Scapular Tip Free Flap Reconstruction for Infrastructure Maxillary Defects: A Single-Institution Case Series

Samer T. Elsamna MD[1]; William Doyle BS[1]; Rebecca Doctor BA[1]; Tara Mokhtari MD[1]; Christopher Nickel MD[1]; Tapan Padhya MD[1]; Matthew Mifsud MD[1]

[1]Department of Otolaryngology-Head and Neck Surgery, Morsani College of Medicine of the University of South Florida, Tampa, FL, USA.

Abstract

Introduction

Maxillary resection is common for the management of a variety of benign and malignant processes. These surgeries often create complex mid-facial defects in which surgical or prosthetic reconstruction is essential for patient function. Ideal maxillary reconstruction remains highly debated and complex, in part due to the array of various potential maxillary defects and complex reconstructive goals posed by the infrastructure region. We describe our institution's experience with the scapular tip free flap (STFF) for infrastructure maxillary (IM) defects.

Methodology

Retrospective review of a single institution's patient log who underwent IM for benign or malignant etiology and subsequent repair with STFF between August 2020 and July 2024. We describe our technique and analyzed pre, peri-, and post-operative variables.

Results

We identified 17 patients who underwent IM with STFF, 10 for malignancy and 7 for benign pathology. There were no free flap failures or major complications post-operatively. The average operative time was 531.6 minutes (8 hours 51.6 minutes); all cases allowed for two-team approach. Of the 17 patients, 6 (35.3%) required intra-operative blood transfusions. Median length of stay postop was 5 days. We review our technical technique.

Conclusion

Selection of reconstruction method for IM is multi-factorial and goal driven. All 17 of our STFF took successfully with relatively short operative times and post-op hospital stays. There were no major or persistent complications though one instance of needing to return to the OR. For efficiency and optimal form and function in midface reconstruction after IM, we propose and advocate for the use of the STFF.

Introduction

- Maxillectomy defects remain a complex patient challenge with potential for significant morbidity and decreased quality of life due to impacts on mastication, speech, swallowing, and cosmesis.[1,2]
- Commonly classified using the Brown horizontal-vertical scale.[3]
- Numerous different techniques have been proposed for IM defect reconstruction over the years.[2]
- A variant of the versatile subscapular free flap system is the scapular tip free flap (STFF) based on the angular branch of the thoracodorsal artery.[4]
- The STFF has a significantly greater pedicle length, three-dimensional scapula tip, and independently mobile tissue components.[4]
- The use of the STFF has been described for large, complex defects of the maxilla and mid-face.[5]
- However, literature on this flap for maxillary defects remains limited, and no studies specifically report on its use as reconstructive method following IM.
- We provide our institution's experience with the use of the STFF for the reconstruction of IM defects.

Methods and Materials

- A retrospective chart review of patients who underwent IM with STFF reconstruction at a single institution between August 2020 and July 2024 was performed.
- Both benign and malignant diagnoses were considered for study inclusion.
- Collected an array of different types of variables such as patient demographics, past medical history, clinicopathologic tumor traits, perioperative and surgical factors, and postoperative .
- Maxillectomy defects prior to reconstruction were classified as either horizontal or vertical as described by Brown et al.[3]
- Our surgical approach & set up is described.

Results

- From August 2020 to July 2024, 17 infrastructure maxillectomies with STFF reconstruction were performed at our institution.
- A summary of patient demographics is illustrated in Table 1.

Table 1: Patient Baseline Characteristics (Total N = 17)

Variable	N	%
Age		
- Mean (Standard Deviation): 62.5 (16.8)		
- Median: 67.0		
Gender		
- Male	8	47.1
- Female	9	52.9
Inpatient Length of Stay Post-operatively (days)		
Median	5	
Mean (Standard Deviation)	7.3 (4.6)	
Quartiles 25/50/75	4 / 5 / 7	
Minimum / Maximum	4 / 20	
30-Day Hospital Readmission	3	17.6
Cancer Resection		
- Yes	10	58.8

Figure 1. Our set up with the TRIMANO FORTIS allows for dynamic mobilization intra-operatively as well as use of two-team approach

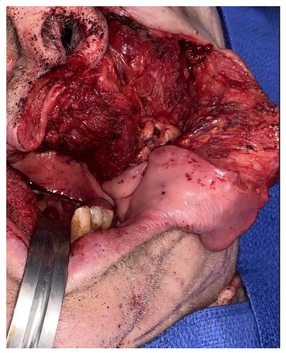

Figure 2. Significant infrastructure maxillectomy defect

Table 2: Operative & Free Flap Factors

Variable	N	%
Vertical Brown Classification[1]		
I	1	5.9
II	16	94.1
Horizontal Brown Classification[2]		
a	1	5.9
b	12	70.6
c	3	17.6
d	1	5.9
Transoral Approach	17	100
Intraoperative Blood Transfusion Required[3]	6	35.3
Postoperative Blood Transfusion Required[1]	3	17.6
Flap Paddle Area (cm^2)		
Under 10cm^2	5	31.3
Above 10cm^2	11	68.7
Mean (SD) / Median	16.0 (8.2) / 15	
Wound Complications		
- Yes	1 (Minor surgical dehiscence)	5.9
- No	16	94.1
Flap Take		
- Complete	17	100
Return to OR		
- Yes	1 (Tracheostomy)	5.9
30-Day Mortality		
- None	0	0

[1]I - maxillectomy not causing oronasal fistula; II - not involving the orbit

[2]a - palatal defect only, not involving dental alveolus; b - less than or equal to 1/2 unilateral; c - less than or equal to 1/2 bilateral, or transverse anterior; d - greater than 1/2 maxillectomy

[3]Maximum 2 Units pRBC required

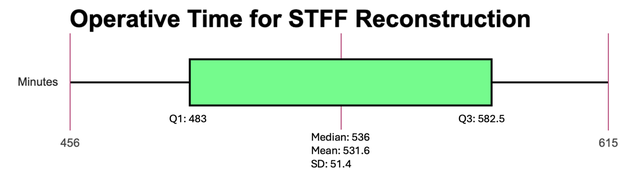

Figure 3. Our operative time in box plot form

Discussion & Conclusions

- STFF is a reliable and versatile variation of a traditional subscapular system free flap. This is the first study to describe an institution's experience with STFF reconstruction after IM.
- All 17 flaps took; only 1 returned to OR (trach); 0 major complications. Mean operative time was just over 8.5 hours, mean length of stay was approximately 1 week.
- Selecting the ideal reconstruction method for IM defects is multi-factorial and heavily patient dependent.
- Long vascular pedicle, adaptable bone stock, adaptability, low donor site morbidity, and shorter operative times and hospital stays are all characteristic of the STFF.
- For those with large defects seeking optimal form and functionality following IM, we propose and advocate for the use of the STFF.

Contact

Matthew Mifsud, MD FACS
Associate Professor
Division Chief
Head & Neck Oncology/Microvascular Reconstructive Surgery
Director Center for Salivary Gland Surgery
University of South Florida Department of Otolaryngology H&N Surgery

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