ASRM Scientific Paper Presentations: Head and Neck
Sunday, January 14, 2018, 7:00am – 8:30am

7:00 AM - 7:05 AM
RM 1. **An Innovative Dynamic Anti-reflux Design: Using Digastric Tendon Sling for Voice Conduit Fabricated by Radial Forearm Flap for Laryngectomy Defect Reconstruction**
Presenter: Biing-Luen Lee, MD
Biing-Luen Lee, MD(1), Shou Fong Lin, MD(2), Ching-Yuan Lin, MD(2) and Shyuang-Der Terng, MD(2)
(1)Taipei Veterans General Hospital Yuanshan & Su-Ao Branch, Yilan, Taiwan, (2)Koo Foundation Sun Yat-Sen Cancer Center, Taipei, Taiwan

Background:

Voice reconstruction for laryngectomy is usually done with trachea-esophageal puncture and voice prosthesis. However, prosthesis related complications are not uncommon. Alternative procedures of voice conduit with free flaps for a permanent voice reconstruction have been reported using free forearm flap, free jejunal flap, or free ileocolic flap. The most common problem among these flaps is regurgitation of liquid from pharynx to trachea or even to lungs. An innovative anti-reflux design is presented to reduce the complication of fluid regurgitation.

Methods:

We designed a large radial forearm free flap, divided into a patch part for pharyngeal defect reconstruction and a tube part connecting pharynx and tracheostoma for voice production (fig. 1 and fig. 2). Digastric tendon was used for slinging the voice conduit (fig. 3), we take advantage of the physiologic contraction of the digastric muscle during swallowing to prevent fluid regurgitation into trachea (fig. 4).

Fig. 1

Fig. 2

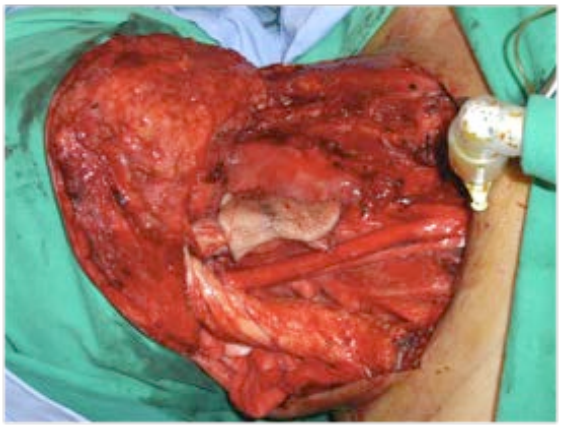

Fig. 3

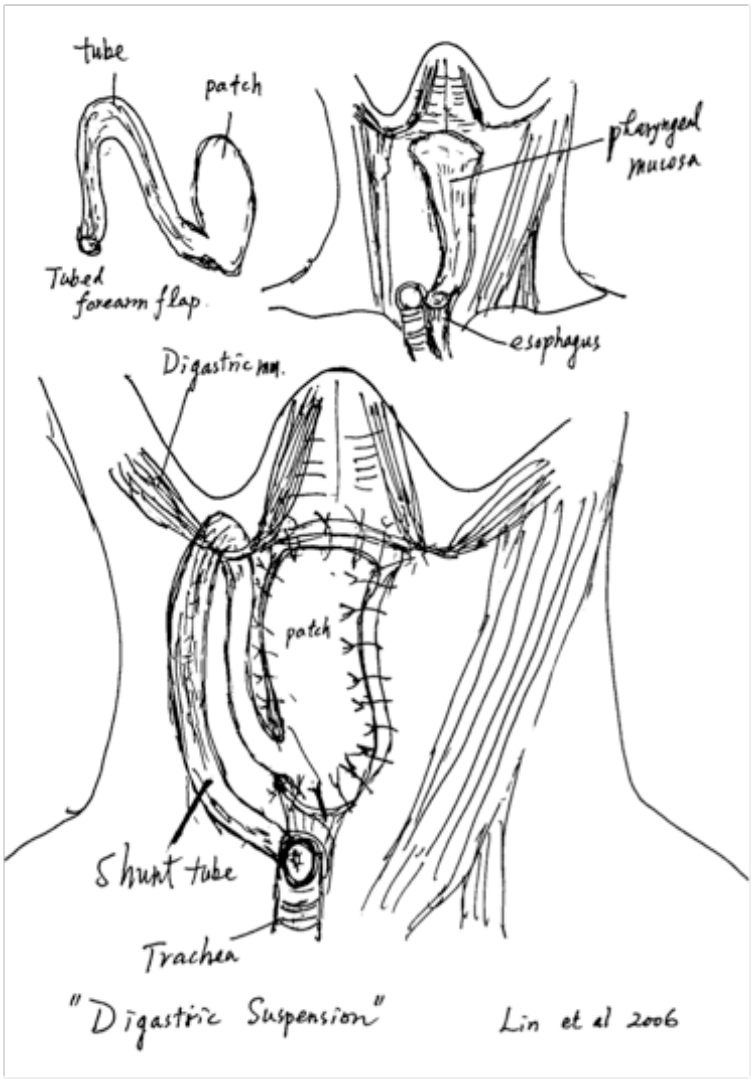

Fig. 4,

We reported 34 patients who had total laryngectomy received one-stage reconstruction with the radial forearm flap fabricated voice conduit from 2002 to 2016, and digastric tendon sling design was started practicing from our 10th patient. Voice quality was categlorized into loud resonance, fair resonance, no resonance and tightness by single surgeon, while fluid regurgitation can be divided into mild (little wet at stoma), moderate (sometimes to trachea) and severe (always to trachea) by clinical observation, and conduit stenosis was diagnosed by both clinical and VideoFluoroSwallowStudy (VFSS) during follow-up.

Results:

The mean age when operation was 53.7 ¡Ó 8.38 years, and 13 patients (38.2%) died during a mean follow-up time of 50.9 ¡Ó 31.26 months. All flap survive well and all patients received radiation therapy either before (11 patients, 32.4%) or after operation (23 patients, 67.6%).

During last follow up, 29 patients (85.3%) had a functional voice conduit, 17 patients (50%) demonstrated fair to loud resonance of sound quality, eight patients (23.5%) had conduit stenosis (4 partial, 4 total); while 15 (44.1%) had clinical regurgitation (8 mild, 6 moderate and 1 severe). Two patients (5.9%) had aspiration pneumonia diagnosed throughout the disease course. Patients

who had received digastric tendon sling technique had a significant lower overall regurgitation rate (p=0.015) and final regurgitation rate (p=0.001).

Conclusion:

Voice conduit fabricated by radial forearm flap is a viable option in total laryngectomy patients, with a low complication rate and a reasonable sound quality. Digastric tendon sling design can significantly lower the fluid regurgitation rate.

7:05 AM - 7:10 AM

RM 2. **Reconstruction of the Temporomandibular Joint: A two-stage Approach for Cases of Severe Trismus in Patients with Recurrent Oral Cancer**

Mayo Clinic, Rochester

Presenter: Kian Adabi, BA

Kian Adabi, BA(1), M. Diya Sabbagh, MD(2), Oscar J. Manrique, MD(2), Pedro Ciudad, MD, PhD(3), Ricardo Galan, MD(4) and Hung-Chi Chen, MD, PhD, FACS(5)

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Background

In certain cases of recurrent oral cancer, trismus can be so advanced that severe ankylosis of bilateral TM joints can be found. In these cases, the oral mucosa is severely contracted and the TM joint is very difficult to release due to the limitation of TM joint excursion.

The goal of our study is to describe a reconstructive two-stage approach in severe cases of trismus of patients with recurrent oral cancer.

Methods

Patients with recurrent oral cancer with severe trismus that underwent this technique were included. For adequate release of oral mucosa unilateral or bilateral pseudojoints were created. This resulted in oral mucosa defect that was reconstructed with a free skin flap. In a second stage, the capacity to close the mouth was reconstructed with the anterior part of temporalis muscle extended with tendon grafts. Demographics, etiology, adjuvant radiotherapy, type of free flap and complications were recorded. Preoperative and 2-year postoperative mandible functionality were analyzed

Results

From 1984 to 2015 a total of 54 patients were included. All the patients were male with an average age of 43 yo (range: 27 to 68 yo). Etiology was cancer (betel nut and smoking). 75% received preop radiation. All patients underwent release of the contracted oral mucosa, removal of the coronoid process, medial pterygoid tendon release, resection of the mandibular angle and pseudojoint reconstruction. Among these cases, 7 were reconstructed using an ALT flap, 45 radial forearm flap and 2 with a medial sural flap. In addition, the anterior part of temporalis muscle extended with tendon grafts was performed in all patients. Pre and Post surgical IO were 7 (0-9) and 26 (18-32) mm respectively ($p<0.05$). Univariate analysis showed that the combination of surgical procedures such as release of the contracted oral mucosa ($p<0.04$), removal of the coronoid process ($p<0.03$), medial pterygoid tendon release ($p<0.05$), resection of the mandibular angle ($p<0.04$) and pseudojoint reconstruction ($p<0.05$) were associated with an overall improvement of the IO aperture.

Conclusion

Trismus is a debilitating disease with devastating consequences if not treated appropriately. Based on this experience, patients treated for severe recurrent disease should undergo a more

aggressive surgical release in order to achieve a wider IO distance and relief of symptoms. However, further studies with a longer follow-up are required to rule out further recurrence.

7:10 AM - 7:15 AM

RM 3. **Utilizing "BlackBone" MRI for Reconstructive Surgical Planning: A Means to Reduce Radiation Exposure with Accurate Surgical Outcomes**

Mayo Clinic, Rochester

Presenter: Marissa Suchyta, BA

Marissa Suchyta, BA(1), Waleed Gibreel, MD(1), Christopher H Hunt, MD(1), M. Diya Sabbagh, MD(1), Krzysztof R Gorny, PhD(1) and Samir Mardini, M.D.(2)

(1)Mayo Clinic, Rochester, MN, (2)Plastic Surgery, Mayo Clinic, Rochester, MN

Background

From 1990 to 2007, the number of CT scans in the United States rose from 13 million to 72 million. Accurate bone imaging enables advances in reconstructive surgery, including the ability to design 3-D printed surgical guides enabling accurate surgical planning and success in complex surgical cases. However, CT radiation exposure also increases carcinogenesis risk. The purpose of this project is to develop a MRI scanning technique that demonstrates bone clearly and to prove that this technique can be used instead of CT for surgical planning and 3D surgical guide creation.

Methods

This study included ten cadaver heads. A mock fibula free flap for mandible reconstruction was performed. Five of these surgeries were planned and guides were created utilizing BlackBone MRI, whereas the other five were planned and performed using CT scans. All specimens underwent a pre-operative CT scan with guides affixed. After mock surgeries were performed utilizing the guides, all specimens underwent a post-operative CT scan. 3d reconstruction of scans was performed and surgical accuracy to the planned surgery was assessed using GeoMagic Wrap, assessing guide positioning accuracy, average post-operative deviation from plan, and differences in planned and post-operative volume.

Results

Ten mock fibula free flap mandible reconstructions were successfully performed. Guides created from BlackBone MRI demonstrated high accuracy to surgical plan. The pre-op Blackbone MRI scan had an average deviation from the pre-op CT scan of less than 2mm. Cutting guide placement in both surgeries had an average deviation from planned placement within 0.75mm. The average deviation of post-operative anatomy from pre-operative plan was within 1.5mm. Post-operative volume deviated less than 5% from the planned volume. These values were extremely comparable to those assessed from the surgeries performed with guides created from CT scans.

Conclusion

This study demonstrates that virtual surgical planning and 3d surgical guide creation can be performed using Blackbone MRI with comparable accuracy to CT scans. This could dramatically reduce radiation exposure for patients. The successful segmentation, virtual planning, and 3d printing of accurate guides from Blackbone MRI therefore demonstrates potential to change the pre-operative planning standard of care.

7:18 AM - 7:23 AM

RM 4. **Thoracic Esophageal Reconstruction with Free Colon Flaps: Is there a better way to improve outcomes?**

Mayo Clinic, Rochester

Presenter: Kian Adabi, BA

Kian Adabi, BA(1), M. Diya Sabbagh, MD(2), Oscar J Manrique, MD(2), Pedro Ciudad, MD, PhD(3), Ricardo Galan, MD(4) and Hung-Chi Chen, MD, PhD, FACS(5)

(1)Montefiore Medical Center/Albert Einstein College of Medicine, Bronx, NY, (2)Mayo Clinic, Rochester, MN, (3)China Medical University Hospital, Taichung, Taiwan, (4)Division of Plastic and Reconstructive Surgery, Universidad Militar Nueva Granada, Hospital Militar Central, Bogota, Colombia, (5)Department of Plastic Surgery, China Medical University Hospital, Taichung, Taiwan

Background

There have been many techniques reported for esophageal reconstruction, each one with its own advantages and disadvantages. Free colon flaps have been used as an alternative option with very promising results. However, one of the risks of this technique is a discrepancy of circumference between the colon and thoracic esophagus that can lead to leaks, strictures and dysphagia when not managed appropriately.

The goal of our study is to compare and report the outcomes of two different techniques for thoracic-esophageal reconstruction.

Methods

Retrospective review of patients that required esophageal reconstruction using colon flaps. Two techniques for anastomosis were performed: (1) Direct anastomosis between colon segment and thoracic esophagus, but burying the excess mucosa into the lumen of the reconstructed esophagus. (2) Cutting the edge of colon on the anti-mesenteric side to form a *"funnel"* before anastomosis with thoracic esophagus.

Demographics, etiology of resection, complications and anatomic/functional studies of the esophagus (EGD, manometry, pH monitoring and gastrografin swallow) were recorded 1-year after surgery.

Results

Between 1996 and 2016 a total of 144 patients underwent esophageal reconstruction with free colon flaps. 68 patients were reconstructed with mucosa invagination and 76 with the funnel technique. 95% of patients were male and 5% were female. The most common etiology was cancer (98%) followed by corrosive injury (2%). Regarding complications, each group had one complete flap loss. Based on gastrografin swallow, the leakage rate was higher in the first group (9/68) compared to the second group (3/76) ($p< 0.05$). All of the patients could eat at least liquid diet, but the rate of dysphagia with semisolid diet was higher in the first group (10/68) compared to the second group (3/76) ($p<0.05$). Based on EGD, dysphagia was due to excess mucosa in the lumen near the colon anastomosis. 6 patients in the first group required excision of excess mucosa to improve symptoms and 3 more balloon dilatation. In addition, manometry studies showed an increased intraluminal-pressure during swallowing on both groups with higher trends in the first group ($p<0.3$). pH monitoring did not show any difference among groups.

Conclusion

Esophageal reconstruction with colonic conduits can be very challenging. However, taking into consideration lumen discrepancy with the low motility of the bowel conduit, resection of redundant mucosa and a wider anastomosis have show to minimize complications and improve outcomes.

7:23 AM - 7:28 AM

RM 5. **Early masseter to facial nerve transfer improves ultimate outcomes in dynamic more than static facial reanimation in acute and subacute facial palsy patients**

UT Southwestern Medical Center, Dallas

Presenter: Shuhao Zhang, MD

Shuhao Zhang, MD(1), Austin Hembd, MD(2), Justin Perez, MD(1) and Shai Rozen, MD(2)

(1)University of Texas Southwestern Medical Center, Dallas, TX, (2)Department of Plastic Surgery, University of Texas Southwestern Medical Center, Dallas, TX

Background

Masseter to facial nerve transfer after facial nerve injuries has been shown to be effective and safe. This study's purpose is to investigate various factors which may affect outcomes after masseter to facial nerve transfers for complete facial paralysis.

Methods

Seventeen nerve transfers were performed between 2012-2016 for acute and subacute complete and incomplete facial palsy. In this study, only patients with complete facial palsy were included in order to isolate the effect of the nerve transfer without the possible confounding regenerative effect of an intact native facial nerve. This cohort consisted of 7 masseter nerve to facial nerve transfers performed after proximal nerve resection. Average age was 35 years (11-64). Mean denervation duration was 8 months (0-20). All nerve transfers were end-to-end transfers, and 5 had concurrent cross-facial nerve grafts (CFNG) coapted end-to-side to the affected facial nerve. Three transfers were performed to the main facial nerve trunk while four selectively to zygomatic branches. Pre- and post-operative photographs and videos were analyzed. The Sunnybrook facial grading score was calculated, and oral commissure excursion and resting philtral deviation were measured using the MEEI FACE program. Statistical analysis was performed to determine whether variables such as age, duration of paralysis, transfer location, and presence of CFNG had significant effects on outcome.

Results

Average follow up was 424 days. Time to return of motor function on the affected side was 131 days (100-157 days). Symmetry in motion, as measured by Sunnybrook score, was significantly better during smile in patients who underwent early nerve transfer within six months of paralysis ($p=0.007$). Oral commissural excursion was a mean of 9.6mm or 81% of the unaffected side. Patients who underwent early nerve transfer had significantly increased excursion than those who did not (11.1 vs 6.5mm, $P=0.003$). Gross resting symmetry, as measured by Sunnybrook score, did not improve. However, philtral deviation, as measured by FACE-Gram, decreased by 31% at latest follow-up, and further improvement correlated with longer follow up.

Conclusion

Masseter to facial nerve transfer is a powerful tool to restore midface animation after complete facial nerve paralysis. Early nerve transfer results in better smiling symmetry and improved oral commissure excursion. Although masseter to nerve transfer did not show improved gross facial asymmetry as measured by the Sunnybrook score, objective metric measurements were noted and longer follow up demonstrated increased facial tone and early nerve transfer appeared to prevent worsening of facial asymmetry.

7:28 AM - 7:33 AM

RM 6. **Elective Interposition Vein Grafting in Oncological Head and Neck Free Flap Reconstruction**

MD Anderson Cancer Center, Houston

Presenter: Marco Maricevich, MD

Marco Maricevich, MD(1), Lawrence Lin, BS(2), Edward Chang, MD(3), Jun Liu, PhD(4) and Matthew M. Hanasono, MD(3)

(1)UT MD Anderson Cancer Center, Houston, TX, (2)University of Texas, Houston, TX, (3)Plastic Surgery, MD Anderson Cancer Center, Houston, TX, (4)Plastic Surgery, The University of Texas MD Anderson Cancer Center, Houston, TX

Background

In complex oncological head and neck reconstructive microsurgery, elective interposition vein grafts are considered when the distance from the flap to the recipient vessels is greater than the pedicle length. The direct impact of elective vein graft in oncological head and neck free flap reconstruction success rate is still unclear. Many surgeons are hesitant to use vein grafts due to concerns for increased risk for thrombosis.

Methods

We conducted a retrospective review of all head and neck free flaps performed from 2005 to 2015 in our institution. We compared the characteristics and outcomes of free flaps with and without elective interposition vein graft. Potential confounding factors for flap compromise and flap loss were examined.

Results

A total of 3,240 head and neck free flaps were performed in 2871 patients. Vein grafts were used in 241 flaps (7.4%). The free flap survival rate was 98.9% without vein grafts and 93.4% with vein grafts ($p < 0.001$). The vein graft group had a higher free flap compromise rate flaps (14.5 vs. 3.4%, $p<0.001$) and lower salvage rate (54.3 vs. 66.3%, $p<0.001$). However, risk factors were higher on the vein graft group: more frequent history of radiation ($p<0.001$), chemotherapy ($p<0.001$), prior neck dissection ($p<0.001$), and prior free flap ($p<0.001$), as well as a higher incidence of recurrent cancers ($p<0.001$) and osteoradionecrosis ($p<0.001$). More than one simultaneous free flap was also more frequently performed in the vein graft group ($p<0.001$). Individual review of every flap loss within the vein graft group identified no cases of thrombosis arising within the graft only and no thromboses caused by anastomotic technical errors, which might be theoretically increased due to the need for an additional anastomosis.

Conclusion

Vein grafts in head and neck free flap reconstructions are useful and often necessary for reconstructive surgeries with high level of complexity when usable recipient vessels are not readily available. Although associated decreased flap survival with the use of vein grafts, we still achieved a 93.4% success rate in notably more challenging cases. A causal relationship between use of vein grafts and worse flap outcomes has not been established in the largest series of vein grafted free flap surgeries reported thus far.

7:36 AM - 7:41 AM

RM 7. **Salvage dynamic smile reanimation with free functional muscle transplant (FFMT) in facial paralysis: Feasibility, technical considerations, and results**

University of Texas Southwestern Medical Center, Dallas

Presenter: Austin Hembd, MD

Austin Hembd, MD(1), Philip Tolley, MS(2) and Shai Rozen, MD(3)

(1)Department of Plastic Surgery, UT Southwestern Medical Center, Dallas, TX, (2)UT Southwestern Medical Center, Dallas, TX, (3)Department of Plastic Surgery, University of Texas Southwestern Medical Center, Dallas, TX

Background: Dynamic smile reanimation for facial paralysis is a long process demanding commitment, patience, and dedication from both patient and surgeon. Failure is devastating for the patient and poses unique challenges for the surgeon. Our goal was to evaluate the feasibility of salvage dynamic smile reanimation with FFMT through analysis of etiologies of failure, key pre-and intra-operative considerations, reuse of donor nerves, and objective metric results.

Methods: Analysis of patients presenting between 2007 and 2017 to a single center after previously failed dynamic smile reanimation who underwent a salvage dynamic procedure with FFMT. Patient demographics, history of radiation or chemotherapy, surgical techniques, and objective measurements using the MEEI Face-gram software were evaluated.

Results: Seven patients – two males and five females with an average age of 58 (Range 46-68) were included. Initial etiology of paralysis included three (43%) patients with Bell's Palsy, two (28.5%) with intracranial tumor resections, and two (28.5%) with parotid gland cancers. Failed reanimation surgeries consisted of four (57%) one-stage free functional muscle transfer (FFMT) to the masseter nerve, one (14%) two-stage FFMT to a cross-facial nerve graft, and two (28.5%) turn-over temporalis muscle flaps. Six (86%) of patients had negligible motion after the initial procedure and one patient (14%) had successful motion until parotid malignancy recurrence requiring excision of the FFMT. Three patients underwent radiation/chemotherapy. Likely etiologies of failure included administration of neurotoxic chemotherapy agent one month after nerve coapation for newly diagnosed cancer in one (14%) patient, failed motion of temporalis muscle turnover flap in two (28.5%) patients, and unknown etiology in FFMT in three (43%) patients. Salvage procedures included neurolysis of a previous nerve coaptation in one (14%) patient with previous FFMT, re-use of the masseter donor nerve for a new FFMT in patients with previously failed FFMT in three (43%) patients, and a FFMT to an unused masseter nerve in two (28.5%) patients with previous failed temporalis slings. Overall this series achieved 11.32 mm of smile excursion on the paralyzed side with a 1.3 mm philtral deviation correction in repose.

Conclusion: Dynamic smile restoration with FFMT in previously failed reanimation patients is feasible. Careful patient evaluation and clear understanding of previous procedures is key to success. Use of a new donor nerve, a previously used donor nerve, and rarely, neurolysis of a previous FFMT nerve coaptation, may all provide successful reanimation.

7:41 AM - 7:46 AM

RM 8. **The Pedicled Internal Mammary Osteomyocutaneous Chimeric Flap (PIMOC) for Salvage Head and Neck Reconstruction**

State University of Campinas, Campinas

Presenter: Guilherme Cardinali Barreiro, MD, PhD

Guilherme Cardinali Barreiro, MD, PhD(1,2), Chelsea C. Snider, MD(3) and Alex Boso Fioravanti, MD(4)

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Background

With advances in head and neck cancer management, there has been a rise in the vessel-depleted, radiated neck with higher rates of fistulas and failed reconstructions. These cases present unique challenges to the reconstructive surgeon. Unconventional microsurgical techniques have been described to overcome these complexities. We describe a novel technique, the pedicled internal mammary artery osteomyocutaneous chimeric flap (PIMOC), and its surgical rationale and clinical application for salvage head and neck reconstructions.

Methods

Seventy flaps in 35 cadavers were dissected to investigate the internal mammary vascular pedicle and its perforators to the ribs and distal extent into the rectus abdominis muscle. The PIMOC flap was designed to include 6^{th}/ 7^{th} rib osteomyocutaneous and rectus abdominis myocutaneous components. Vessel length and caliber were measured. Flap composition, surgical technique, and arc of rotation were standardized. The anatomic study was translated to the clinical setting for salvage head and neck reconstruction cases.

Results

The caliber of the main arterial pedicle and its branches was homogeneous with regard to laterality and gender in all cadaver dissections. The caliber of the internal mammary artery ranged from 1.5 to 2.4 mm; the vein 2.0 to 3.6 mm. The pedicle length from origin to the 6^{th} or 7^{th} rib osteomyocutaneous flap component ranged from 18.5 to 21.6 cm, providing adequate length for flap rotation to the face. The rectus abdominis myocutaneous component reached as far as the occiput in all cases and provided the deep inferior epigastric vessels for supercharged anastomoses. The PIMOC flap was utilized in a series of five patients for salvage head and neck reconstruction. Four flaps contained a rib component; two with the 6th rib and two with the 7th. All flaps contained a rectus abdominus myocutaneous component. All donor sites were closed primarily and there were no major complications within an average follow-up of 6 months. There were no total flap losses and the patients regained adequate facial contour, speech and swallow.

Conclusion

The PIMOC flap is based on a single vascular pedicle and can be used as a salvage procedure in complex head and neck reconstruction where there are limited recipient vessels and significant radiation or iatrogenic sequelae. It is a reliable and reproducible flap that provides substantial donor tissue and long pedicle length.

7:46 AM - 7:51 AM

RM 9. **Chimeric versus Composite Bony Mandible Reconstruction**

University of Chicago Hospitals, Chicago

Presenter: Amanda K Silva, MD

Amanda K Silva, MD(1), Andrés A. Maldonado, MD, PhD(2), Laura S Humphries, MD(1) and Lawrence J Gottlieb, MD, FACS(1)

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Background

Reconstruction of mandibular defects in patients with locally advanced cancer or sequelae from treatment often requires multiple tissue components inset in different planes with limited recipient vessel options. Intrinsic chimeric flaps may be best suited for reconstruction of these defects given the freedom to inset various tissue types in different orientations and the convergence to a single vascular pedicle. The purpose of this study was to identify differentiating characteristics of mandibular defects that were reconstructed with composite versus intrinsic chimeric free flaps, and their associated complications.

Methods

A retrospective chart review was performed for all patients who underwent bony mandible reconstruction with a soft tissue component from 1995 to 2015. Patient factors, flap characteristics, and complications were analyzed.

Results

Seventy-two patients were reviewed. Thirty-five were reconstructed with a composite flap and thirty-seven with an intrinsic chimeric flap. Median follow-up was 47.6 months. There were no significant differences in patient characteristics, except patients reconstructed with composite flaps were significantly more likely to have cardiac disease (Table 1). The most common flap for the composite group was a free fibula (89%), whereas a greater variety of flaps were used for the intrinsic chimeric group: free fibula (57%), lateral femoral circumflex (27%), and subscapular (16%) (Table 2). Defects reconstructed with intrinsic chimeric flaps had significantly more components ($p=0.002$) and more extensive soft tissue needs ($p=0.028$) than composite reconstructions. However, the bony defects reconstructed with intrinsic chimeric flaps were less complex ($p=0.005$) (Table 3). Despite a significantly longer operative time for the intrinsic chimeric flaps, there were no differences in complications or length of hospital stay (Table 4). On subgroup analysis of defects with both internal lining and external skin needs, defects reconstructed with intrinsic chimeric flaps were significantly less likely to experience a complication requiring an additional flap compared to those reconstructed with composite flaps (12% versus 56%, $p=0.003$). Additionally, defects reconstructed with a composite flap with either an external skin or internal lining defect had a significantly lower rate of complications requiring an additional flap when compared to defects with both components (18% versus 56%, $p=0.035$).

Conclusion

Intrinsic chimeric flaps are a good option for reconstruction of more complex composite mandibular defects with large soft tissue needs, with no increased risk of complications despite longer operative time as compared to composite flaps**.** Less complex defects may be reconstructed with more simple composite flaps**.**

Table 1. Patient characteristics

	Composite (n=35)	Intrinsic Chimeric (n=37)	p value
Characteristic	**No. of patients (%)**		
Male gender	22 (63)	27 (73)	0.450
Age (years) Average Range	56.2 11-76	55.4 20-85	0.800
Medial comorbidities Cardiac Pulmonary Diabetes mellitus Cirrhosis Morbid obesity Underweight	17 (49) 1 (3) 3 (9) 0 3 (9) 2 (6)	3 (8) 2 (5) 1 (3) 3 (8) 1 (3) 7 (19)	<0.001 1.000 0.351 0.240 0.351 0.153
Tobacco Use	10 (29)	11 (30)	1.000
Alcohol Use	8 (23)	14 (38)	0.206

Table 2. Defect characteristics

	Composite (n=35)	Intrinsic Chimeric (n=37)	p value
Characteristic	**No. of patients (%)**		
Prior surgery Ablative Reconstructive	 29 (83) 10 (29)	 23 (62) 14 (38)	 0.067 0.460
Radiation Preoperative Double Preoperative	 25 (71) 7 (20)	 29 (78) 11 (30)	 0.590 0.419
Donor vessel Peroneal Subscapular LFC Deep circumflex iliac Superficial temporal	 31 (89) 1 (3) 0 2 (6) 1 (3)	 21 (57) 6 (16) 10 (27) 0 0	 0.004
Donor closure Primary Skin graft Local tissue	13 (37) 21 (60) 1 (3)	4 (11) 29 (78) 4 (11)	 0.017
Recipient vessel Non-carotid branch Vein graft	 3 (9) 2 (6)	 10 (27) 3 (8)	 0.065 1.000

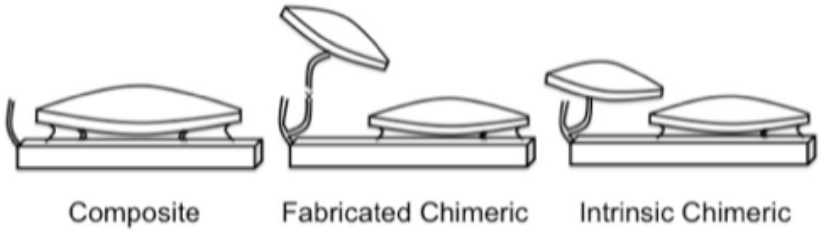
Table 3. Detailed defect characteristics

	Composite (n=35)	Intrinsic Chimeric (n=37)	p value
Characteristic	**No. of patients (%)**		
# defect components 2 3 4 >5	 17 (49) 12 (34) 6 (17) 0	 4 (11) 19 (51) 11 (30) 3 (8)	0.002
Bone length (cm) Average Range	 8.3 2 - 17.3	 7.0 2 - 20	0.151
# osteotomies 0 1 2 3	 11 (31) 10 (29) 9 (26) 5 (14)	 27 (73) 5 (14) 3 (8) 2 (5)	0.005
External skin	26 (74)	30 (81)	0.576
Intraoral	27 (77)	33 (89)	0.215
External and internal lining	18 (51)	26 (70)	0.147
Total skin used (cm^2) 0-100 101-200 201-300 >301	 26 (74) 6 (17) 2 (6) 1 (3)	 15 (41) 15 (41) 5 (14) 2 (5)	0.028
Tongue	2 (6)	7 (19)	0.153
Dead space	4 (17)	16 (43)	0.004

Table 4. Complications, operative duration, and length of stay

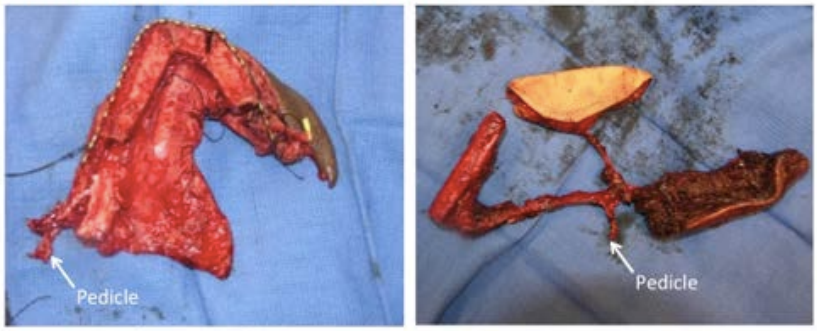
	Composite (n=35)	Intrinsic Chimeric (n=37)	p value
Complication	**No. of patients (%)**		
Recipient Overall Required operative intervention Required new flap	 19 (54) 18 (51) 9 (26)	 20 (54) 17 (46) 6 (16)	 1.000 0.814 0.391
Return to OR for flap concerns Partial flap loss Total flap loss	6 (17) 6 (17) 1 (3)	7 (19) 3 (8) 0	1.000 0.301 0.486
Donor Overall Required operative intervention	 7 (20) 3 (9)	 6 (16) 4 (11)	 0.764 1.000
Medical Overall	 11 (31)	 9 (24)	 0.602
Operative duration Average (Range)	 14.7 (10-22.7)	 17.6 (8.9-30)	 0.015
Length of stay Average (Range)	 15.5 (5-53)	 14.1 (5-33)	 0.553

Figure 1. Different types of compound flaps



The composite flap lacks the freedom of movement of individual flap components. The fabricated chimeric flap requires intra-flap microanastamoses (denoted by "x")

Figure 2. Composite versus intrinsic chimeric flap



Composite Fibula | Peroneal artery intrinsic chimera

7:54 AM - 7:59 AM

RM 10. **Multiple, Simultaneous Free Flaps for Reconstruction of Extensive, Composite Head and Neck Defects: Does the End Justify the Means?**

Erasmus MC Cancer Institute, University Medical Center Rotterdam, Rotterdam

Presenter: Marc A.M. Mureau, MD, PhD

Shoista Kambiz, MD, PhD(1), Nick Brinkman, MD(1), Tim de Jong, MD, PhD(2) and Marc A.M. Mureau, MD, PhD(3)

(1)Erasmus MC, University Medical Center Rotterdam, Rotterdam, Netherlands, (2)Plastic and Reconstructive Surgery, Erasmus MC, University Medical Center Rotterdam, Rotterdam, Netherlands, (3)Plastic and Reconstructive Surgery, Erasmus MC Cancer Institute, University Medical Center Rotterdam, Rotterdam, Netherlands

Background: The use of simultaneous, multiple free flaps has become a useful and reliable reconstructive option in patients undergoing major oncological resection for head and neck cancer. However, some reluctance remains among reconstructive surgeons with understandable concerns regarding flap outcomes and limited survival of patients with advanced malignant head and neck disease. Therefore, we evaluated postoperative complications, long-term patient survival and functional outcomes following multiple, simultaneous free flap reconstructions in patients who had undergone resection of a locally advanced head and neck tumor.

Methods: Patients treated with multiple, simultaneous free flaps for reconstruction of extensive, composite defects after resection of locally advanced head and neck cancer between 1999 and 2013 were retrospectively reviewed. Patient charts were evaluated for demographics, complications and flap failure rates, overall survival, and difficulties with speech, eating and drinking. Furthermore, all patients alive at the start of the study were asked to fill in the 10-item Eat Assessment Tool (EAT-10) questionnaires and an adjusted Voice Handicap Index (VHI). EAT-scores range between 0 and 40, with scores <16.2 indicating safe swallowing and scores >24.5 indicating unsafe swallowing.

Results: Eighty-seven multiple free flap reconstructions were performed in 42 patients; 39 patients received two and three patients received three simultaneous free flaps. Mean follow-up time was 51 months (0-202 months). The predominant free flap combination consisted of an osteocutaneous fibula with a fasciocutaneous anterolateral thigh flap (n=22) and an osteocutaneous fibula with a radial forearm flap (n=14). Five flaps required early anastomosis revision and only two total flap losses were observed (4.8%). At the time of this study, 19 patients were still alive (47%). Mean overall survival was 105 months (95% CI, 75-134 months). The 5-year survival of patients undergoing multiple, simultaneous free flap reconstruction was 46%. The mean score for the EAT-10 dysphagia questionnaire was 8.4 (SD ± 10.4), indicating safe swallowing (one patient had a score above 24.5). Ninety percent of the patients reported a moderate to good speech intelligibility with the VHI.

Conclusion: Multiple, simultaneous free flaps can be performed safely in carefully selected patients, leading to moderate/good functional outcomes and survival rates comparable to literature regarding single free flap reconstructions. Our study, which is the second largest series in literature, convincingly demonstrates it is worthwhile to perform these challenging microvascular reconstructions in patients with locally advanced head and neck cancer.

7:59 AM - 8:04 AM

RM 11. **Orbicularis Oculi Muscle Re-innervation in Facial Palsy Patients after Facial Nerve Transfer Confers Complete Voluntary Eye Closure**

UT Southwestern Medical Center, Dallas
Presenter: Justin Lee Perez, MD
Justin Lee Perez, MD, Austin Hembd, MD, Phillip Tolley, BA, Shuhao Zhang, MD and Shai Rozen, MD
UT Southwestern Medical Center, Dallas, TX

Background: Facial palsy can result in serious ophthalmologic sequelae including exposure keratopathy, corneal opacification, or blindness, due to lack of orbicularis oculi innervation and persistent, unopposed levator palpebrae muscle function resulting in paralytic lagophthalmos. Masseteric to facial nerve transfers are primarily performed for select patients with acute and subacute facial paralysis, yet at a price of mild degree of ocular synkinesis may result in robust re-innervation of orbicularis oculi allowing complete voluntary palpebral aperture closure resulting in corneal protection.

Goals: Evaluate and quantify the effect of masseter to facial nerve transfers on upper and lower eyelid position in repose as well as motion during willful eye closure.

Methods: Retrospective review of nerve transfers performed between 2009 and 2017 was conducted and included patient demographics, etiology of paralysis, duration of paralysis, type of nerve transfer performed (selective versus non-selective), pre-existing ocular function and prior ophthalmologic interventions. Two independent assessors evaluated pre-and post-operative photography using the Manhattan Eye and Ear Infirmary Face-gram software for objective quantification of palpebral aperture during willful eye closure. Postoperative videos were assessed for dynamic factors including rapidity of lid closure.

Results: Sixteen patients underwent CN V to CN VII nerve transfer for facial reanimation. Of these, two were excluded for follow up time of less than 4 months, and four patients excluded for absent photography/videography. Ten patients meeting inclusion criteria, with mean age was 43.9 years (11-81 years) with average follow up time of 15.2 months. There was clinically significant improvement in eye closure dynamics postoperatively including restoration of complete willful eye closure in 70.0% of patients. Rapidity of eye closure was timed (to millisecond range) by watching videography frame-by-frame. All patients with complete eye closure were able to do so in under 1.20 seconds (range 0.35 – 1.19 seconds). Furthermore, calculated palpebral aperture in still photos during willful eye closure was consistent with the clinical results seen on videography [average preoperative palpebral aperture: 3.36 mm (range: 1.72-7.1mm); average postoperative palpebral aperture: 0.78 mm (range: 0-5.57mm)].

Conclusion: Although masseteric to facial nerve transfers do not provide a blink reflex nor synchronous eye closure, they are extremely reliable in restoring willful eye closure and dynamic palpebral competence for corneal protection in supple, un-scarred lids, albeit at a price of mild synkinesis. This provides critical clinical insight into the restoration of ocular movement in acute and subacute facial palsy patients, in whom ocular preservation is of utmost priority.

8:04 AM - 8:09 AM

RM 12. **Use of the Distal Facial Artery (Angular Artery) for Supermicrosurgical Midface Reconstruction**

University of Tokyo Hospital, Tokyo
Presenter: Hidehiko Yoshimatsu, MD
Hidehiko Yoshimatsu, MD(1) and Takuya Iida, M.D.(2)
(1)Plastic and Reconstructive Surgery, University of Tokyo, Tokyo, Japan, (2)University of Tokyo, Tokyo, Japan

Background:

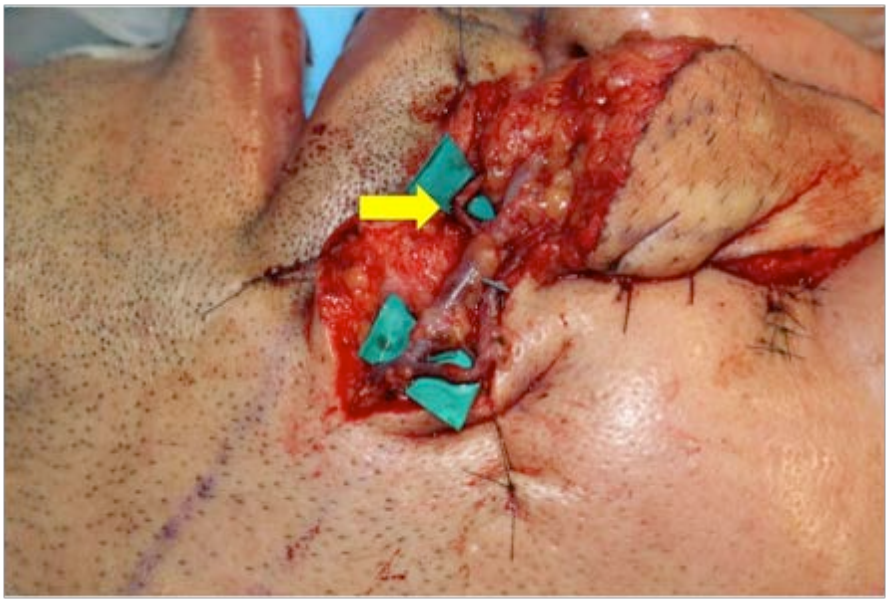
In free-flap reconstruction of the midface, options for the recipient artery are quite limited. Although the terminal branch of the facial artery, or the angular artery, is closer to the defect, there have been no comprehensive case series looking into the use of the angular artery as the recipient artery due to its small caliber.

The purpose of this article is to validate the feasibility of the use of the distal portion of the facial artery as the recipient artery in free-flap reconstruction of the midface, and to seek appropriate types of flaps and venous drainage methods.

Methods: From August of 2011 to April of 2017, 9 patients with midface defects underwent free-flap reconstructions using the angular artery as the recipient artery. Identification and marking of the angular artery were performed preoperatively using handheld Doppler ultrasound. The angular artery was located through an incision made on the side of the nose. When present, vena comitans of the facial artery or any subcutaneous vein in the vicinity of the defect was used as the recipient vein. The direction of venous flow was confirmed using indocyanine green (ICG) angiography. When no appropriate vein could be found around the defect, the facial vein at the submandibular region was chosen as the recipient vein, and a vein graft was procured from the lower leg to bridge the gap.

Results: The average diameter of the angular artery was 0.8 mm. In all cases, arterial anastomosis was performed in an end-to-end fashion. All flaps survived completely. In 2 cases, the flap became congestive within 24 hours after the surgery. Re-anastomosis of the veins restored flap status in 1 case, and an additional venous anastomosis using the angular vein as the recipient vein improved the congestion in the other case.

Conclusion: The distal portion of the facial artery, or the angular artery, is anatomically consistent, and is a reliable option for the recipient artery. When the hurdle of size can be addressed with supermicrosurgicl skills, the use of the angular artery for the recipient artery provides several advantages. First, closer distance to the defect allows shorter pedicle of the flap. Second, the method will decrease the number of vein grafts necessary, if any. Although a vein graft was necessary for venous drainage in 4 out of 9 cases in our series, less number of vein grafts can contribute to less chance of postoperative complications.



8:12 AM - 8:17 AM

RM 13. **Palliative Microsurgery: Patient Selection Based on Preoperative Functional Status**

Montefiore Medical Center, New York

Presenter: Brian D Mikolasko, MD

Brian D Mikolasko, MD(1,2), Carrie Stern, MD(3), Corin Kinkhabwala, BA(2), Yaacov Chein, BA(2), J. Alejandro Conejero, MD(2) and Evan Garfein, MD(3)

(1)Icahn School of Medicine at Mount Sinai, New York, NY, (2)Montefiore Medical Center/Einstein College of Medicine, Bronx, NY, (3)Plastic and Reconstructive Surgery, Montefiore Medical Center/Einstein College of Medicine, Bronx, NY

Background

Head and neck cancer carries significant morbidity which can alter appearance and dramatically affect identity and social function. 50% of patients are willing to accept a 7% risk of death to regain “normal appearance” following cancer resection. In 14%, this number increases to 45% (Borah 2010). Palliative reconstructive surgery can significantly improve quality of life, but questions remain regarding which patients are ideal candidates. This study aims to further define which patients benefit most from palliative reconstruction.

Methods

A retrospective review of patients who underwent palliative reconstruction for head and neck cancer between 2008 and 2014 was conducted. Preoperative patient selection was assessed using the American Society of Anesthesiologists (ASA) Physical Status (range 1-5) and the Eastern Cooperative Oncology Group (ECOG) Performance Status (range 0-5). Both measurements independently predict postoperative morbidity and mortality in cancer resection. Average locoregional recurrent free survival (“wound free time”), hospital length of stay (LOS), complication rates, and survival overall and by functional score were recorded. Data were compared using a paired *t*-test and $P < 0.05$ to represent statistical significance.

Results

34 patients underwent palliative resection and reconstruction with 11 pedicled and 23 free flaps. Palliative reconstruction patients had an average age of 60.8 years (60.8 ± 10.9) and 96% had stage IV disease at the time of surgery. Average overall survival was 8.2 months. Average baseline ASA and ECOG scores were 2.91 (range 2-4) and 1.33 (range 1-2), respectively. ASA scores of 2, 3, and 4 had LOS of 10.5 (10.5 ± 4.3), 27.8 (27.8 ± 11.9), and 85.5 days (85.5 ± 11.3), respectively. This represented hospitalization for 8.0%, 10.3%, and 73.7% of overall survival when analyzed by functional score, respectively. ECOG scores of 1 and 2 had LOS of 10.2 (10.2 ± 5.9) and 23.3 days (23.3 ± 11.4), respectively. This represented hospitalization for 1.7% and 7.5% of overall survival times when analyzed by functional subgroup, respectively. ASA scores of 2, 3, and 4 had reconstructive complication rates of 20%, 37%, and 100%, and systemic complication rates of 20%, 40.8%, 100%, respectively. Differences in complication rates between functional groups were statistically significant ($P < 0.05$).

Conclusion

Palliative reconstruction should be offered to select patients using functional status as a guide when cure is not possible. As goals shift to quality of life, ASA and ECOG scores offer a starting point to minimize hospital stay, avoid locoregional complications, and maximize wound free time in palliative patients.

8:17 AM - 8:22 AM

RM 14. **Anatomical Study Of the Nerve to the Temporalis and its Implications in Lengthening Temporalis Myoplasty**

Singapore General Hospital, Singapore

Presenter: Allen Wei Jiat Wong, MBBS (Singapore), MRCS (Edinburgh), Master of Medicine (Surgery)

Allen Wei Jiat Wong, MBBS (Singapore), MRCS (Edinburgh), Master of Medicine (Surgery)(1), Terence Goh, MBBS (Singapore), MRCS (Edinburgh), MMed (Surgery), FAMS(2), Yee Siang Ong, MBBCHir (Cambridge), MRCSC (Edinburgh), Cosmetic Surgery M. Med (Surgery), FAMS (Plastic Surgery)(2), Kok Chai Tan, MBBS (Aust), FRCS (Eng), FAMS(1) and Bien-Keem Tan, MBBS, FRCS (Edinburgh), FAMS (Plastic Surgery)(3)

(1)Singapore General Hospital, Singapore, Singapore, (2)Plastic Reconstructive and Aesthetic Surgery, Singapore General Hospital, Singapore, Singapore, (3)Plastic, Reconstructive and Aesthetic Surgery, Singapore General Hospital, Singapore, Singapore

Background

The Lengthening Temporalis Myoplasty is an established technique for facial reanimation. This technique is single-staged, and the smile can be produced immediately after surgery. The preservation of the nerve supply of the temporalis muscle is crucial to the success of the technique. We set out to identify the course of the temporalis nerve and investigate the potential pit-falls causing denervation of the muscle.

Methods

16 hemi-facial cadaveric specimens were injected with coloured latex dyes and dissected. To expose the temporalis in its entirety, the skin flap was raised from a bicoronal incision and extended inferiorly along the inferior border of the mandible. Osteotomy of the zygomatic arch, maxilla walls and lateral orbital rim was performed to access the middle portion of the temporalis. Osteotomy of the mandible was performed to access the insertion of the temporalis muscle and its nerve supply.

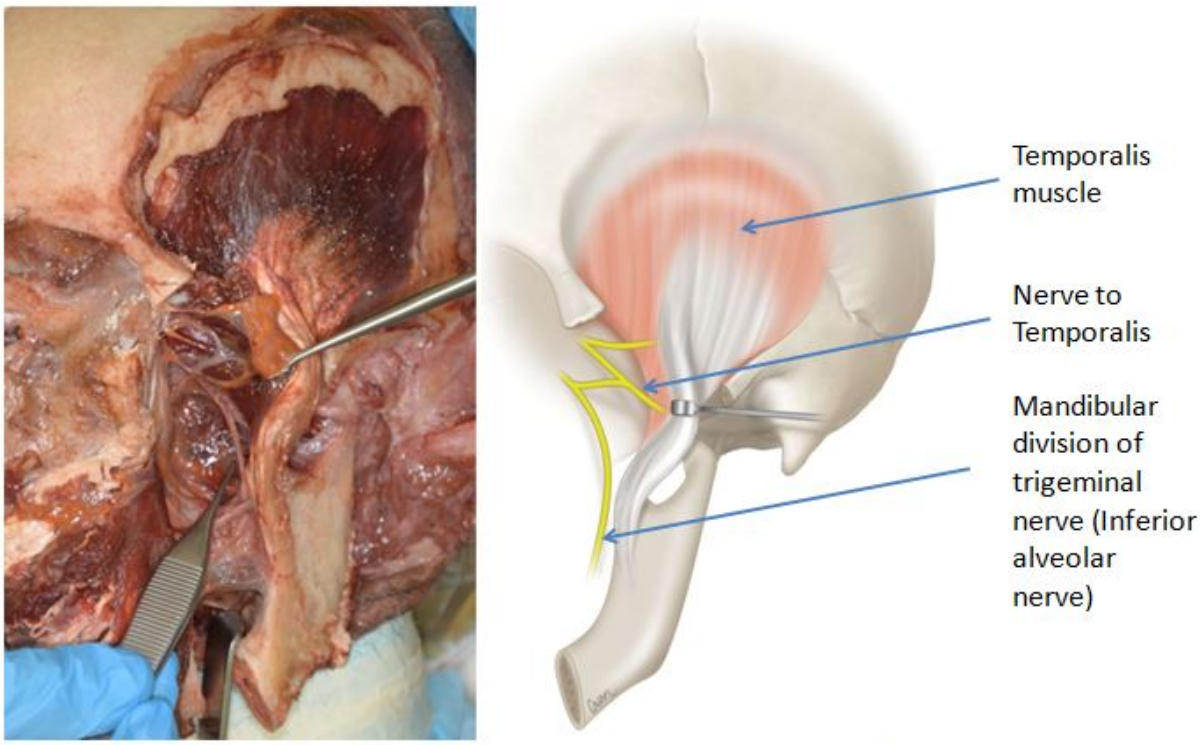
Results

The temporalis nerve enters the muscle close to its tendinous insertion onto the coronoid process. The average distance from the entry point of the nerve to the tip of the coronoid process was 0.8 cm (0 – 1.8cm). The nerve then travels superiorly as the deep temporal nerve and arborises in the muscle body. In 25% (4/16) of our specimens, the temporalis nerve was found to be arising from the maxillary division of the trigeminal nerve, via the infraorbital nerve. In the remaining 75% (12/16), the temporalise nerve originated from the mandibular division of the trigeminal nerve, via the inferior alveolar nerve.

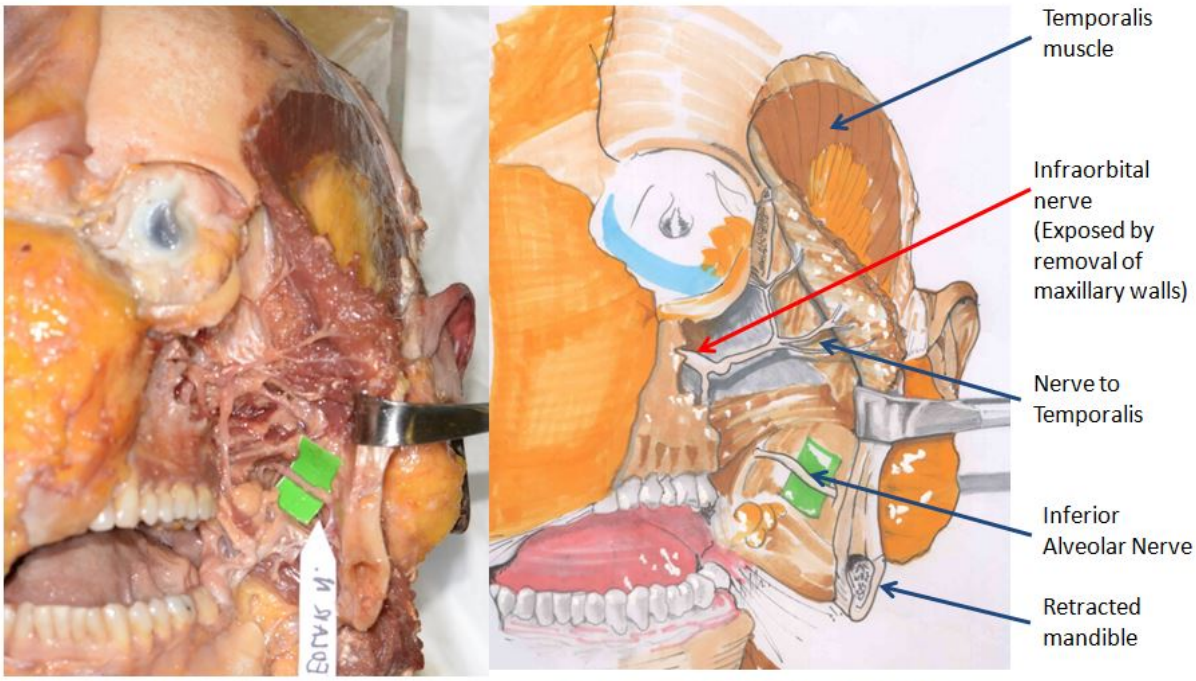
Conclusion

The entry of the temporalis nerve was found to be very close to the coronoid process, hence the disinsertion of the muscle from the coronoid process must be done at the base of the coronoid process, to prevent inadvertent denervation of the muscle. We recommend the removal of the entire coronoid process via osteotomy to allow careful all-round unfurling of the tendon. The temporalis nerve travels on the deep posterior surface of the temporalis, in a caudal-cranial direction. To preserve the nerve, we recommend the elevation of the temporalis muscle in a subperiosteal fashion in the temporal fossa. The temporalis nerve could also arise from the maxillary division of the trigeminal nerve, in contrast to the classical teaching of the nerve

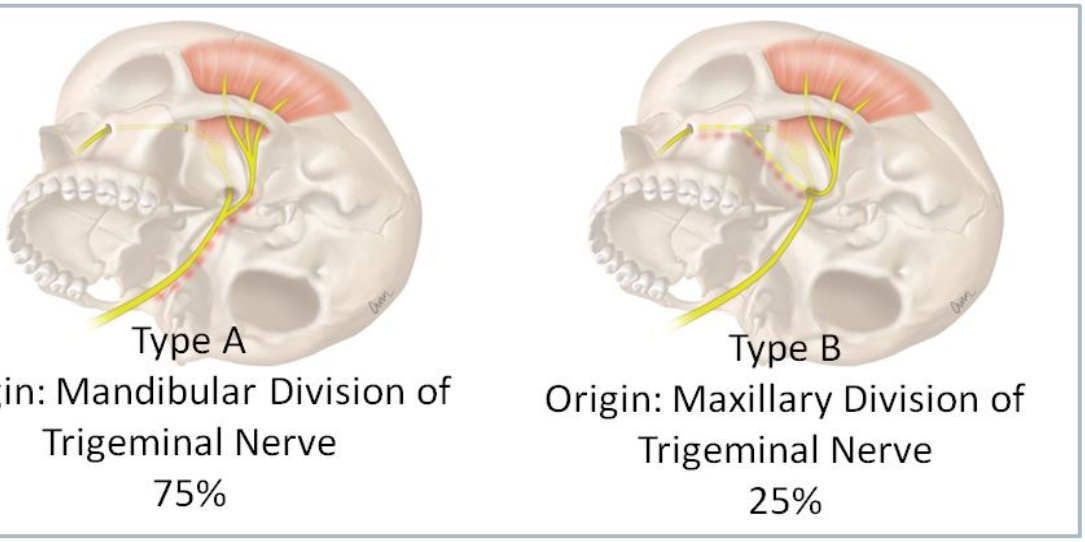
arising from the mandibular division of the trigeminal nerve. Preservation of the temporalis nerve in these locations is crucial to preventing traction injury on the nerve.



Classical origin of the nerve to the temporalis, airising from the mandibular division (V3) of the trigeminal nerve.



Novel origin of the nerve to the temporalis muscle: Originating from the infraorbital nerve (red arrow), which is from the maxillary division (V2)of the trigeminal nerve.



Two different origins for the nerve to the temporalis muscles: mandibular division (V3) and maxillary division (V2) of the trigeminal nerve

8:22 AM - 8:27 AM
RM 15. **Analysis of postoperative 30-day mortality after free flap reconstructions for head and neck cancer patients: A nationwide, population-based cohort study**
China Medical University Hosptial, Taichung
Presenter: En-Wei Liu, MD
En-Wei Liu, MD(1) and Hsu-Tang Cheng, MD(2)
(1)China Medical University Hospital, School of Medicine, China Medical University, Taichung, Taiwan, (2)Division of Plastic and Reconstructive Surgery, China Medical University Hospital, China Medical University School of Medicine, Taichung City, Taiwan

Background

Thirty-day postoperative mortality is the most important index for assessing operative outcome, which has rarely been examined in reconstructive microsurgery for head and neck cancer (HNC) patients. The aims of this study were to determine the incidence, preoperative medical conditions, and postoperative complications for 30-day postoperative mortality among HNC patients undergoing free flap reconstructions.

Methods

Using Taiwan's National Health Insurance Research Database, a nationwide cohort study was conducted for HNC patients who underwent free flap reconstructions between 1998 and 2010. A retrospective analysis of 16325 consecutive free flap procedures during a 12-year period was performed and 30-day postoperative fatal cases were identified (n=79 deaths).

Results

The 30-day post-operative mortality rate was 0.48 % (79 out of 16325 patients). The 30-day post-operative mortality was significantly correlated with age (adjusted odds ratio (OR): 1.06; 95% Confidence Interval (CI): 1.04 to 1.09), chronic renal failure (adjusted OR: 5.23; 95% CI: 2.22 to 12.3) and ischemic heart disease (adjusted OR: 1.82; 95% CI: 1.03 to 3.22). Fetal cases demonstrated more of the following postoperative complications: acute renal failure (adjusted OR: 35.9; 95% CI: 11.7 to 110.4), acute myocardial infarction (adjusted OR: 18.6; 95% CI: 4.91 to 70.4), pneumonia (adjusted OR: 1.91 to 7.82), and septicemia (adjusted OR: 2.45; 95% CI: 1.40 to 4.27).

Conclusion

These results indicate that head and neck reconstruction with free flaps is reliable. Reconstructive microsurgeons should be careful about patients with with advanced age, chronic renal failure and ischemic heart disease. To decrease the operative mortality rate, careful perioperative management is needed to prevent complications.