal tibia. The bone was noted to have minimal oozing. The incision site was closed using 4-0 poliglecaprone 25 along the periosteum and then deep, with final closure in a running subcuticular fashion.

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<sup>30</sup> It is important to recognize when a previous code includes harvesting of the graft. Additional information is provided in the footnotes of the anterior iliac crest section.

Attention was directed back to the oral cavity. Tooth #30 was extracted in one piece without difficulty. The bone content that had been collected from the right tibia was then placed into the left maxillary sinus. An absorbable collagen membrane was trimmed to the appropriate size and placed over the osteotomy. The flap was then replaced and sutured back using 3-0 chromic gut sutures in an interrupted fashion.

Finally, attention was directed to the extraction site of tooth #30. This area was curetted out one additional time, irrigated thoroughly, and noted to be hemostatic. The remaining cancellous bone that had been harvested from the tibia was then condensed into the extraction site. A collagen plug was placed over the bone graft, and a figure-of-eight stitch was placed over the collagen plug using 4-0 polyglactin sutures. This concluded the surgical portion of the procedure. The throat was then thoroughly suctioned, and the throat pack was removed. An orogastric tube was placed, the stomach contents suctioned and then removed.

The patient was extubated in the operating room and taken to the PACU in stable condition.

**Notes:**

## 67) Posterior Iliac Crest Graft

### a. Indications for Treatment

1. Mandibular reconstruction/defects
2. Maxillary reconstruction/defect

### b. Complications of Treatment

1. Scarring
2. Nerve damage (cluneal nerves)
3. Arterial injury (superior gluteal artery)
4. Infection
5. Pelvic fracture or instability
6. Sacroiliac joint pain
7. Hematoma
8. Graft failure
9. Ocular damage from prone positioning
10. Compartment syndrome of the buttock
11. Ureteral tract damage

### c. Key Steps in Treatment

1. Prone positioning
2. Longitudinal or oblique incision over the posterior superior iliac spine
3. Exposure and incision through the gluteus maximus muscle
4. Avoid medial dissection through the sacroiliac joint
5. Subperiosteal dissection on the posterior iliac crest
6. Reciprocating saw on the posterior aspect of the crest, removal of cortical bone and curettage of marrow cancellous bone
7. Periosteum closure after placement of hemostatic agents
8. Fascial closure
9. Skin closure

## POSTERIOR ILIAC CREST GRAFT

### PREOPERATIVE DIAGNOSIS

1. Mandibular continuity defect (ICD M84.88)

### POSTOPERATIVE DIAGNOSIS

1. Mandibular continuity defect (ICD M84.88)

### PROCEDURES PERFORMED

1. Posterior iliac bone harvest (CPT 20902)

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation.

The patient was then placed in the prone position. The posterior iliac crest was palpated, local anesthetic was injected subcutaneously for hemostasis and a 6-cm incision over top of the crest was made through the skin and subcutaneous tissue. Bovie electrocautery was utilized to continue dissection down to the crest of the bone. Using Cobb and periosteal elevators the lateral muscle was elevated off the tissue for approximately 6 cm, paying close attention to staying in a power field, the tissue was elevated off the periosteum was elevated off the crest. Once the bone was fully exposed an approximate 5 cm portion was marked out and then using a reciprocating saw, a cortical cancellous cut was made 5 cm in length, 3 cm deep for a 5 x 3 cm block of lateral cortical bone. Using curved osteotomes this was harvested without any complication and then using a curette bone approximately 20 mL of bone marrow was removed as well. Next, the site was thoroughly irrigated and hemostasis was achieved in all soft tissues. Avitene was packed into the site in order to achieve hemostasis and the actual bone site. Once patient was completely hemostatic. The periosteum was closed over the top and a 7 flat drain was placed with an anterior exit that was separate from the wound. The hip was then closed and 2 additional deeper layers before the skin was closed. The deeper layers were closed with Polyglactin 910 suture 4-0 Polyglactin 910 and the skin closed with 4-0 nylon. A pressure dressing was then applied using fluffs and foam tape and a drain to bulb suction. The patient was then flipped back onto the hospital bed from the operating room table in supine position. The bed was turned 180 degrees away from the anesthetic team and the bone graft inset was performed by a second surgical team.

### Notes:

## 68) Anterior Iliac Crest Graft

### a. Indications for Treatment

1. Mandibular reconstruction/defect
2. Maxillary reconstruction/defect

### b. Complications of Treatment

1. Scarring
2. Nerve damage
  - i. Ilioinguinal nerve
  - ii. Lateral femoral cutaneous nerve
3. Arterial injury
4. Infection
5. Pelvic fracture or instability
6. Hematoma
7. Graft failure
8. Hernia
9. Ileus
10. Gait disturbance
11. Chronic pain

### c. Key Steps in Treatment

1. Hip positioning with a hip roll
2. Dissection from skin to Scarpa's fascia
3. Subperiosteal dissection reflecting the abdominal musculature and iliacus from the inner wall of the pelvis
4. Reciprocating saw to cut a medial cortical block
5. Curette the interior aspect of the pelvis to harvest marrow
6. Placement of hemostatic agents in the wound
7. Fascia closure
8. Skin closure

## ANTERIOR ILIAC CREST GRAFT

### PREOPERATIVE DIAGNOSIS

1. Mandibular continuity defect (ICD M84.88)

### POSTOPERATIVE DIAGNOSIS

1. Mandibular continuity defect (ICD M84.88)

### PROCEDURES PERFORMED

1. Anterior iliac bone harvest (CPT 20902)<sup>31</sup>

### PROCEDURE IN DETAIL

The patient's identity and planned procedure were verified in the preoperative holding area and the surgical site was marked. A time-out was performed confirming proper patient, site and procedure, that preoperative antibiotics had been administered and that all necessary equipment was available. The patient was brought to OR #\_\_ and transferred from the stretcher to the operating room table in the supine position. All appropriate leads and monitors were placed. The patient was pre-oxygenated for ten minutes prior to intubation. Intubation was performed without complication.

Attention was first directed to the left lower quadrant of the abdomen which was prepped in the standard fashion. An iodine impregnated plastic adhesive dressing was placed over the anticipated incision site. Skin and subcutaneous tissue was retracted laterally. A 5 cm linear incision was made 1 cm posterior to the palpated anterior superior iliac spine. The incision was carried deep through subcutaneous tissue until the white colored Scarpa's fascia was encountered. This was divided and the periosteum overlying the iliac crest was visualized. The periosteum was divided with electrocautery and a subperiosteal plane was developed reflecting the abdominal musculature and iliacus muscle from the medial wall of the pelvis. A Tessier iliac retractor was used to expose the inferior aspect of the planned cortical cancellous graft. The anticipated graft was outlined and a reciprocating saw was used to cut the anterior, posterior and superior cuts. A curved osteotome was used to complete the inferior and lateral osteotomy and was used to recapitulate the corners of the graft. The graft was then harvested and placed in saline gauze in a closed container. The site was irrigated thoroughly and fibrillar collagen hemostatic agents were placed into the wound. The fascia was closed with 3-0 polyglactin 910 as was the subcutaneous tissue. A 5-0 poliglecaprone suture was used in a subcuticular fashion to close the skin. This was covered with dermal glue. The graft portion was then performed in a site that had been developed by a second surgical team. See their dictation for complete details regarding graft bed site development and in setting of the graft. The patient tolerated the procedure well, was extubated in the OR and taken to the PACU in stable condition.

### Notes:

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<sup>31</sup> 21210 Graft, bone; nasal, maxillary or malar areas (includes obtaining graft) "sinus lift" 21215 Graft, bone; mandible (includes obtaining graft).

## **BACK MATTER**

