

Tuesday, January 14, 2014 - Head and Neck Scientific Paper Session - 8:00am -9:45am

8:00am - 8:04am

Systematic Review: A comparison of nerve transfers, cross-facial nerve grafting, and the "baby-sitter" technique in reanimation of acquired facial paralysis and the role of surgical timing

Anne Tong, MBBS¹; Marcelo J. Lacayo Baez, MD¹; Pablo A. Baltodano, MD²; Basak Basdag³; Jennifer DiBiagio, BS⁴; Li Xie⁵; Amir H. Dorafshar, MBChB⁶; Gedge Rosson⁵; (1)Johns Hopkins Hospital, (2)Johns Hopkins University, (3)Johns Hopkins School of Medicine, (4)Johns Hopkins hospital, (5)The Johns Hopkins Hospital, (6)University of Maryland School of Medicine
Institution where the work was prepared: Johns Hopkins Hospital ,Baltimore, MD, USA

Background: Various surgical techniques are used to reconstruct the facial nerve in facial paralysis, especially when primary repair or grafting is not possible. The time interval from onset of paralysis to surgical intervention has been observed to affect outcomes of facial reanimation surgery. In the current entity, comparative advantage of techniques and the optimal timing of surgical intervention remain controversial. The aim of this study is two-fold: we sought to systematically review the current literature to (i) compare the outcomes of nerve transfers, cross-facial nerve-grafting(CFNG), and the 'baby-sitter' technique in acquired facial paralysis and (ii) to determine whether a correlation exists between surgical timing and surgical outcome.

Method: Articles were selected by a 3 reviewer independent screening process and yielded 71 articles that met our inclusion criteria (**Figure 1**). Eligible articles reported on (1) nerve transfer/cross-facial nerve grafting/ baby-sitter techniques in acquired facial paralysis and (2) outcome measures of facial muscle expression after surgery.

Results: We found no randomized studies and, based on the Oxford Centre for Evidence-based Medicine(OCEBM) definition, the majority of the reviewed articles represented level 4 evidence. The hypoglossal nerve, spinal-accessory nerve, and the masseteric branch of the trigeminal nerve have been used as nerve transfers in this clinical entity. The marked variability of outcome measures and largely heterogeneous populations did not allow for a meta-analysis of data. The House-Brackmanngrading system was reported in

the majority (45%) of reviewed articles, followed by other methods of clinical assessment (**Figure 2**). Reported timing of surgery was inconsistent and incomplete in several studies, thus its association with outcomes could not be determined. Exploratory pooling of data from available studies was obtained for age, surgical timing, and donor-site morbidity (**Figure 3**).

Conclusion: A comparison of outcomes between facial reanimation techniques and their correlation with surgical timing remains inconclusive because studies are primarily of low-level evidence. In addition, poor consistency in reporting of surgical timing and outcome measures rule out the possibility of a meaningful comparative analysis. To enable reproducibility and comparability of these results thus warrant a standardized grading system and a consistent methodology for reporting surgical timing.

Figure 1 Study Attrition Diagram

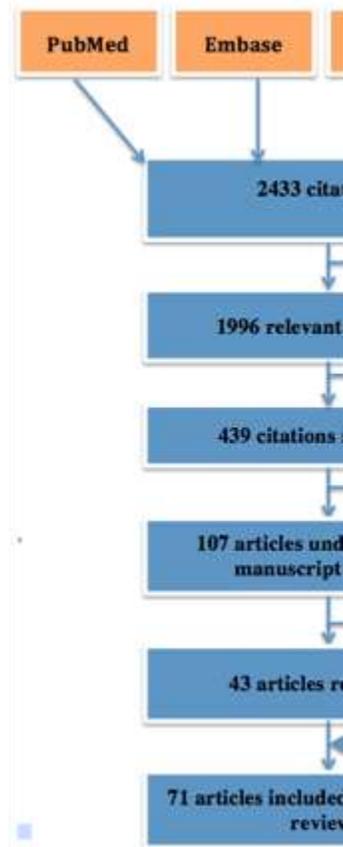


Figure 2 Outcome measures used to evaluate facial function after reanimation surgery

Outcome measures of facial function	Number of articles	Trigeminal / masseteric-facial	Spinal accessory- facial	Hypoglossal-facial	Cross-facial nerve grafting	"Baby-sitter" technique
House-Brackmann grading system	32			31		1
Terzis grading scale	2	1				1
May's grading system	1			1		
Repaired Facial Nerve Recovery Scale (RFNRS)	1			1		
University of Pittsburgh Maximal Static Response Assay(MRSA) of facial motion	1				1	
Yanigihara's 40-point scale	1			1		
Nominal clinical grading (eg. "poor", "good", "excellent")	21	2	5	11	2	1
Discrete assessment and reporting of facial function (eg. "eye closure", "movement of the corner of mouth")	15	3	3	2	5	2

*Some articles were found to use more than one of the stated outcome measures

Figure 3 Characteristics of acquired facial paralysis treated with nerve transfers, cross-facial nerve grafting, and "baby-sitter" technique

Facial reanimation technique	Trigeminal/masseteric branch-facial	Spinal-accessory facial	Hypoglossal-facial	Cross facial nerve grafting	"Baby-sitter" technique
Number of included articles	5	7	66	7	3
Location of studies					
North America	3	5	15	2	1
Europe	1	2	19	3	-
Other	1	-	12	2	2
Study design					
Randomised controlled trials	-	-	-	-	-
Non-randomised controlled trials or series	-	-	-	-	-
Uncontrolled case series	5	7	66	7	3
Year of publication					
Range	1978 - 2012	1950 - 1998	1950 - 2011	1973 - 2010	2007 - 2009
< 1970	-	4	3	-	-
1971 - 1990	2	1	12	2	-
1991-2000	-	2	12	2	-
2001- 2012	3	-	19	3	3
*Patient population					
Total patients	38	168	1133	78	31
(i) Mean	7.6	26.6	19.7	10.3	10.3
(ii) Range	3 to 14	3 to 137	3 to 61	2 to 23	4 to 20
*Age					
(i) Mean	40.69	43.71	42.98	31.98	29
(ii) Range	35.3 to 52.3	9 to 79	13 to 65	5 to 63	5 to 53
*Indications					
Infectious	2	-	7	-	1
Neoplastic	11	136	969	34	7
Trauma	9	24	84	12	6
Inflammatory	1	1	12	-	-
Vascular	1	2	2	-	3
Idiopathic	-	2	-	2	-
◆◆ Minimum surgical timing					
≤ 6 months	2	2	29	2	1
≤ 1 year	1	2	11	4	1
≤ 2 years	-	-	-	1	-
> 2 years	-	-	-	-	-
Not reported	2	3	6	-	1
*Surgical timing					
(i) Mean	-	-	7.94 months	17.4 months	9.79 months
(ii) Range	3 weeks - 3 years	Immediate - 2 years	Immediate - 7 years	Immediate - 15 years	3 months - 15 months
Donor-site morbidities					
Reported donor-site morbidities	Masseter wasting	Shoulder morbidity	(1) Tongue atrophy (2) Speech difficulties (3) Swallowing difficulties	Leg morbidity (discomfort and paraesthesia)	Tongue / leg morbidity
◆ Not reported	4	2	14	4	1
*Frequency of donor-site morbidity					
(i) Mean	-	21.40%	(1) 21.4% (2) 60% (3) 77%	21%	-
(ii) Range	0%	0% - 25%	(1) 0 - 100% (2) 0 - 66% (3) 0 - 100%	0% - 28%	0%
*◆◆ Minimum follow-up duration					
< 6 months	-	-	7	2	-
> 6 months	3	3	29	5	1
Not reported	2	4	10	-	2

* Pooled results based on available data from reviewed articles.
 ◆ Results indicate number of articles
 ◆ Results indicate number of cases/patients
 Abbreviations: "-" indicates not available.

8:04am - 8:08am

Proximal skin island fibula flap: improving donor area outcome

Guilherme Cardinali Barreiro, MD¹; Rachel Baptista, MD¹; Daniel Marchi dos Anjos²; Kiril Endo Kasai¹; Marcus Ferreira, Prof¹; Thiago Jung Mendacoli, MD³; (1)Clinics Hospital Of the University of São Paulo, (2)University of Sao Paulo, (3)Sao Paulo

Institution where the work was prepared: University of Sao Paulo, Sao Paulo, Brazil

The fibula osteocutaneous flap remains the choice for most microsurgeons in mandible and contiguous soft-tissue defect reconstructions. The main disadvantage about the donor area is the delayed healing of the skin graft.(1-2) We describe a series of 35 patients where a proximal skin island was used either by itself or in a combined multiple perforator osteomyocutaneous flap, which prevented the use of a second flap for complex head and neck reconstructions and improved donor area outcome.

Thirty flaps in 15 fresh cadavers were dissected for proximal perforator analysis. It branched off the tibiofibular trunk in 5 (15,6%) flaps and would not be useful for harvesting in a single pedicle with the fibular artery. Thirty-five consecutive composite mandibular defects were immediately reconstructed with a fibular osteocutaneous flap from April 2011 to June 2013. Age ranged from 23 to 67 years. Perforators were isolated and used according to the defect. Harvesting of the fibula bone was through classical anterior approach.

All patients were reconstructed with a single fibula osteomyocutaneous free flap. Sixteen patients required multiple skin islands for combined mucosal and skin defects. Fourteen needed only the proximal skin island. In 5 patients (14,3%), the proximal perforator branched off the tibiofibular trunk and the distal perforator was used. In the other 30, it arose from the fibular artery, 2-3 cm after it branched off the trunk. Final perforator length was 6-9 cm. It was myocutaneous in 88% of the cases. The lateral hemisoleus was included in 8 patients. The proximal leg defect was primarily closed in 23 patients (76,7%) and skin grafted in 7 (23,3%). There were no dehiscences or delayed healing of the proximal defect. Two flaps were lost because of salivary fistula.

The proximal skin island fibula flap provides an independent skin island with little compromise of the donor area and allows for composite mandibular defects reconstruction without the need of a second free flap.



Figure 1: Complete healing and rehabilitation of the donor area with normal gait 15 days after a proximal skin island fibula flap.

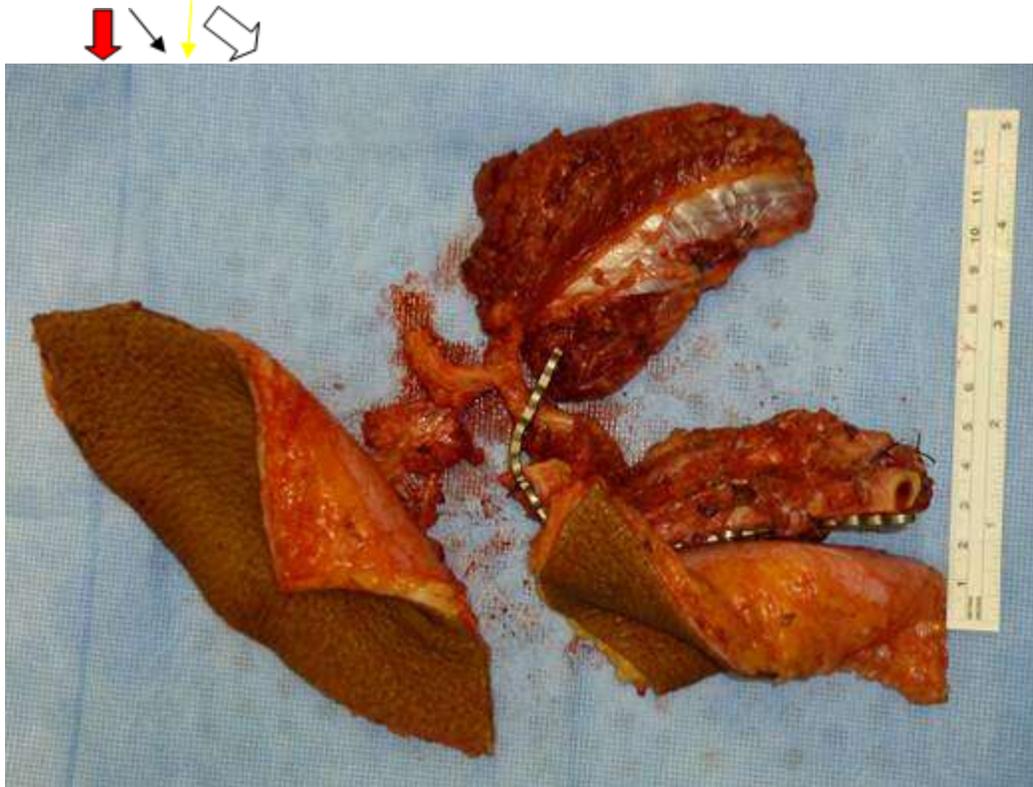


Figure 2: A double skin island free osteomyocutaneous fibula flap harvested for composite mandibular defect. The fibular trunk (big white arrow) branches a perforator to the proximal leg skin island (black arrow), another to the lateral hemisoleus (yellow arrow), continues on to irrigate the bone (big red arrow), the distal perforators to the distal leg skin island (small white arrow).

8:08am - 8:12am

Comparison of Symmetry and Interfragmentary Gap Size in Free fibular Mandibular Reconstruction: Free-Form versus 3D-Planned

Elizabeth Stirling Craig, MD¹; Mikell Yuhasz¹; Felix Koch, MD, PHD²; Jeffrey Salomon³; Roger Lowlicht, MD, DDS²; Stefano Fusi³; Derek Steinbacher, MD, DDS²; (1)Yale New Haven, (2)Yale New Haven Hospital, (3)Yale School of Medicine

Institution where the work was prepared: Yale New Haven Hospital, New Haven, CT, USA

Introduction: Vascularized fibular transfer is the workhorse for mandibular reconstruction. Traditionally an en fos approach is taken to adapt a mandibular reconstruction plate and fashion the fibular graft accordingly. 3-dimensional planning, with use of cutting guides and pre-bent plates, has been introduced with possible benefits. The purpose of this study is to evaluate the interfragmentary gap size and symmetry between conventional free-hand fibular preparation and those using 3-dimensional planning.

Methods: A retrospective review was performed in concordance with Yale HIC (#1101007932). Mandibular reconstructions involving free fibular transfer performed by the senior authors (SF, DMS) at a single institution between 2010-2012 were included. Cases without CT scans in the early postoperative period were excluded. Demographic and intraoperative data was collected. Post-operative CT scans were analyzed using Materialise software. Interfragmentary gap distances were assessed (mm), as was symmetry (degrees). Results were analyzed using a two-sided t-test.

Results: Of 45 fibular reconstructions, 16 met the criteria for inclusion. The majority were male (13M:3F), with a mean age 56.7 (range of 14-82 years). 37 gaps were analyzed (26 non-3D; 11 3D). Fibula to native mandible gap-size was 1.63mm versus 1.60mm in non-3D to 3D, respectively ($p=0.9621$). Inter-fibular gaps measured 1.89mm versus 0.00mm in non-3D compared to 3D ($p=0.024$). Symmetry (a ratio between right and left angles) measured 1.024 versus 1.01 in non-3D compared to 3D ($p=0.8011$).

Conclusions: 3D planning with use of intraoperative cutting guides and prebent plate lessens interfibular gap dimensions and may enhance axial symmetry. Space between native mandible and fibula is not appreciably altered using planning. Future efforts will focus on the accuracy and reproducibility of the 3D planned to actual results as well as clinical significance and efficiency benefits.

8:12am - 8:16am

Complications After Gracilis Free Muscle Transfer for Facial Reanimation: A Meta-Analysis and Proposed Stratification System

Ryan M. Garcia, MD¹; Arun Gosain, MD²; Michael R. Zenn³; Jeffrey Marcus³; (1)Duke University Medical Center, (2)Northwestern University, (3)Duke University

Institution where the work was prepared: Duke University Medical Center, Durham, NC, USA

Introduction: Gracilis free muscle transfer has become the gold-standard of treatment for patients with long-standing facial paralysis. Multiple studies have detailed promising smile restoration results but information detailing the potential complications is lacking. The aim of this study is to systematically review the literature and perform a meta-analysis to evaluate the overall complication rate associated with this procedure. We also implemented and analyzed a new stratification system for subcategorizing complications.

Materials and Methods: The PubMed, Embase, and Web of Science databases were queried with multiple search strategies for published articles between January 1950 and February 2013 that detailed gracilis free muscle transfer for facial reanimation. Title, abstract and full text review was performed. Complications were defined as any reported, identifiable adverse outcome that altered patient outcomes. Complications were further subcategorized as "major" if an operative intervention or maneuver was necessary for correction, "moderate" if a patient's standardized treatment plan was altered, or "minor" if the unexpected outcome was recognized but did not require further intervention.

Results: The literature search yielded 61 studies of gracilis free muscle transfer for facial reanimation (183 articles excluded). All patient ages were analyzed (mean, 25.6 years, range, 6-60). Articles described 1 and 2-staged procedures with a variety of donor motor nerves (masseter, cross-facial, hypoglossal, spinal accessory, and C7). Planned tertiary procedure articles were excluded. 35 of the 61 articles (57.4%) reported whether a complication had occurred. Pooled proportion based on a random effect model (DerSimonian-Laird) of all complications was 13.8% (95% CI, 9.8% to 18.3%). Major, moderate, and minor complication rates were 7.4% (95% CI, 5.2% to 10.0%), 2.6% (95% CI, 1.3% to 4.3%), and 3.1% (95% CI, 1.6% to 5.1%), respectively. The most common major complications included hematoma, abscess, and vascular compromise to the flap. Moderate complications included infection requiring antibiotic treatment,

seroma requiring aspiration, and salivary leak. The most common minor complication was hypertrophic scarring. Failure of muscle flap reinnervation or evidence of long-term muscle contraction was 1.8% (95% CI, 0.9% to 3.0%).

Conclusions: Our data suggests that complications after gracilis free muscle transfer for facial reanimation is underreported and may in fact be associated with significant adverse outcomes (13.8%). Use of our simple stratification system will provide a basis for future studies and will better inform patients who are considering this procedure.

8:26am - 8:30am

Classification of Mandible Defects and Algorithm for Microvascular Reconstruction

Arthur J. Nam, MD, MS; Raja Mohan, MD; Peter Ming Zhang, BS; Saami Khalifian, BS; Benjamin Schultz, BA; Neil Vranis, BS; Eduardo Rodriguez, MD, DDS; Johns Hopkins University / University of Maryland

Institution where the work was prepared: Shock Trauma Center / University of Maryland, Baltimore, MD, USA

Purpose: Composite mandibular tissue loss from trauma and oncologic resection result in significant functional and cosmetic deformity. Bony stabilization combined with soft tissue flaps and subsequent non-vascularized bone grafts have been the mainstay of segmental mandibular reconstruction. However, bony resorption, soft tissue collapse and delayed procedures limit long-term viability. This study classifies patterns of mandibular composite tissue loss and describes a microvascular treatment algorithm.

Methods: From July 2005 to April 2013, 26 patients (17 men, 9 women: mean age 53 years) underwent microvascular composite mandibular reconstruction by a single surgeon at R Adams Cowley Shock Trauma Center and at Johns Hopkins Hospital, with a mean follow-up of 16.1 months (range, 12 days to 84 months). The composite mandibular defects resulted from resection for benign & malignant tumors (n=6), osteoradionecrosis (n=11), trauma (n=5), infection (n=2), and congenital deformity (n=2). These patients with composite tissue loss were identified and classified according to missing subunits.

Results: A treatment algorithm based on composite microvascular flaps was developed and used to treat 26 patients with composite mandibular defects. Type I defect is a unilateral defect not crossing the midline and not extending into angle of mandible. Type II is unilateral defect extending beyond the angle of mandible. Type III is a bilateral defect not involving the mandible angles. Type IV is a bilateral defect with extension into at least 1 angle of mandible. Type II defects were predominant (n=13), followed by Type I and Type III (each n=6), and Type IV (n=1). Nineteen patients had fibula flaps, 5 patients had iliac crest flaps, and 2 had other free flaps. Fourteen patients had complications requiring further operative interventions: infection (n=4), partial flap loss (n=4), plate fracture (n=2), malocclusion (n=2), dehiscence (n=1), and thrombosis of microvascular anastomoses (n=1).

Conclusions: The treatment algorithm presented focuses on the size and location of the mandibular defect, tissue requirement, and donor free flap characteristics. These patterns are useful to classify and treat composite mandibular defects of any etiology with an algorithm for free flap selection based on subunit reconstruction. Iliac crest and fibula bone free flaps are ideal for restoring variety of composite mandibular defects since they provide enough bone stock for the ultimate goal of mandibular function.

8:30am - 8:34am

Success of Sequential Free Flaps in Head and Neck Reconstruction

Matthew M. Hanasono, MD; Christian Corbitt; Peirong Yu; Roman Skoracki

Institution where the work was prepared: The University of Texas MD

Anderson Cancer Center, Houston, TX, USA

Background: The need for additional free flaps following an initial free flap reconstruction sometimes arises. However, there is understandable hesitation to perform subsequent free flaps due to concerns regarding recipient vessel availability, flap loss, and other complications.

Methods: An analysis of patients undergoing one or more sequential head and neck free flap reconstructions for recurrent/second primary cancer, osteoradionecrosis, or late complications unrelated to flap loss, such as stricture, fistula, or contour deformity, between 2000 and 2012 was performed.

Results: Two hundred seventy-three free flaps were performed on 117 patients over the course of 2, 3, or 4 surgeries, with 23 patients receiving 2 or 3 simultaneous free flaps in a single surgery. One patient who underwent 4 sequential free flap reconstruction surgeries had a double free flap at the time of his second surgery, for a total of 5 successful free flaps. The success rate of subsequent free flaps was 98.7% compared to 99.1% for initial free flaps in the same patients ($p=1.00$). The complication rate following subsequent free flaps was 42.9% compared to 36.8% following initial free flaps ($p=0.46$). There were no significant differences in overall complication rates following second, third, fourth, and fifth sequential free flaps ($p=0.21$). Flap success rates for double/triple simultaneous free flaps were 97.8% compared to 99.1% for single flaps ($p=0.41$) and the complication rate for double/triple simultaneous free flaps was 34.6% compared to 47.8% for single flaps ($p=0.20$). In patients receiving oral or pharyngeal sequential free flap reconstructions, 90.1% demonstrated at least 80% speech intelligibility and 81.6% remained feeding tube-independent. The mean follow-up time was 47.1 ± 33.4 months. The 5-year survival of patients undergoing sequential free flaps was 75.4%.

Conclusions: Multiple sequential free flaps are feasible and reliable in appropriately selected patients. These findings suggest that the ability to perform free flap reconstruction should rarely limit a patient's candidacy for resection of recurrent cancers or consideration for surgery intended to improve patient aesthetics or function.

8:34am - 8:38am

Comparison of spinal accessory nerve versus masseter motor nerve - innervated free functioning free muscle transplantation for facial reanimation
Johnny Chuieng - Yi Lu, MD; David Chwei-Chin Chuang, MD; Chang Gung Memorial Hospital

Institution where the work was prepared: Chang Gung Memorial Hospital, Linkou, Taiwan

Background:

The selection of the ideal neurotizer for the functioning free muscle transplantation (FFMT) in facial reanimation has always been controversial, based primarily on the etiology of the facial paralysis and the surgeon's preference. Other than the traditional two stage cross face nerve graft (CFNG), the masseter motor nerve (V3) has been popularized due to a one stage operation. Our institution has introduced the spinal accessory nerve (XI) for both unilateral and bilateral facial palsy in a one stage operation and the aims of this study are to provide objective and subjective comparisons between XI and V3.

Material and Methods:

From the year 1987 to 2011, a total of 330 patients received FFMT for facial reanimation in a single tertiary center. 36 patients used the XI and 5 patients used the V3 as the neurotizers for innervation. A smile excursion score based on teeth exposure and the cortical adaptation stage documenting the cortical plasticity were used to assess the functional outcomes. A questionnaire was devised to evaluate the subjective aspects of the patient's results.

Results:

The smile excursion score improved from 0.5 to 3.45 in XI patients and from 0 to 2.80 in V3 patients. 83% of XI patients and 100% of V3 patients reached independent smile or above (cortical adaptation stage 3) but more XI patients reached spontaneous smile. 90% of XI patients and 80% of V3 patients were satisfied with the post-operative outcomes, but were more concerned with the aesthetic results than the functional outcomes. No statistically significant differences were found between the two groups.

Conclusion:

Both XI and V3 are effective alternatives to the CFNG as neurotizers for a one staged FFMT (see Table). Both can be used in congenital patients such as Moebius syndrome, but our preferences are to use XI in post-paretic facial synkinesis and V3 for aged or cancer patients based on previous results.

	CFNG	V3	XI
Stage requirement	2	1	1
Dissection difficulty	Easier, Other field	Easier, Same field	Difficult, Another OP field
Nerve grafts	Yes (or no)	No need	No need
Power	+ (standard)	++	++
Cortical adaptation (Maximum)	Spontaneous smile	Independent smile	Spontaneous smile
Involuntary movement	None or mild	More frequent (eating, chewing)	Less frequent (elevate shoulder)
Mobius syndrome	Easy involved	Less involved	Least involved

8:38am - 8:42am

Lymphatico-venous Anastomosis for Treatment of a Life-threatening Congenital Thoracic Duct Malformation

Richard G. Reish, MD; Christian J. Vercler, MD; Ahmad I. Alomari, MD; Steven J. Fishman, MD; Joseph Upton, MD; Amir H. Taghinia, MD

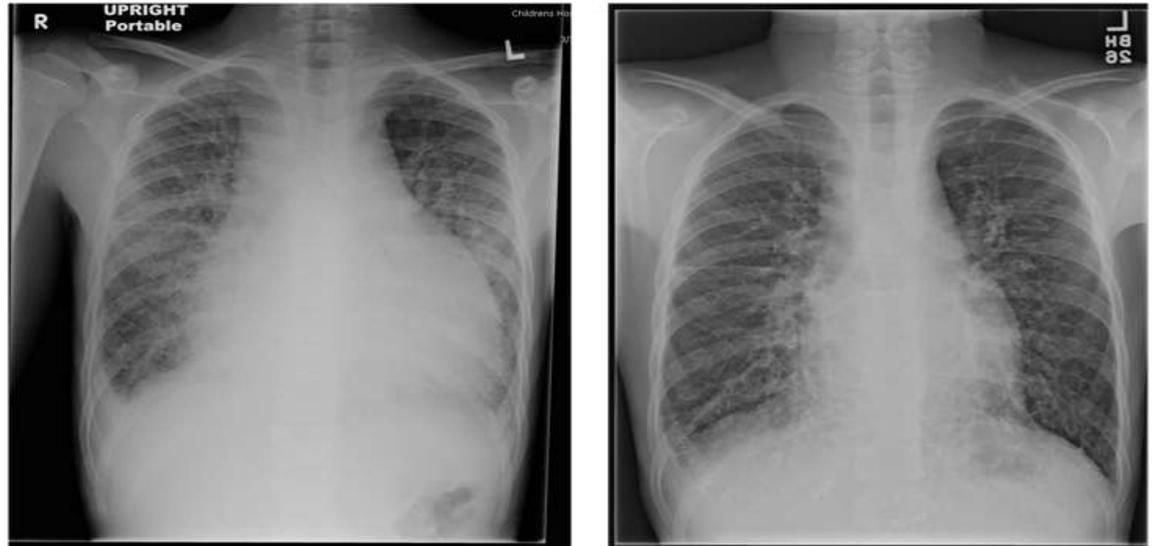
Institution where the work was prepared: Boston Children's Hospital, Department of Plastic Surgery, Boston, MA, USA

Background: Congenital anomalies of the thoracic duct are extremely rare, difficult to manage, and frequently life-threatening. These anomalies often present with seemingly insoluble clinical scenarios including respiratory compromise, chylothorax, chylous ascites, malnutrition, hypoproteinemia, and lymphopenia. Imprecise nonanatomic therapies such as pleurodesis, prosthetic pleuro-peritoneal or peritoneovenous shunts, or even radiation therapy have been used as management strategies and may provide short-term palliation, but rarely result in long-term improvement in quality of life and survival. Lymphatico-venous bypass of the central lymphatics in the neck may provide potential for a long-term durable solution for a small cohort of these patients.

Case: A 15yo male presented to our institution in April 2012 with acute onset of cough and respiratory distress. A chest x-ray demonstrated a massively widened cardiac silhouette (Figure 1). Pericardiocentesis was performed and a 1.5L chylous pericardial effusion was drained. A pericardial drain was placed. A lymphangiogram was performed and demonstrated an enlarged thoracic duct, which did not completely empty into the internal jugular/subclavian confluence (Figure 2). The patient was brought to the operating room and we dissected the abnormal thoracic duct and performed an anastomosis of the abnormal thoracic duct to external jugular vein (Figure 3). Postoperatively the pericardial drain output immediately decreased and was removed within two days. The patient has been followed for 14 months with serial echocardiograms which have demonstrated no reaccumulation of pericardial effusion.

Conclusions: Congenital anomalies of the thoracic duct are extremely difficult to manage and often present as unsolvable clinical scenarios. This case demonstrates a life-saving microsurgical intervention in this patient. Two technical aspects of this case which may have contributed to success are that the lymphatico-venous anastomosis was placed adjacent to a venous valve in order to prevent lymphatic reflux and the respiratory

pressure variation and gradient in the neck may have served to augment forward lymphatic flow. Further study and follow-up is needed to definitively ascertain if lymphatico-venous bypass in the neck will be a long-term durable solution for these patients.



a.

b.

Figure 1:

a. Pre-operative chest x-ray (left) demonstrating a massively widened cardiac silhouette.

b. 48 hours post-operative chest x-ray (right) showing resolution after lymphatico-venous anastomosis.

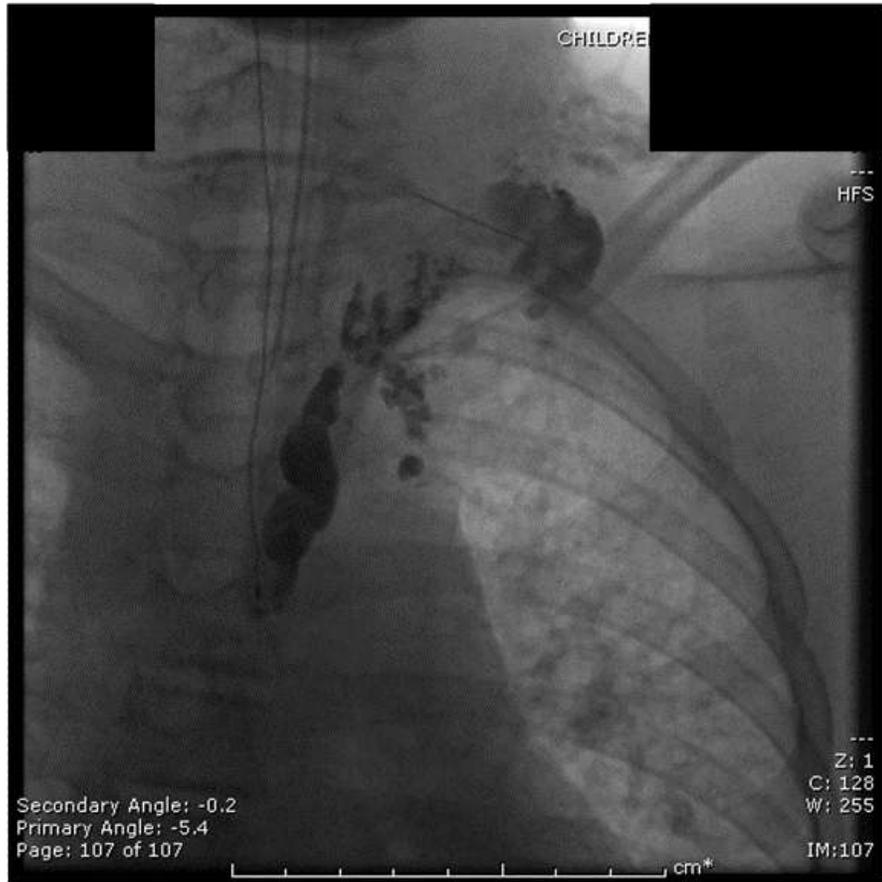


Figure 2: Lymphangiogram demonstrating an enlarged thoracic duct.

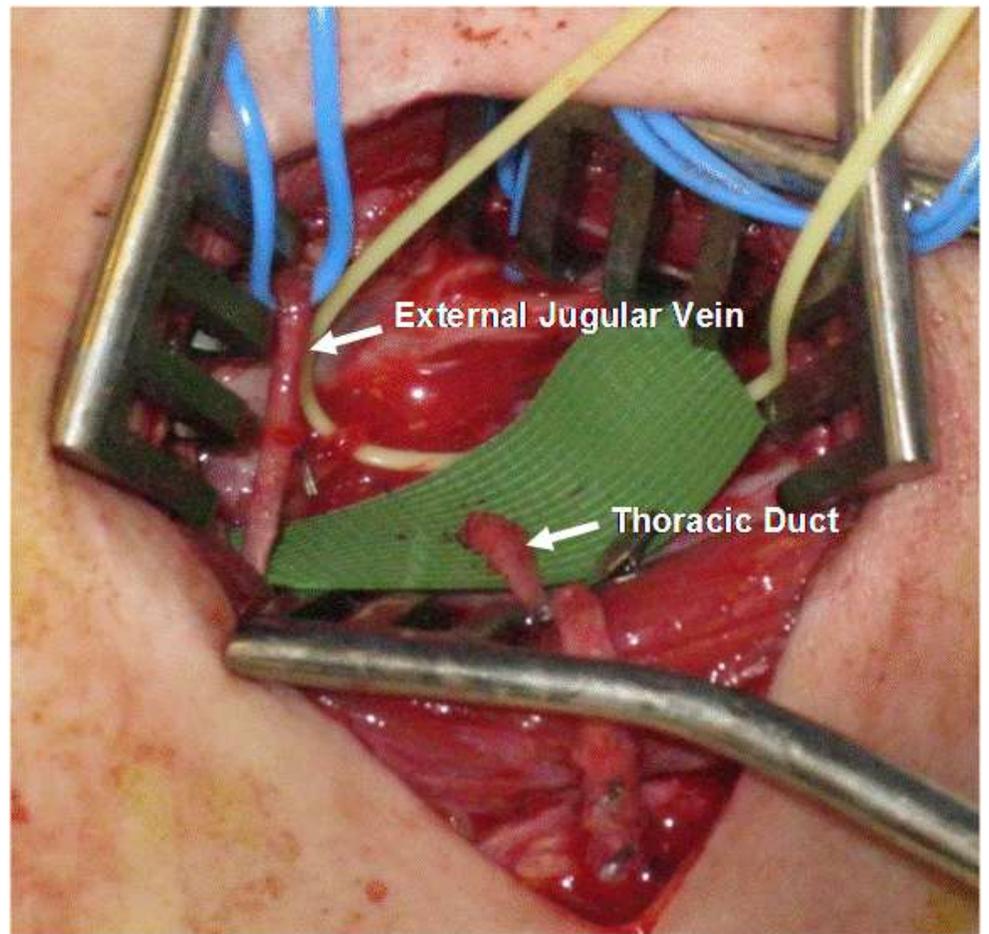


Figure 3: Dissection of the abnormal thoracic duct.

8:52am - 8:56am

Optimization of Functional Outcomes of Mandible Reconstruction With Free Fibula Flap Utilizing Virtual Surgical Planning

Tomer Avraham, MD; Peter Franco; Lawrence Brecht; David Hirsch; Jamie Levine

Institution where the work was prepared: NYU Langone Medical Center, New York, NY, USA

Purpose: The use of free osseous flaps has become the gold standard for reconstruction of complex mandibular defects. For a variety of reasons free fibula transfer has become the operation of choice for these indications. While this operation has become routine, contouring of the flap using wedge osteotomies, as well as its inset remain operator dependent and imprecise. At our institution we have attempted to make this process more uniform and reproducible through the use of virtual planning and pre-fabricated cutting jigs. The purpose of this study was to review our series free fibula mandibular reconstructions using these adjunctive technologies.

Methods: Prior to surgery all patients underwent CT scanning of the face and bilateral lower extremities. These images were then transmitted to an outside vendor. In consultation with both the ablative and reconstructive teams, a surgical plan was devised, cutting jigs for both creation of the mandibular defect and for fibular osteotomies were fabricated, and a stereolithographic model that allows for precise reconstruction plate bending was created. The rest of the surgical procedure was performed in standard fashion. Following IRB approval, all cases between 2009 and 2012 were identified and retrospectively reviewed.

Results: Fifty four reconstructions were performed in 52 patients. Patients were evenly divided between a private, university affiliated medical center and a large county hospital. The most common indications were malignancy (45%), ameloblastoma (24%), osteonecrosis/osteomyelitis (20%), and congenital defects (8%). Thirty percent of patients had irradiation of the recipient site and 38% had previous surgery in said site. A skin paddle was utilized in 85% of cases, and additional osteotomies to create a "double barrel segment" were performed 25% of the time. Sixty-four percent of patients received dental implants into the fibula flap, with 49% achieving functional dentition with dentures. Postoperative imaging demonstrated excellent precision and accuracy of flap positioning.

Conclusions: Pre-operative virtual planning along with use of prefabricated cutting jigs allows for precise contouring and positioning of microvascular

fibular free flaps in mandibular reconstruction. Employing this technique in over fifty patients we have been able to achieve excellent outcomes with dental rehabilitation rates that greatly exceed previously published reports.

8:56am - 9:00am

Free Fibula Flap Reconstruction of the Mandible in the Pediatric Population Utilizing Virtual Surgical Planning

Tomer Avraham, MD; Peter Franco; Lawrence Brecht; David Hirsch; Jamie Levine; NYU Langone Medical Center

Institution where the work was prepared: NYU Langone Medical Center, New York, NY, USA

Purpose: The use of free osteocutaneous fibula flaps has become the gold standard for reconstruction of complex mandibular defects. As use of this modality has become more commonplace, indications have been expanded such that it is routinely used in the pediatric population. The use of this reconstructive method creates unique challenges related to precision, planning, and future growth. We have attempted to optimize both the procedure and outcomes through the use of virtual planning and pre-fabricated cutting jigs.

Methods: All cases of mandibular reconstruction with a free fibula osteocutaneous flap in children aged less than 18 between 2009 and 2012 were identified. These cases were then reviewed retrospectively for a variety of outcomes and variables. Prior to surgery all patients underwent CT scanning of the face and bilateral lower extremities. These images were then transmitted to an outside vendor. In consultation with both the ablative and reconstructive teams, a surgical plan was devised, cutting jigs for both creation of the mandibular defect and for fibular osteotomies were fabricated, and a stereolithographic model that allows for precise reconstruction plate bending was created.

Results: Our cohort included 8 patients average age 13.9 years with a range of 10 to 17 years. Indications for procedure were 4 cases of hemifacial microsomia, 3 cases of ameloblastoma, and one of stage 4 squamous cell carcinoma. There was one major complication in our series which was flap loss in a patient with ameloblastoma, reconstructed with a second fibula flap. The patients with hemifacial microsomia underwent augmentation of hemi-mandibular length with vascularized bone as well as concomitant orthognathic procedures to optimize occlusion and chin point positioning. All these patients achieved significant improvement in their occlusal relationships. Three patients underwent immediate placement of osteointegrated dental implants. All patients achieved placement of dental implants within six months of flap placement. Seven of eight patients have achieved dentition of their fibula flap, with one patient who underwent surgery in late 2012 awaiting denture placement.

Conclusions: Pre-operative virtual planning along with use of prefabricated cutting jigs allows for precise complex fibula reconstruction of the mandible in the pediatric population. Additionally, virtual planning facilitated concomitant orthognathic procedures in patients with hemifacial microsmia. All patients in our series were able to have dental implants placed into their mandibular reconstruction. Improvement of long-term dental function in this population suggests superiority of virtual planning techniques to previous modalities.

9:00am - 9:04am

Peri-operative Antibiotics in the Setting of Oropharyngeal Reconstruction:
Defining a Standard of Care?

Leslie Erin Cohen, MD¹; Alyssa J. Reiffel, MD¹; Jill J. Ketner, PA¹; Brendan Finnerty²; Whitney Burrell, MD¹; Tatiana Boyko, MD¹; Andrew Weinstein, MD¹; Jason A. Spector, MD

Institution where the work was prepared: New York Presbyterian Cornell ,
New York, NY, USA

Background:

Recipient site infection following oropharyngeal reconstruction is a potentially disastrous complication that can jeopardize both the reconstruction and patient survival. Although studies suggest that peri-operative antibiotic administration reduces infection rates in these patients from 87% to 20%, there is no consensus among reconstructive surgeons regarding what constitutes the most appropriate antibiotic regimen, particularly regarding the duration of treatment, in the setting of reconstruction of the oropharynx. We reviewed our experience with peri-operative antibiotic administration in the setting of flap reconstruction of oral cavity defects.

Methods:

A retrospective review was performed of all patients who underwent pedicled/local or free flap reconstruction of defects of the oropharynx following oncologic resection by a single surgeon at a single institution between 2007 and 2012.

Results:

Seventy nine patients were included: 50 underwent microvascular free flap reconstruction, while 29 underwent reconstruction with pedicled/local flaps. Patients received a combination of intravenous antibiotic agents designed to cover oral flora. Mean duration of intravenous peri-operative antibiotic administration was 5d (range, 1-12d). All patients received topical antibiotic prophylaxis (oral mouthwash). Complications included recipient site cellulitis (8.9%), mucocutaneous fistula (5.1%), dehiscence (2.5%), and hematoma formation (1.3%). Among those who developed complications, 20% received a short course of antibiotics (<5d), and 80% received 5 days or more. Wound infections were found to be associated with a preoperative history of

chemoradiation, tobacco use, previous head and neck malignancy, low albumin and diabetes mellitus. Intraoperative variables linked with wound infections were length of surgery >12hr, pedicled flap reconstruction and defects located at the mandible. Wound infections correlated with increased length of hospital stay and a delay in resuming PO intake.

Conclusions:

Our data confirm that complex head and neck reconstruction is associated with significant post-operative morbidity. Despite the frequency with which complex oral cavity reconstructions are performed at our institution, no standardized regimen for peri-operative antibiotic administration exists as of yet. These data suggest that extended courses of peri-operative antibiotics do not confer additional benefits beyond short-course therapy. Although further study is warranted, these data may be used to justify limiting the duration of prophylactic antibiotics in order to minimize the incidence of antibiotic-related morbidities and reduce overall healthcare costs. Finally, these data may assist surgeons in recognizing which of their patients may be at higher risk for postoperative infection.

9:04am - 9:08am

A Comparison of Free Tissue Transfers to the Head and Neck performed by Plastic Surgery and Otolaryngology

Ian Craig Hoppe, MD; Anthony Kordahi; Edward S. Lee

Institution where the work was prepared: University Hospital, Newark, NJ, USA

Introduction: Microvascular reconstruction of head and neck defects is performed by either the otolaryngology service or the plastic surgery service, dependent on the institution. Very little, if any, literature exists comparing differences between these two services and their reconstructive outcomes. The American College of Surgeons' National Surgical Quality Improvement Project (NSQIP) provides a unique opportunity to examine a predefined set of variables with regards to free vascularized tissue transfers performed by each service.

Methods: Following institutional review board approval the NSQIP Participant Use Files for 2005 – 2011 were examined for all Current Procedural Terminology codes regarding free tissue transfer. The results were further refined to include only primary ICD-9 codes involving a neoplasm of the head or neck. Each record was examined to determine which service performed the free tissue reconstruction. Outcome variables examined included total operative time, total hospital stay, wound complications, flap failures, and other selected outcomes.

Results: During this time period a total of 534 flaps were performed, 213 by plastic surgery and 321 by otolaryngology. The average age was 61.8, with 367 males and 166 females (sex of 1 patient not provided). The average operative time was 578 and 567 minutes for plastic surgery and otolaryngology, respectively ($p = 0.52$). When further refining the analysis to resections performed by otolaryngology, there was no difference in operative time when the same surgical team performed the flap, or when another team performed the reconstruction. Total hospital length of stay was 12.9 and 11.2 days for plastic surgery and otolaryngology, respectively ($p < 0.05$). There were no significant differences noted between surgical site infections, wound dehiscence, and flap failure between flaps performed by plastic surgery and otolaryngology. In addition there were no significant differences noted between blood transfusion, return to operating room, postoperative pneumonia, and myocardial infarctions between the two services. Patients undergoing flaps performed by plastic surgery were

significantly more likely to be on a ventilator 48 hours postoperatively ($p < 0.005$).

Conclusions: This study shows similar results with regards to free vascularized tissue transfers when performed by plastic surgery and otolaryngology. Plastic surgeons may be less familiar with airway management than otolaryngologists, possibly explaining the increased likelihood of the patient being ventilated for more than 48 hours postoperatively. The similar outcomes between the two services indicate that each specialty receives adequate training in microsurgical head and neck reconstruction.

9:18am - 9:22am

Functional Outcomes of Supraclavicular Artery Island Flaps (SCAIFs) Versus Microsurgical Free Flaps In Head And Neck Reconstruction

Jay Granzow, MD¹; Andrew Li, MD²; Amy Caton, MD²; Clifford Thomas Pereira, MD³; Patricia Gomeztrejo²; J. Brian Boyd, MD¹; (1)University of California, Los Angeles, (2)Harbor UCLA Medical Center, (3)UCLA Institution where the work was prepared: Harbor UCLA Medical Center, Torrance, CA, USA

Introduction: Head and Neck cancer and trauma reconstruction frequently relies on microvascular free flaps that require microsurgical expertise, long operative times, and intensive postoperative monitoring. The supraclavicular artery island flap (SCAIF) is an effective pedicled alternative with the advantages of a shorter operative time, decreased ICU and overall hospital lengths of stay, and sensory innervation. Interestingly, most SCAIFs, while retaining sensory innervations, do not preclude the use of future free flaps. In this study we compare functional outcomes of SCAIF and fasciocutaneous free flap reconstruction for Head and Neck soft tissue defects.

Methods: A retrospective review was performed on consecutive cases by a single surgeon (JWG) for complex defects of the Head and Neck between 2006 and 2012. Patients were grouped into a non-osseous fasciocutaneous free flap group (FFF) and a SCAIF group. Functional outcomes were objectively assessed by a single speech pathologist: level of speech intelligibility, ability to swallow, and dependence on G-tube feeds. Intraoperative and postoperative complications were recorded for each patient. The two groups were compared using two-sided Student's t-Test. A p-value of ≤ 0.05 was considered statistically significant.

Results: A total of 33 patients underwent either microsurgical free flaps (15 patients) or SCAIFs (19 patients) for Head and Neck tumors between January 2005 and January 2012. Complications requiring return to the operating room occurred in 26% of SCAIFs and 26% of FFFs. Complications not requiring return to the OR occurred in 21% of SCAIFs and 20% of FFFs, with one free flap loss and no SCAIF losses. Differences in functional assessment between the two groups (level of speech intelligibility, need for electrolarynx, ability to swallow, and dependence on G-tube feeds) were not statistically significant.

Conclusion: SCAIFs and microsurgical free flaps offer similar coverage benefits for head and neck reconstruction. SCAIFs are faster and easier to perform than FFFs and require less postoperative care. We found no

significant differences between the two techniques with respect to perioperative complications, postoperative speech or postoperative swallowing.

9:22am - 9:26am

Outcome of Osseointegrated Dental Implants in Double-Barreled Versus Vertically Distracted Fibula Osteoseptocutaneous Free Flaps

Christopher Glenn Wallace; Yang-Ming Chang; Yueh-Min Hsu; Fu-Chan Wei
Institution where the work was prepared: Chang Gung Memorial Hospital, Linkou, Taiwan

Background: Achieving both total dental rehabilitation, with robust crown-implant ratios (CIRs), and aesthetic facial height specifically for anterior segmental mandibulectomy defects is challenging. An adequately tall alveolar ridge is required to support osseointegrated dental implants (ODIs); concurrently, full pre-morbid mandibular height restoration is necessary for an appropriately low inferior mandibular margin. Amongst the available approaches, one is to double-barrel a fibula osteoseptocutaneous free flap and place primary osseointegrated dental implants (ODIs) into the upper barrel. Another is to use a single-barreled fibula osteoseptocutaneous flap placed at the inferior mandibular margin and subject it to vertical distraction osteogenesis (VDO) for alveolar ridge height augmentation followed by secondary ODIs. We investigated which option provides better osseointegration outcomes.

Methods: Between 2003 and 2009, all patients with parasymphiseal/symphiseal segmental mandibular defects who underwent single-barreled fibula with VDO and secondary ODIs (Group A), or double-barreled fibula with primary ODIs (Group B), were prospectively evaluated for CIRs, marginal bone loss (MBL) and complications.

Results: Group A ODIs (n=35; 10 patients) and Group B ODIs (n=36; 13 patients) osseointegrated similarly well according to MBLs ($p>0.05$). All Group A ODIs were surrounded by palatal mucosal grafts (PMGs); however, within Group B, ODIs surrounded by PMGs (n=18) osseointegrated better than those surrounded by fibula skin paddle (n=18; $p<0.001$). Interestingly, Group B ODIs with PMGs osseointegrated better than Group A ODIs according to mesial MBL ($p<0.05$). Furthermore, Group B ODIs without PMGs osseointegrated worse than Group A ODIs according to mesial ($p<0.01$) and distal ($p<0.05$) MBLs. Importantly, CIRs were consistently significantly better in Group A than Group B ($p<0.05$), irrespective of PMGs. Complications were almost entirely limited to, and were common and complex in, Group A. Nevertheless, all patients in both Groups completed dental rehabilitation.

Conclusion: Patients choosing VDO for superior CIRs need to be made fully aware of higher risks of VDO-related complications. Strategies we used to overcome more complex difficulties successfully will be elaborated. The

double-barreled fibula approach requires fewer surgical stages, encounters complications only rarely, and provides adequate CIRs and superior osseointegration quality according to MBLs when PMGs are utilized. Fibula skin paddle should be exchanged for PMGs whenever possible to improve osseointegration. These findings are important when deciding the optimum choice of reconstruction for anterior segmental mandibulectomy defects when dentition is to be restored.

9:26am - 9:30am

Auricular free flap- the good choice for reconstruction in different regions of the head and neck after tumor resection

Lukasz Krakowczyk; Adam Maciejewski, MD, PhD; Ryszard Szumniak, MD, PhD; Cezary Szymczyk, MD, PhD; Janusz Wierzgoń; Piotr Jedrzejewski;

Maciej Grajek; Rafał Ulczok; Mirosław Dobrut; Stanisław Półtorak

Institution where the work was prepared: Cancer Center Institut of Oncology Department of Oncological and, Gliwice, Poland

Background:The form, function, and aesthetic appeal of some anatomical region in head and neck subunits must be addressed.

Surgical treatment in some cases in head and neck cancer is extremely difficult due to the combined defects of skin, cartilage and the mucosa. It can be

achieved only by providing sufficiently and anatomically adapted cartilage and/or bone support, followed by covering the inner part using tissue closely resembling mucosa and the outer part using skin compatible with the surrounding skin.

Material and method:Our clinical experience includes 28 patients with nasal or epiglottic cancer. Radical tumor resections and reconstructions were performed in all of cases. For epiglottic reconstructions we used our own modification of auricular free flaps in 2 cases and in 26 cases auricular free flap was chosen for reconstruction of different anatomical part of the nose. In 4 patients for the nasal reconstruction we use double auricular free flap.

Results:In the whole group of 28 patients tumor resection was radical and surgical margins were histopathologically negative. Actuarial 12-months recurrence-free survival is 100% and

overall free flaps survival was 100%. Due to vein thrombosis two flaps were successfully explored within 24 hours after surgery. Authors presents the technical details based on photos and animations.

Conclusions:Reconstructions with auricular free flap after tumor resection tumor in head and neck region is a reliable, cosmetically appealing, and functional method.

Proper treatment of head and neck cancer, including radical resections and reconstruction, requires a structured multidisciplinary approach to achieve excellent tumor control and a satisfactory aesthetic and functional outcome.

9:30am - 9:34am

3-D Video Analysis of Facial Movements after Facial Reanimation Surgery in Pediatric Patients

Eva Placheta; Chieh-Han John Tzou; Igor Pona; Alina Hold; Manfred Frey

Institution where the work was prepared: Medical University of Vienna, Vienna, Austria

Introduction: Dynamic reconstruction of facial movements is the treatment goal for patients with irreversible facial palsy. The concepts of facial reanimation in the pediatric patient group differ from those of adult patients. The aim of this study is to analyze the pediatric facial palsy patient population treated from 1998 to 2012 and to assess their functional outcome. **Methods:** A retrospective cohort analysis was performed. All patients with facial palsy under the age of 18 years, who underwent facial reanimation surgery and 3-D video analysis of facial movements, were included in this study. The amplitude of motion during standardized facial movements was analyzed and compared to the results in the adult patient group. **Results:** 55 of 293 patients treated for facial reanimation from 1998 to 2012 were pediatric patients (19% of the patient population, 30 male and 25 female patients). The mean age was 10.6 years. The most common etiology of facial palsy was congenital (38%), followed by post-tumor facial palsy (25%). 16% of patients presented with Moebius Syndrome and post-traumatic facial palsy, respectively. All children underwent dynamic facial reanimation. 64% of patients were treated with a gracilis muscle transplant innervated by a cross-face nerve graft (20% reanimation of the mouth, 44% reanimation of eyelid and mouth function with 2 cross-face nerve grafts). 3 patients were treated with a latissimus dorsi transplant innervated by the contralateral facial nerve. 6 patients (Moebius Syndrome) received bilateral gracilis muscle transplants (innervated by the masseteric nerve or hypoglossal nerve). One patient with Moebius syndrome underwent a bilateral elongated temporalis plasty. 4 patients with incomplete facial palsy were upgraded with cross-face nerve grafts and distal end-to-side neurotomy. Microsurgical reanimation of the face led to better functional results in the pediatric than in the adult patient group. The amplitudes of reconstructed movement were higher and thus more symmetric. **Conclusion:** Pediatric facial palsy is primarily treated by microsurgical facial reanimation, especially with free muscle transplants. The functional results are generally better than those achieved in adults.