Local Flaps for the Oral Cavity: From the Reconstruction Sketchbook

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Disclosure

• Shant Korkigian, DO and ENT Specialists, PC has no financial or personal conflicts of interests to disclose.
• Often oral lesions are daunting for the surgeon!!!
Introduction

• Many surgeons who do head and neck or general otolaryngology are often hesitant to pursue cases because of the reconstruction involved
  – Time
  – Technically difficult
• There are simple and very efficient local flaps available for many of these patients
Objectives

• Understand the anatomic and functional characteristics of oral defects
• Understand the current trends in oral reconstruction
• Understand what YOU can provide for patients and know when to send them out!
Anatomy and Function
Oral Cavity Anatomy: Boundaries

- Oral Fissure
- Buccal Mucosa
- Floor of Mouth
- Hard Palate
- Maxillary Sinuses and Nasal Cavities
- Junction of Soft Palate
- Oropharynx
- Circumvallate Papillae

Anterior
Oral Cavity Anatomy: 7 Subunits

National Cancer Institute (2012)
Oral Cavity Anatomy: Musculature
Oral Cavity Anatomy: Musculature
Oral Cavity Anatomy: Musculature
Oral Cavity Anatomy: Fascia
Oral Cavity Anatomy: Fascia
Oral Cavity Anatomy: Fascia

• The mighty buccal fat pad!
  – The buccal fat pad is not just ANY old adipose!
    • Enhances intramuscular motion in adults
      – In infants it prevents in-drawing of the cheek during sucking
      – Allows muscles of mastication a buffer between zygomatic arch, ramus of the mandible and one another
    • Different density than subcutaneous fat

Oral Cavity Anatomy: Fascia

- Location
  - Lies in the masticatory space between the buccinator and the masseter
  - Wrapped in a thin fascial envelope
  - Central body (along posterior maxilla and superior buccinator) with pedicles
    - Buccal (superficially within the inner cheek)
    - Pterygoid (deep to medial mandibular ramus, between he pterygoid muscles)
    - Superficial (Enveloped by two layers of temporal fascia extending to temple)
    - Deep (deep to zygoma and deep temporal facia extending to temple)

Oral Cavity Anatomy: Neurovasculature

- Anterior Vasculature: Facial Vessels
  - Artery comes off the external carotid near the angle of the mandible and over lies the SMG
  - It then hooks around the inferior border of the mandible anterior to the buccinator muscle
  - Gives several branches to the buccinator at the superior border of the mandible at an average of 6.5cm from midline
  - Passes 1-1.5 cm lateral to the commissure of the mouth to give off the inferior labial artery
  - Lies deep to the risorius and zygomaticus major and superficial to the buccinator
Oral Cavity Anatomy: Neurovasculature

- All muscles of facial expression are innervated on their deep aspect EXCEPT mentalis, buccinator and levator anguli oris!
- Buccal fat pad is deep to the facial nerve, branches of trigeminal nerve and the parotid duct
Oral Cavity Anatomy:
Neurovasculature

1.5 cm
Oral Cavity Anatomy: Neurovasculature

- Submental artery
  - Branch of the facial artery which comes off near the insertion of the posterior belly of the digastric to the hyoid
  - Runs just below the angle of the mandible then passes the medial aspect of the submandibular gland
  - Deep to the belly of the digastric in 70% of cases

Oral Cavity Anatomy: Neurovasculature

• Posterior Vasculature: Maxillary Vessels
  – Three Main branches
    • Mandibular
    • Pterygoid*
    • Sphenopalantine*
Oral Cavity Anatomy: Neurovasculature
Function

• Deglutination
  – Holding lips water tight
  – Opening and closing jaw
  – Production of saliva

• Speech
  – Articulation of the tongue, palate
  – Ability to open and close mouth and lips

• Swallowing
  – Phase 1, 2 (and 3) are affected

• Secretion management
  – Production of saliva
  – Drainage of saliva and nasal secretions

• Facial Expression
Function

• Goals of reconstruction should then be:
  – Maximize function
    • Trismus
    • Deglutination
    • Sensation
  – Preserve form
    • Most oral lesions do not alter form however the reconstruction process may!
  – Minimize donor site morbidity
    • Many reconstructions we provide patients do have consequences!
Current Trends
Current Trends

Free tissue transfer

Distant tissue transfer

Local tissue transfer

Tissue expansion

Skin grafting

Direct wound closure, including healing by primary intention and delayed primary closure

Healing by secondary intention
Current Trends

• Secondary Intention
• Primary Closure
• Local:
  – Facial Artery Based Flaps
  – Maxillary Artery Based Flaps
  – Platysma Based Flaps
• Regional:
  – Pectoralis Major Flap
  – Trapezius Flap
  – Suprascapular Island Flap
• Free Flaps
  – Radial Fasciocutaneous Forearm Free Flap
  – Fibular Osteocutaneous Free Flap
  – Anterior Lateral Thigh Free Flap
Sometimes you need a free flap!
A lot of times you want one!
Current Trends

• Not every oral defect needs a free flap!!
  – Depends on several factors!
    • Size and anatomic position
    • Functional needs
    • Access to microvascular surgeon
    • Co-morbidities of patient

• There are several regional and local options for those patients who do not need or wouldn’t be optimally addressed with a free flap or large regional flap
Current Trends

• Three Facial Artery Based Flaps
  – Nasolabial Flap
    • Anterior or palatal defects
  – Buccal Myomucosal or Fat Pad Flap
    • Lateral, palatal or inferior defects
  – Facial Artery Myomucosal Flap
    • Maxillary antrum, palate, alveolus, nasal floor, septum, buccal mucosa, inferior defects, tonsilar fossa, oral vestibule, lower lip
Current Trends

- Seven soft tissue flaps based on the Maxillary Artery
  - Buccinator Myomucosal Flap or Fat Flap*
    - Post palatoplasty, oronasal fistula, VPI, RMT, tonsillar fossa
  - Temporal Flap*
    - Oropharyngeal wall, buccal, tonsillar fossa, soft palate
  - Palatal Mucoperiosteal Flap*
    - Palatal, oronasal fistula, tonsillar, RMT
  - Masseter Muscle Flap*
    - Buccal, posterior aveolar ridge, RMT, lateral pharyngeal wall
  - Inferior Turbinate flap*
    - CSF leaks, palatal defects, cleft palates
  - Nasoseptal flap
    - Skull base
  - Infraorbital flap
    - Nasal or sinus cavity reconstruction

Rahpeyma and Khajehahmadi (2017)
Current Trends

• Most of these flaps can be problematic for the patient and many surgeons
  – Invasive
  – Time consuming
  – Many possible morbidities
  – Have specific uses

• Today we will review 3 flaps that are:
  – Minimally invasive
  – Quick for even the inexperienced surgeon
  – Have low morbidities
  – Are versatile
What can you provide?
FLAPS TO DO

• BUCCAL FAT PAD FLAP
• FACIAL ARTERY MYOMUCOSAL FLAP
• SUBMENTAL PLATYSMA FLAP
Buccal Fat Pad

- In 1977 buccal fat pad first described by Egyedi, et al
  - Used for oro-antral fistulas
- In 2000-2001 buccal fat was described as a reconstructive tool for cancer (Rapidis et al, 2000; Hao, 2000; Dean et al, 2001)
Buccal Fat Pad

• Buccal fat pad
  – Arterial Supply
    • Buccal and deep branches from maxillary artery
    • Tranverse facial branch of the superficial temporal artery
    • Small unnamed branches of the facial artery
    • The main pedicle is posterior and superior but the facial comes inferiorly and is most often compromised
  – Size
    • 9.3 g
    • 9.6 mL
    • 6x4x3cm can be dissected safely
  – Range
    • Lip to the lateral oropharyngeal wall
    • Central palate to mandible

Buccal Fat Pad

- Buccal fat pad
  - Advantages
    - Quick
    - Simple
    - Easy dissection
    - No visible scars
    - Low morbidity
    - Low failure rate
    - Minimal trismus
  - Disadvantages
    - Small to medium defects
    - Offers minimal bulk
    - Range (arc of rotation in minimal without tension)
    - Facial deformity can occur
    - Epithelializes in 3-4 weeks, healthy mucosa by 12 weeks

• Buccal fat pad
  – STEP 1: Incision (3 methods)
    • Vertical incision slightly lateral to the anterior border of the ascending ramus
    • Elevate a mucoperiosteal flap in the upper molar region through a lateral incision of the vestibular sulcus
    • Horizontal incision along superior vestibular sulcus, 5 mm above the second molar, halfway between gingivobuccal sulcus and Stensen’s duct

Buccal Fat Pad

- Buccal fat pad
  - STEP 2: Harvest
    - BFP then becomes visible
    - Gentle pressure helps “pop” it out
    - Using a combination of blunt dissection against the capsule and gentle medial retraction of the pad you can produce a graft to your needs

Buccal Fat Pad

- Buccal fat pad
  - **STEP 3: PLACEMENT**
    - Direct rotation or tunneling under the mucosa can be done
    - Minimal tension should be placed on the graft
    - Circumferential suturing with long acting dissolvable suture

Original Tumor
1 Week Later
6 Months Later
Buccal Fat Pad

• Buccal fat pad
  – Tips and tricks
    • Avoid suction!
    • Make sure there is no tension
    • Make sure teeth are out of way
    • Preserve the thin capsule
    • Warn patients about the cheek defect
    • No need to cover it up!
      – Tideman, et al (1986) showed that in a large series
How’d we do with this flap?

– Maximize function

– Preserve form

– Minimize donor site morbidity
  • Some outward deficit

– Time

– Technical ease
Facial Artery Musculomucosal Flap

- In 1992 Pribaz, et al used an axial musculomucosal flap based on the facial artery to close anterior oral defects
- Flap is designed just anterior to Stenson’s duct
- Consists of mucosa, submucosa, buccinator muscle with a arteriovascular pedicle from the facial artery
- Can be based superiorly (pivot point at upper gingival sulcus) or inferiorly (pivot point at RMT)

Facial Artery Musculomucosal Flap

- **Size:** 2.5x7cm
- **Range:** Mucosal defects of the palate, aveolus, maxillary antrum, nasal floor and septum, oral vestibule, vermillion, tonsillar fossa, floor or mouth

- **Advantages:**
  - Myomucosal with more bulk
  - Hearty blood supply
  - No secondary mucosalization like BFP

- **Disadvantages:**
  - Can be hindered by anatomy of artery
  - Can interrupt Stenson’s duct if not careful
  - Technically more difficult than BFP
Facial Artery Musculomucosal Flap

• **STEP 1: Incision**
  – Boomerang design is the classic incision with an oblique orientation from the RMT to ipsilateral sulcus
  – Incision is made through mucosa and buccinator
Facial Artery Musculomucosal Flap

- **STEP 2: Identify pedicle**
  - Doppler can be used to identify pedicle
  - Most distal end of the facial artery is found, ligated and cut

- **STEP 3: Harvest**
  - Dissection occurs just deep to the facial vessels, taking only minimum tissue
  - Tributaries of the artery can be ligated for greater mobility
Facial Artery Musculomucosal Flap

• STEP 4: Placement
  – Flap can be rotated 180 degrees and transposed across RMT, passed over alveolus or tunneled under mucosa
  – Two layered closure of both the flap and donor site is needed
Tips and Tricks

- Maxillary and facial artery based flaps are NOT reliable when external carotid is taken.
- Doppler can be VERY helpful.
- Skeletonizing the facial artery can buy you length and pedicle mobility.
- Lymphatics is always along the facial vein so maxillary based flaps are highly oncologically sound.
How’d we do with this flap?

– Maximize function

– Preserve form

– Minimize donor site morbidity

– Time
  • Sometimes two step procedure
  • Sometimes difficult to find artery

– Technical ease
Submental Flap

- Described by Martin in 1993
- Muscle only or myocutaneous flap with pivot point at angle of mandible

Arterial supply:
- Submental artery
- Also sometimes a branch of the suprasternal artery from the suprascapular system

Nervous supply:
- Motor: Cervical branch of Facial Nerve
- Sensory: Transverse cervical nerve

Submental Flap

- Designed across midline
  - Superior limit: mandibular arch in the midline
  - Lateral limit: mandibular angles
  - Inferior limit: depends on patients redundancy
- Size: 5x5cm-7x12cm
  - Depends on age
  - Simple pinch test allows surgeon to see what is available
- Range:
  - Chin, lower lip, oral commissure, floor of mouth, oral vestibule
  - Can be used for through and through defects
  - Can be used for oral tongue

Submental Flap

• Advantages:
  – Versatile
  – Offers skin, muscle and possibly bulk
  – Hearty pedicle

• Disadvantages:
  – Can injure marginal mandibular nerve
  – Intraoral hair
  – External defect/scaring
  – Must maintain facial and internal jugular veins

Submental Flap

• Step 1: Inferior Incision
  – Inferior border of elliptical flap is incised with platysma included
• Step 2: Neurovascular structures identified
  – Dissection occurs down to the submandibular gland where facial vessels are appreciated
  – Bilateral anterior bellies of digastric identified
  – May use facial nerve monitoring
  – On or just below mandible
Submental Flap

• Step 3: Harvest
  – Superior border of elliptical flap is incised with platysma included
  – Flap is raised from medial to lateral
  – Contralateral anterior belly of the digastric muscle is left deep but platysma is taken with flap
  – Contralateral vessels are ligated
  – Ipsilateral anterior belly of the digastric may be detached from hyoid bone if needed
Submental Flap

- **Step 4: Pedicle dissected**
  - Facial artery and veins can be skeletonized to the lateral border of the mylohyoid to gain length for flap to be tunneled or reach optimal position
  - The underlying mylohyoid muscle is either cut or a strip is included with the pedicle if the flap needs to be tunneled medial to the mandible for intraoral reconstruction. The mylohyoid is detached from the mandible and the hyoid and is bluntly dissected off the ipsilateral geniohyoid muscle to complete the flap mobilization
Submental Flap

• Step 5: Closure
  – Multilayer closure in the oral cavity is performed
  – Primary closure of the donor site is easily performed with some undermining
  – Drains should be used for larger flaps
Submental Flap

• Tip and Tricks
  – Doppler can be used to preserve perforators
  – Flap is generally raised before lymphadenectomy
    • Can leave or take submandibular gland
  – The contralateral aspect of the flap can be raised either in a sub-platysmal or supra-platysmal plane
    • This can reduce the risk of injury the contralateral marginal mandibular nerve but may reduce vascularity to the distal tip
  – Division of the posterior belly of the digastric and skeletonizing the vessels to the external carotid and internal jugular vein can also improve reach
  – May de-epithelialize flap to remove hair
How’d we do with this flap?

- Maximize function
- Preserve form
- Minimize donor site morbidity
- Time
- Technical ease
Final Notes

• Remember not everything needs a free flap or even a large rotational flap!
• Technically easy compared to many more advanced reconstructive techniques
• You can provide a high quality oral reconstructive results to patients with minimal morbidity and in a relatively short amount of surgical time with many local flaps!
• Good understanding and identification of the anatomy will allow you to preserve function and have a great result!
Locoregional Flaps for Oral Cavity Reconstruction: A Review of Modern Options

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Intraoral Reconstruction Using Local and Regional Flaps

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ABSTRACT

Choosing a pedicled flap to reconstruct an intraoral defect depends on the size and the anatomic position of the tissue defect. The goals are to restore form and function and minimize donor site morbidity. Regional pedicled flaps available for intraoral reconstruction are the buccal fat pad flap, facial artery musculomucosal flap, platysma, pectoralis major,
References

Thank you!