RM52 **The Power of Periosteum & the Role of the Medial Femoral Condyle Free Flap in Treatment of Osteoradionecrosis of the Mandible**

Joshua J Goldman, Royal Oak
Presenter: **Joshua J Goldman, MD**
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Background

The AHRQ Radiotherapy Treatment Update states: "Radiotherapy is a mainstay of treatment, offered to nearly 75 percent of all head and neck cancer patients with either curative or palliative intent. Radiotherapy may be used alone or as a part of multimodality approach, often with significant long-term side effects." The treatment of osteoradionecrosis (ORN) has evolved along with the concepts of its etiology. Given the pathophysiologic factors of ORN,(hypovascularity, hypocellularity, and hypoxia) the regenerative capacity of periosteum is of particular reconstructive significance.

The medial femoral condyle free flap (MFCFF) has been established as a versatile source of vascularized periosteum with chimeric potential, safe harvest, and minimal donor site morbidity. Our study provides a comprehensive review of the literature concerning ORN of the mandible (ORN-M), explores the regenerative potential of vascularized periosteum (particularly with protection of the cambial layer via harvest of corticoperiosteal free flaps), and, from our center's pilot experience, offers technical recommendations for an early-to-mid-stage surgical intervention.

Methods

A review of literature was performed on ORN-M, periosteal regeneration (vascularized periosteum versus grafts, basic science studies, translational research), and use of the MFCFF in facial reconstruction. A single surgeon experience of head and neck microsurgical reconstruction, from 2011-2018, included 59 patients. Retrospective chart review identified a group of 11 patients with a diagnosis of ORN-M and/or osteomyelitis of the mandible. Four of 11 patients underwent MFCFF. All other osseous free flap reconstructions were excluded. Outcome assessments included pain resolution, computed tomography (evidence of bony union), complications, and clinical staging.

Results

One patient experienced salvage of an interim pathologic fracture without segmental excision. One patient exhibited a preoperative fistula that resolved after reconstruction. Three patients experienced postoperative facial infections, which prompted alteration in surgical technique. All patients had resolution of preoperative pain. Radiologic staging stabilized (1) or improved (3). None have experienced recurrence or disease progression. All four patients exhibit post-operative union on CT.

Conclusion

The treatment algorithm for ORN-M reserves surgical intervention for salvage of advanced cases. As staging of ORN increases, the likelihood of stabilization/resolution with conservative measures decreases. The regenerative potential of vascularized periosteum, minimal donor site morbidity, and chimeric versatility of the MFCFF exhibited by this pilot cohort suggests it may be an ideal option for early and mid-stage ORN. Our experience indicates the need for a corticotomy with appropriately keyed cortical replacement, thorough sequestrectomy of the medullary canal, and minimal use, or complete avoidance, of hardware.

RM53 **Cervical Spine and Craniovertebral Junction Reconstruction with a Vascularized Fibula Free Flap: A Case Report, Systematic Review, and Meta-Analysis**

Joshua J Goldman, Royal Oak
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Background

The complex anatomy and biomechanics of the craniovertebral junction (CVJ) make appropriate exposure and permanent stabilization technically challenging after vertebral body resection. The results of hardware failure can be dire, if not fatal. Most analyses addressing spinal reconstruction with vascularized bone include all vertebral levels. Because the cervical spine is distinctively well-positioned among a plethora of available recipient vessels, we sought to specifically assess rates of fusion and complications of free fibular struts applied to the cervical region and CVJ. We pooled technical surgical pearls and recommended indications for stabilization with vascularized bone to provide a roadmap for these challenging reconstructions and applied them to our practice.

Methods

A systematic search of PubMed/MEDLINE, Embase, Scopus, and Web of Science was performed resulting in 629 study results. After removal of duplicates, two independent authors reviewed the studies for inclusion and exclusion criteria per PRISMA protocol and assessed availability of appropriate demographic, operative, and outcomes detail, to allow study weighting. The data and recommendations were pooled, analyzed, and applied to a complex case of CVJ hardware failure.

Results

Twenty-five articles met criteria, representing 59 patients and 61 fibula flap C-spine reconstructions. The average number of corpectomies was 2.6 (1-5). Successful fusion was noted in 59 (96.7%) flaps. Failure occurred in 2 patients (3.3%), both of which were salvaged with a contralateral fibula (Table I). Pooled recommended indications include radiated, requiring radiation, and/or infected settings, salvage of hardware failure, >2-level corpectomy, and posterior pharynx defect. Surgical pearls include primary debulking of chimeric flaps, hardware minimization, overlay of excess periosteum, decreased ischemia time, and posterior placement. We applied these recommendations to a case of failed mesh cage (Fig. 1A-B) and achieved a successful fusion, longer than any in current literature to the skull base, with posterior pharyngeal reconstruction (Fig. IIA-C).

Conclusion

Exposure and reconstruction of cervical spinal defects requires comfort with trans-facial techniques and H&N microsurgery. Despite current use mainly as a means of salvage, and representing the upper echelon of technical challenge, the demonstrated success of vascularized fibula may warrant its consideration as a primary means of achieving C-spine fusion in specific circumstances.

RM54 **Volumetric Changes of Transferred Free Anterolateral Thigh Flaps in Head and Neck Lesions**

Kyushu University, Fukuoka
Presenter: **Kenichi Kamizono, MD, PhD.**
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Background: The purpose of this study is to clarify sequential volumetric changes of anterolateral thigh (ALT) flaps transferred to the head and neck lesion.

Methods: We retrospectively analyzed volumetric change of fat and muscle of 22 ALT flaps transferred to the head and neck lesions. We assessed flap volume using the water-displacement method intraoperatively and three-dimensional volume-calculating software using radiographic data postoperatively. We then examined sequential flap volumetric change and the factors affecting those changes.

Results: The average duration until the entire flap volume decreased to its minimal size was 8.7 months. Entire flap volume decreased to 47.4% of its initial intraoperative volume after 8.7 months. The fat volume decreased to 62.5%, and the muscle volume decreased to 30.2% after 8.7 months, respectively. The rate of decrease in muscle volume was significantly larger than that in fat volume ($p<0.05$). The only significant factor which affected entire flap volume reduction was the recipient site (oral and pharyngeal lesions) ($p=0.001$), and which affecting fat volume decrease was postoperative body weight loss ($p=0.046$).

Conclusion: For oropharyngeal lesions, a flap size of 1.6 times larger (100/62.5) than the ideal volume might be required.

RM55 **Free Colon Tissue Transfer for the Management of Xerostomia in Head and Neck Cancer Patients: A Bacteriological Study and Clinical Appraisal**

Ying-Sheng Lin, Taichung
Presenter: **Ying-Sheng Lin, MD, MPH**
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Background

After extensive surgery or radiation therapy, head and neck cancer patients might suffer dry mouth due to destruction of salivary glands, which would cause significant disturbance in speech and swallowing. Without the help of frequent water intake, the patients would have difficulties continuing speaking for more than a few minutes. They would also have difficulties eat hard or dry food. For example, they do not like to eat meat unless it is oily. In this study, we present our clinical experience using free colon tissue transfer to restore the lubrication of oral mucosa, and also the result of our bacteriological study in mice about how different locations of free colon segments would affect the intraluminal bacteria colony.

Methods

A segment of ascending colon or ileocolon was transferred to the oral cavity with microvascular anastomoses. The ascending colon segment was split along its anti-mesenteric border for reconstruction of oral mucosal defect following release of trismus. It was best indicated when there was no tooth at one side of the mouth, so that the flap would not be chewed between the teeth. The ileocolon was transferred to fill the oropharyngeal and hypopharyngeal defect. An experimental study using mice was conducted. Pedicled colon flaps were transferred to a subcutaneous space of abdominal wall. After 3 months, the intraluminal mucosa of the transferred colon flaps were biopsied and bacterial cultures were done.

Results

Clinically, the transferred colon tissue was sufficient to provide lubrication with remarkable improvement of dry mouth. The colon secretion was comfortable for the tongue without bad smell one month postoperatively. Experimentally, the bacterial culture showed that the spectrum of bacteria remained the same, but the colony count had decreased.

Conclusion

Free colon tissue provides lubrication for oral cavity with the secretion similar to saliva. It improves the appetite of patients, and also facilitates speech function for patients suffering dry mouth. The bacterial study showed the bacterial spectrum did not change but the colony decreased. So the original bad smell faded away postoperatively.

RM56 **Double-Barrel Technique Improves Outcomes in Free Fibula Flap Reconstruction of Anterior Mandibular Defects**

New York University Langone Health, New York
Presenter: **Z-Hye Lee, MD**
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Background:

Virtual surgical planning (VSP) has contributed to technical advancements leading to more sophisticated reconstruction after segmental mandibulectomy. We present our experience on reconstruction of anterior mandibular defects utilizing the fibula free flap and the effect of recent innovations in VSP on functional outcomes.

Methods:

A retrospective chart review was performed on all patients undergoing mandibular reconstruction with virtually planned free fibula flaps at a single institution between 2008 and 2018. Anterior mandibular defects involving the symphysis and parasymphysis were identified, and patient demographics, perioperative characteristics and postoperative outcomes were analyzed.

Results:

Eighty-five patients underwent anterior mandibular reconstruction with free fibula flap with 42% of reconstructions performed for malignancy. Mean follow-up was 24.8 ± 25.9 months. Double-barrel fibula was utilized in 24 (28.2%) of cases and a customized reconstruction plate was used in 32 (37.6%) of all cases. Patients with double-barrel fibulas were significantly more likely to undergo dental rehabilitation (70.8% vs. 45.9%, p=0.038) and to tolerate oral nutrition (100% vs

75.4%; p=0.007) compared to those undergoing single-barrel reconstruction. Flap failure occurred in 6 cases (7%), none of which were double-barrel reconstructions.

Conclusion:

The free fibula flap is an excellent option for reconstruction of anterior mandibular defects. The use of double-barrel technique is associated with improved outcomes, reflecting our evolving expertise in this area of complex head and neck reconstruction.

RM57 **The Superficial Circumflex Iliac Artery Perforator (SCIP) Flap: Is It the Ideal Soft Tissue Flap in Head and Neck Reconstruction?**

Inselspital University Hospital Bern, Bern
Presenter: **Radu Olariu, MD**
Radu Olariu, MD(1), Cedric Zubler, MD(2), Roland Giger, MD, PhD(1), Adriaan O Grobbelaar, MD, PhD(1) and Mihai A Constantinescu, MD, PhD(1)
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Background

A thin skin flap is often desirable in order to achieve a satisfactory functional and aesthetic result in Head and Neck reconstruction. Superficial circumflex iliac artery perforator (SCIP) flaps have been used for this purpose mainly in the Asian population but have yet to gain acceptance in the Western world due to lack of thorough anatomical studies quantifying the vascular pedicle and surface area of the flap.

Methods

We performed an anatomical study on 21 cadavers and used the knowledge gained in a series of Head and Neck reconstructions.

In the anatomical part of the study wide areas were harvested subfascially from the groin of Thiel-fixated cadavers in order to ensure the inclusion of all relevant vessels. Both deep and superficial branches of the superficial circumflex iliac artery were carefully dissected and individually injected with mAngiofil. After CT-imaging the flaps were raised on the superficial plane, perforators were marked and the flaps subsequently rescanned. High-resolution images of regions of interest were taken using micro-CT.

In the clinical arm of our study the anatomical knowledge we gained was used in 15 cases for Head and Neck Reconstruction.

Results

A total of 21 flaps were harvested and analyzed. The deep and superficial branch (present in each specimen) provided each more than 3 perforators (3.4 vs 3.6, $p=0.61$). The length of the pedicle was significantly increased in the deep branch (9.1 cm vs 6.6 cm superficial branch, $p < 0.01$) as was the perfused area (202 cm^2 vs. 112 cm^2 $p<0.01$). The deep branch offers a significantly thinner flap on the deep plane (8.6 vs. 9.7 mm, $p < 0.01$) and on the superficial plane (5.6 vs 6.1 mm, $p < 0.05$), however the superficial plane offers a significantly reduced variability in thickness.

In fifteen clinical cases the mean length and width of the flaps were 16.3 and 7.7 cm respectively and the pedicle was in average 7.1 cm long. There was no flap failure, one flap was revised for venous congestion with flap salvage. Good functional results could be obtained in all patients

Conclusion

This study proves the anatomical reliability of the SCIP flap and its use in the largest clinical series in the Western population. It provides an almost ideal alternative to the radial forearm or ALT flap if a thin pliable fasciocutaneous flap is required. Our anatomical studies indicate that the deep branch based SCIP flaps cutaneous territory is reliable and easy to raise.

RM58 **Reconstruction of Circumferential Pharyngoesophageal Defects Using Three Different Anterolateral Thigh Flap Design: A Single Surgeon Experience with Forty-Two Consecutive Cases**

Marco Pappalardo, Palermo
Presenter: **Marco Pappalardo, M.D.**
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Background: Reconstruction of circumferential hypopharyngeal defects is a challenging task. Indeed, the deleterious effects of radiotherapy can affect the development of late complications such as fistula and strictures. The aim was to compare the early and late postoperative complications following circumferential pharyngoesophageal reconstruction using three different ALT flap designs.

Methods: From 2010 to 2017, a total of 42 circumferential hypopharyngeal defect cases were collected. All patients were men with an average age of 57.5 ± 15.3-year-old. All patients underwent neo-adjuvant concurrent chemo-radiotherapy. In the high-risk patients, we modified our previously described delta-inset thigh flap (dITF) with a refined method using two anchor stitches at the level of the cervical esophagus to the prevertebral fascia to increase its shape and preventing the drop down. A Novel Innovation of voice reconstruction using a J flap design of the ALT has been also added. Patients were divided into three groups based on the flap design: spiral tubing(n=12), dITF(n=14) and Anchor Technique combined with J flap design (AT-J) (n=16). Swallowing was evaluated according to the type of the ingested food and using a 7-point Likert scale by Su et al. Speech function was investigated using a 5-point Likert scale, where a score 1 indicated the patient could not generate any voice and 5 means a very good vocal function.

Results: All flaps survived. Venous thrombosis was detected in one spiral-tubing flap and was successfully salvaged. The follow-up period ranged from 12 to 38 months. Two patients in the spiral-tubing group presented acute carotid blowouts and were salvaged with endovascular trapping of the involved carotid artery. The overall fistula rates among the three groups were not statistically significantly different (P= 0.09). The rate of stricture in distal anastomosis was 33% in the spiral-tubing group, 28% in the dITF group and 6% in the AT-J group (*P*= 0.03). At the last follow-up, a statistical difference was observed among the 3 groups regarding the median deglutition score that was higher in the AT-J group (*P*= 0.02). The median speech score for intelligibility, fluency loudness was 3.5/5 in the AT-J group and was significantly higher than the other 2 groups using the external voice device (*P*= 0.01).

Conclusion s: The dITF and AT-J flap can be safely utilized to reconstruct circumferential hypopharyngeal defects preventing life-threatening flap-related complications such as carotid blowout. The modified refinement of AT-J may circumvent distal anastomosis stricture with significantly better swallowing and speech function outcome.

RM59 **Herpetic Corneal Keratopathy Management By Ipsilateral Supratrochlear Nerve Transfer for Corneal Neurotization**

Chang Gung Memorial Hospital, Chiayi, Chiayi
Presenter: **Chih-Hung Lin, MD**
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Plastic and Reconstructive Surgery, Chang Gung Memorial Hospital, Chang Gung Medical College and Chang Gung University, Chiayi, Taiwan

Background

Neurotrophic Keratopathy (NK) is a potentially sight-threatening condition caused by the impairment of the trigeminal corneal innervations with a decrease or loss of corneal sensitivity. This prospective study aims to evaluate the outcomes of surgical neurotization of the cornea using ipsilateral supra-trochlear nerve transfer in patients with Herpes virus induced neurotrophic keratopathy.

Methods

13 eyes in 13 patients underwent an interdisciplinary corneal neurotization by an ophthalmologist and a plastic surgeon after preoperative exclusion of forehead sensation impairment. A 3cm supra-eyebrow incision allows microsurgical supratrochlear nerve dissection, and a subconjunctival tunneling is performed for the nerve transfer. NK was assessed before and every 3 months after surgery by using slit-lamp microscopy, corneal sensitivity test, specular microscopy, and in vivo confocal microscopy.

Results

All the surgeries had no major complications. Average disease duration from cornea denervation to surgery was 15.2 years. The mean follow-up duration was 18.5 +/- 6 months. The symptoms exhibited subjectively improved visual acuity, and objectively visual analogue scale and NK-grading improvement. The sub-epithelial corneal nerve plexus was found 9 months after surgery. The corneal thickness decreased and the corneal endothelial count increased after the operation.

Conclusions

This is the largest series of corneal neurotization by direct ipsilateral supratrochlear nerve transfer. It is a minimally invasive method to restore the corneal sensitivity and treat NK successfully within one year without sural nerve graft. Long-term follow-up observation is needed for further assessment.

RM60 **Concomitant Masseteric-to-Facial Nerve Transfer and Parotidectomy Significantly Enhances Facial Symmetry and Excursion in Patients with Post-Operative Facial Nerve Discontinuity**

University of Texas Southwestern Medical Center, Dallas
Presenter: **Ahneesh J Mohanty, BA**
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Background

Complete post-operative facial paralysis is a complication of curative resection of tumors involving the parotid gland and/or facial nerve where the nerve itself must be sacrificed. Reconstruction may be performed immediately or in a delayed fashion. The timing of reconstruction is not always dependent on the reconstructive surgeon, but rather on their involvement during the resection and prior to radiation or late presentation of patient after radiation. While in some cases interposition nerve grafts can be used, this is not always feasible, and thus nerve transfers may be performed. This study seeks to compare the results of nerve transfers and static support performed at the time of resection prior to radiation to those in delayed reconstruction performed after radiation.

Methods

Two groups of complete palsy patients with post-operative facial nerve discontinuity were retrospectively identified: those who underwent concomitant nerve transfer at the time of tumor resection, and those who underwent nerve transfer 4-8 months following tumor resection. Oral commissure asymmetry, philtral deviation from midline, and upper lip height deviation were measured from post-operative still photography using MEEI Emotrics and FaceGram software, by two independent researchers. Statistical analysis was performed using GraphPad Prism.

Results

13 patients were identified who met the inclusion criteria: 7 who underwent concomitant nerve transfer, and 6 who underwent delayed nerve transfer. All patients who underwent nerve transfer also received TFL slings during the same operation. The mean age for both groups was 64 and 73, respectively ($p=0.07$), while the mean post-operative follow-up time was 13.7 and 10.4 months, respectively. Patients who underwent immediate nerve transfer after tumor extirpation benefitted from a 2.6- fold increase in smile excursion (RM ANOVA, $p<0.003$), 65.7% reduction in oral commissure asymmetry (RM ANOVA, $p<0.001$), 32.9% reduction in philtral deviation (RM ANOVA, $p<0.018$), when measured between 1 month post-op and the last post-op follow-up. Global regression analysis by the least-squares method revealed non-significant differences in smile excursion (t test, $p=0.74$), symmetry restoration of both the oral commissure (t test,

p=0.81), and philtrum (t test, p=0.83) between the immediate and delayed nerve transfer approaches when analyzed using pooled variance.

Conclusion

When feasible and considering the minimal added morbidity, concomitant nerve transfers and static support at the time of extirpation provides more immediate and effective restoration of resting and dynamic symmetry, while radiation does not seem to affect nerve regeneration, and thus should be considered at the time of tumor resection.

RM61 **Comparison of First and Full Union Rates in Free Fibula Mandible Reconstruction Utilizing Cadcam Vs Non Cadcam**

MD Anderson Cancer Center, Houston
Presenter: **Luke Grome, MD**
Luke Grome, MD(1), Jordan Kaplan, MD(1), Alexander F. Mericli, M.D.(2), Rene D Largo, M.D.(2) and Patrick B. Garvey, M.D.(3)
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Background
Free tissue transfer utilizing a fibula osteocutaneous free flap is the work-horse for mandible reconstruction. As the complexity of mandible reconstruction has increased, virtual surgical planning (VSP) has become popularized in hopes of improving outcomes and simplifying surgery. It has been suggested that VSP is associated with more anatomically accurate mandible reconstructions, and faster rates of bony union. The aim of this study was to evaluate if computer-aided design and computer-aided manufacturing (CADCAM) when compared to standard, non CADCAM reconstructions, demonstrated reduced time to first union and full union.

Methods
Following IRB approval, a database was created for all free fibula osteocutaneous flaps for mandible reconstructions at MD Anderson Cancer Center from April 2005 through February 2019. Medical records for these consecutive cases were reviewed for patient demographic and case specific information relevant to this study. To assess time to bony union postoperative CT scans were reviewed and time to bony union was recorded. Union was defined as the presence of bi-cortical callous formation and full union when this was present at all osteotomy sites. Product limit method was used to estimate the cumulative full union rate within two years. Log-rank test was used to compare the cumulative full union rate among subgroups.

Results
Four hundred and thirty-eight patients were enrolled with an average age of 61.3 years (range 14-91, years). Patients were followed for up to 2 years. Out of 438, 348 patients were scanned within one year and 335 had first union. The first union rate within 1 year was significantly greater in the CADCAM group (CADCAM: 99.3% vs non-CADCAM: 94.1%, $p<0.001$). The 2 year full union rate in the CADCAM group is significantly higher than the non CADCAM group(CADCAM: 94.3% vs non-CADCAM: 89.3%, $p=0.005$).

Conclusion
The CADCAM group showed a significantly greater rate of first union within 1 year and full union at 2 years. This supports the idea that CADCAM results in greater bony union and at a faster rate compared to non CADCAM mandible reconstruction. VSP provides surgeons with a tool that simplifies a complex surgery and provides superior rates of bony union which may translate to superior patient outcomes.

RM62 **Comparison of Plate Type and Fusion Rate By Time to First and Full Union for Mandibular Reconstruction with Free Fibula Flaps**

MD Anderson Cancer Center, Houston
Presenter: **Jordan Kaplan, MD**
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(1)Baylor College of Medicine, Houston, TX, (2)The University of Texas MD Anderson Cancer Center, Houston, TX, (3)MD Anderson Cancer Center, Houston, TX

Background
Free tissue transfer utilizing a fibula osteocutaneous flap is the work-horse for mandible reconstruction. As the complexity of mandible reconstruction has increased, virtual surgical planning (VSP) has become popularized in hopes of improving outcomes and simplifying surgery. It has been suggested that VSP is associated with more anatomically accurate mandible reconstructions, and faster rates of bony fusion. The aim of this study was evaluate plate bending method; titanium premilled (PM), master bender (MB) bent and surgeon bent plates (OR), and time to first and full bony union. Premilled plates are patient specific computer generated titanium plates. Master bender plates are hand bent by master fabricators based on VSP. Surgeon bent plates are bent in the operating room by the surgeon at the time of reconstruction.

Methods
Following IRB approval, a database was created for all free fibula osteocutaneous flaps for mandible reconstructions at MD Anderson Cancer Center from April 2005 through February 2019. Medical records for these consecutive cases were reviewed for case specific information relevant to this study. To assess time to bony union postoperative CT scans were reviewed and time to bony union was recorded. Union was defined as the presence of bi-cortical callous formation and full union when this was present at all osteotomy sites. Product limit method was used to estimate the cumulative full union rate within two years. Log-rank test is used to compare the cumulative full union rate among subgroups.

Results
Four hundred and thirty-eight patients were enrolled. Patients were followed for up to 2 years. Out of 438, 348 patients were scanned within one year and 335 had first union. The premilled titanium plate cohort had the best 1 year first union rate, followed by the master bender group (PM: 100%, MB: 97.6%, and OR: 94.2%, $p<0.001$). The 2 year full union rate is significantly better when VSP was applied. PM and MB groups had the better 2 year full union rates compared to OR bent plates (PM: 94%, MB: 96%, and OR: 89%, $p=0.006$).

Conclusion
First union rate at 1 year was best in the premilled cohort. Master bender and premilled plates showed significantly greater full union rate at 2 years when compared to the operating room surgeon bent plates. This supports the idea that virtual surgical planning provides a more anatomically accurate mandible reconstruction and may offer patients superior outcomes and reduced postoperative complications.

RM63 **Microsurgical Reconstruction of the Columella**

Amita Saint Joseph Hospital, Chicago
Presenter: **Brenton R Robinson, M.D.**
Brenton R Robinson, M.D. and Robert L Walton, M.D.
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Background: The columella is an important subunit of the nose providing support and projection of the nasal tip. Columellar absence or deficiency is associated with a poor aesthetic and functional status. Traditionally the nasal columella is a difficult subunit to reconstruct due to its unique contours, limited availability of adjacent skin, and tenuous vascularity. The authors present the results of a spectrum of cases reconstructing the columella highlighting pearls and pitfalls during the reconstructive process.

Methods: Fifteen patients with columellar defects were enrolled in this retrospective study. Etiology of the columellar defect was: trauma (5), carcinoma (3), iatrogenic necrosis (4), cocaine (3). Of these, 9 cases involved the columella alone and 7 cases involved the columella and portions of the adjacent nasal lining and/ or paranasal soft tissues. Patient age averaged 38.1 yrs (range 4-61 years), there were 8 females and 7 males. 5 cases were performed using the first dorsal metacarpal island free flap, 9 cases utilized the radial forearm free flap(4 delayed, 6 immediate), one case utilized the superficial inferior epigastric free flap

Results: 16 flaps were performed in 15 patients. There was one flap loss due to intrinsic ischemia related to prior radial artery catheterization. Vascular repairs were made to the facial or angular arteries in 9/16 flaps and to the vascular lexical of previous free flaps in 7. An average of 1.6 revision procedures were performed in each patient. Autologous cartilage grafts were employed in 14/15 patients. All reconstructions were brought to a successful conclusion.

Conclusion s: Reconstruction of the columella can be a daunting challenge owing to its unique location which is a difficult and awkward reach for most local flaps. Compared to traditional techniques using grafts and local flaps, our experience has shown that microsurgical reconstruction of the columella provides a reliable and aesthetic means for reconstruction. It avoids disfiguring and visible facial scarring and can be modeled “offsite” prior to transfer.

RM64 **Occult Malignancy in Oral Osteoradionecrosis**

Chang Gung Memorial Hospital, Linkou
Presenter: **Nicholas Thu Khoa Do, M.D.**
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Background: The presence of occult malignancy in oral osteoradionecrosis (ORN) remains underreported. The aim of this study is to characterize how these patients may present clinically, radiologically, and histologically as well as determine how the diagnosis of malignancy altered surgical management and the resultant functional and oncologic outcomes.

Methods: Retrospective review of all cases of maxillary or mandibular osteoradionecrosis proceeding to reconstruction were reviewed from 2010 to 2018. Occult malignancy was defined as identification of cancer on final pathology when prior evaluations demonstrated only ORN. Demographic data was collected along with initial tumor pathology and treatment details (resection, reconstruction, & radiation). Clinical, radiographic, and pathologic details regarding ORN were gathered. Treatment details of the ORN resection and reconstruction were obtained. Finally, reconstructive & oncologic short (30 days) and long-term (1 yr) outcomes were assessed.

Results: Between 2010 and 2018, 43 cases of ORN underwent resection & reconstruction. Six cases of incidental malignancy were found yielding an incidence of 13.9% of all ORN patients requiring reconstruction with the majority being squamous cell carcinoma (5/6, 83%). There were no differences between those with incidental malignancy and ORN and those without regarding past medical history, clinical presentation, nor initial surgical treatment & reconstruction. While patients with occult cancer were more likely to have an identifiable mass on CT, cancer was not specifically diagnosed. Pre-operative biopsy was done on 30% of all ORN patients (n=13) and frozen section obtained on only 49% (n=21). Only half (3/6) of the occult cancer patients had a frozen section while those that did were able to identify malignancy (2/3, p=0.017). Occult cancer cases did not undergo re-operative return. All occult cancer cases received ALT reconstructions with half being muscle chimerics. While short and long-term reconstructive outcomes did not differ between ORN only and occult cancer cases, occult cancer patients were more likely to have cancer recurrences (p=0.008).

Conclusion: Occult malignancy in head & neck ORN has an incidence of 13.9%. Those patients with incidental cancer found on final pathology for ORN are more likely to have additional recurrent malignancy. While pre-operative detection of malignancy during evaluation for ORN reconstruction remains difficult, malignancy may still be detectable during frozen section allowing for appropriate changes in the oncologic and reconstructive plans.

RM65 **Classification of Injury and Flap Selection for Microvascular Reconstruction of Facial Gunshot Wounds**

Collin Nevil, Kansas City
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Background: The incidence of facial gunshot wounds (GSW) has increased in parallel with the prevalence of gun violence in the United States. Reconstruction methods for facial GSW are still evolving and are commonly both patient and surgeon specific. The primary goal of reconstruction is the restoration of facial function with optimal aesthetic appearance for each facial subunit. This study investigates the utilization of various microvascular free flap reconstruction techniques based upon an anatomic zone classification scheme.

Methods: A retrospective review was conducted at a tertiary academic center over an eight year period for all subjects who underwent microvascular free flap reconstruction related to facial GSW. Reconstructions were classified into three anatomic zones: lower (mandible), middle (hard palate to orbital floor) and upper (supraorbital bar and skull) based upon the site of flap inset. Subjects were further evaluated for the mechanism of injury, type of flap used, and anatomic site of flap inset.

Results: Thirty-six subjects sustained facial GSW during this study period, requiring 27 microvascular free flaps in 18 of these subjects. Anatomic subunits included: lower (n=7), middle (n=9) and upper (n=4). Two subjects had reconstructions in more than one subunit. In the lower zone, free flaps were utilized to reconstruct the mandible, gingival buccal sulcus and chin skin (n=7). The types of flaps used were: osteocutaneous radial forearm (n=4) and fibula osteocutaneous (n=3). In the middle zone, free flap reconstruction was utilized for the nose (n=5), the hard palate (n=5), the maxilla (n=3) and facial muscle reanimation (n=1). Nasal reconstruction was accomplished through: osteocutaneous radial forearm flaps (n=3), a tempoparietal fascial flap (n=1) and a dorsalis pedis fasciocutaneous flap (n=1). Palatal reconstruction was accomplished utilizing: osteocutaneous radial forearm flaps (n=2), fasciocutaneous radial forearm flaps (n=2), and a tempoparietal fascial flap (n=1). Maxilla reconstruction was accomplished exclusively with fibula osteocutaneous flaps (n=3). Free flap reconstruction in the upper zone was utilized for frontal bone defects (n=3) and for anterior CSF leaks (n=2). All frontal bone defects were treated with osteocutaneous radial forearm flaps, (n=3) while CSF leaks were addressed using the rectus abdominus flap (n=2).

Conclusion: Microvascular reconstruction is a workhorse in the management of facial GSW. A variety of different flap types can be used to reconstruct structures within all zones of the face. In our experience, osteocutaneous free flaps were most commonly utilized; however, a variety of soft tissue only flaps are necessary to reconstruct various subunit defects.

RM66 **Does Fascia Inclusion in the ALT Free Flap Affect Functional Outcomes of Zone II Buccal Mucosa Reconstruction?**

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Background

Zone II buccal mucosa is limited to the buccal proper region without the commissure and retromolar areas. Pliability and softness of transplanted tissue could be critical for functional outcomes. The aim of the study was to assess whether the suprafascial ALT (SF-ALT) reconstruction results in better mouth opening, speech and diet compared with fasciocutaneus ALT (FC-ALT).

Methods

From 2000-2016, all patients with buccal cancer who received ALT flap reconstruction by the senior authors were reviewed. Defects limited to zone II buccal mucosa were identified excluding extensions to the retromolar area, the lips as well as through-and-through and segmental mandibulectomies. The patients were grouped into SF-ALT or FC-ALT. Patients' demographical and oncological data as well as defect anatomy and flap reconstruction data were collected. Outcome measurements were: Inter-incisor distance (IID) (pre-Op an end of F/U), IID changes every 6 months, speech and diet. Nonparametrical statistics was calculated.

Results

42 patients out of 273 buccal cancer cases met the inclusion criteria, (SF-ALT: 18, FC-ALT: 24).

There was no significant difference between both groups regarding age, BMI, smoking, betel nut consumption, TNM staging, defect area and volume, preoperative IID, follow-up duration and radiotherapy ($p \rangle 0.05$). The maximum follow-up was 18 ± 8 months (SF-ALT) vs 19 ± 7months (FC-ALT) (p=0.75). The median defect area in SF-ALT was 37 ± 15 cm^2 vs 39 ± 15 cm^2(p=0.9). The median preoperative IID was 29± 9mm (SF-ALT) vs 30 ± 10mm (FC-ALT) (p=0.45).

There was one salvaged vascular complication in each group. On the maximum follow-up date, the IID was 32mm (±5) in the SF-ALT group vs 25 mm (±3) in the FC-ALT group (p=0.03). FC-ALT patients developed a smaller IID (p=0.04) over time even after statistical elimination of radiotherapy as a confounder (p=0.03). Furthermore, FC-ALT patients were 8.9 times (p=0.012) more likely to develop diet restriction (66% FC-ALT patients, vs 25% in the SF-ALT patients). There were no significant differences in speech (p=0.15) or drooling (p=1.0)

Conclusion

This is the first study that points out a functional outcome difference based on fascia inclusion in the recipient site independent from radiotherapy influence. The suprafascial ALT appears to be associated with better mouth opening and permits less diet compromise. Fascia inclusion during ALT dissection should be carefully considered when planning buccal mucosa reconstruction, due to possible negative effect.

RM67 **Microvascular Mandibular Reconstruction with an Endoprosthesis: Optimizing Bone Height and Border Contour**

University of Southern California, Los Angeles
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Background

The primary goals of mandibular reconstruction are to restore aesthetics and provide a platform for future dental restoration. However, many mandibular reconstruction plate designs focus on restoring the mandibular border without positioning the bone flap at a sufficient vertical height to allow for placement of dental implants.

Methods

Patients with large mandibular tumors requiring en bloc resection underwent virtual surgical planning to design a custom endoprosthesis that would optimize mandibular bone height. The normal side of the mandible was mirrored to the reconstructed side, enabling the caudal edge of the endoprosthesis to recapitulate the normal angles and slopes of the mandible. The upper portion of the endoprosthesis was designed to conform to the bone flap or graft. Additionally, a thin titanium ledge was integrated along the medial surface to support the bone in a cephalad position, optimizing its distance from the occlusal plane.

Results

Three patients underwent en bloc mandibular resection and reconstruction using the custom endoprosthesis. This included a 17 year old with multifocal ameloblastoma reconstructed with a free fibula, a 16 year old with ossifying fibroma reconstructed with iliac crest corticocanellous block graft, and a 13 year old with giant cell granuloma reconstructed with rib graft. In the case of the 17 year old, the left fibula was segmented and plated on the leg (Figure 1). Pre and postoperative imaging confirm that the reconstruction both restores mandibular contour and optimizes bone height for subsequent dental restoration (Figure 2 and 3). The patient underwent successful placement of dental implants nine months postoperatively.

Conclusion

We demonstrate successful application of the mandibular endoprosthesis with both bone grafts and microvascular flaps. We have applied the plate to skeletally immature and mature patients and have incorporated holes into the caudal aspect of the plate for genioglossus and geniohyoid resuspension when reconstructing the anterior mandible. By optimizing mandibular form and height, this endoprosthesis becomes an attractive option for patients whose ultimate goal is dental restoration.

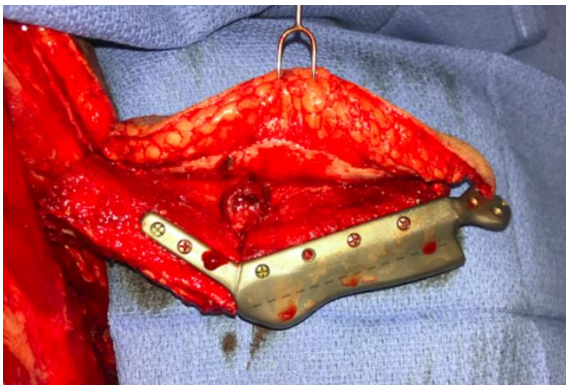
Figure 1: 

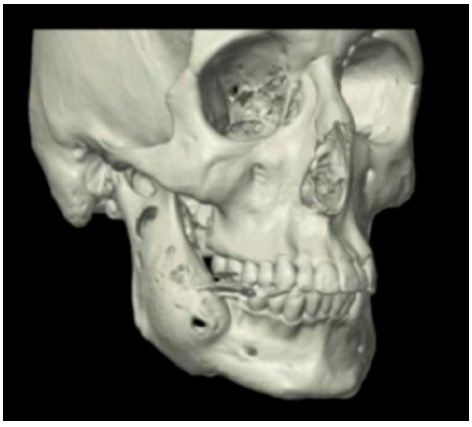
Figure 2: 

Figure 3: 

RM68 **Long-Term Outcomes Following Immediate Dental Implant Placement in Free Fibula Flaps for Oncologic Mandibular Reconstruction**

Memorial Sloan Kettering Cancer Center , New York
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Background

Dental rehabilitation following treatment for mandibular cancer is a crucial part of the restorative process for head and neck patients. For these patients, immediate dental implant placement (IDIP) has been found to be a safe procedure with an acceptable 90-day complication profile. Moreover, IDIP leads to early dental restoration without delays in radiotherapy. The current study aims to examine one-year clinical outcomes following IDIP in patients undergoing free fibula flap (FFF) reconstruction for oncologic mandible defects.

Methods

In May 2017, the center began IDIP into FFF for oncologic patients necessitating segmental mandibulectomy using computer-aided design and manufacturing (CAD/CAM). All patients undergoing IDIP were compared to a similar historical cohort [HC] (from 6/2011 to 4/2017), which used also used CAD/CAM, but without immediate dental implants. Data were extracted from a prospectively maintained clinical database. Outcomes of interest included overall minor and major (categorized as those requiring return to operating room) complications, time to permanent prosthesis and implant survival.

Results

A total of 61 patients underwent FFF reconstruction for mandibulectomy defects with CAD/CAM assistance between January 2011 and July 2018 (IDIP: n=27; HC: n=34). Five HC patients underwent delayed implant placement. Overall, 88 total dental implants were placed (IDIP: n=72; HC: n=16), with five implants failed secondary to osseointegration (IDIP: n= 4; HC: n=1). At one year following mandibulectomy, no significant differences were noted in major or minor complications between groups ($p=0.255$). Seventy-eight percent (n=21) of IDIP patients completed dental restoration at one year compared to one patient (20%) in the HC ($p<0.001$). IDIP patients, on average, reached permanent prosthesis faster compared to HC patients (IDIP: 101.6 mean days [SD: 77.06]; HC: 1022 mean days [SD: 643.63]; $p=0.008$).

Conclusion

IDIP is a reliable and safe procedure with a long-term complication profile comparable to delayed implant placement. A greater proportion of IDIP patients go on to complete dental restoration, and at a faster rate than those undergoing delayed implant placement. Evaluation of quality of life outcomes needs to be performed.