Reconstruction of the Oral Cavity

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Introduction

- Difficult challenge
- Complex anatomy and function
- Goals
  - Restore preoperative function
  - Cosmesis
- Patient status is important consideration
- Variety of reconstruction options
Anatomy

- Vermilion to junction of hard and soft palate superiorly
- Inferiorly to circumvallate papillae
- Structures: lips, alveolar ridges, buccal mucosa, retromolar trigone, hard palate, floor of mouth, mobile tongue
- Functions: speech, mastication, bolus preparation and initiation of deglutition
Functional Considerations

- Oral sphincter
  - Speech, mastication and deglutition
  - Provides a watertight closure for bolus preparation
  - Prevents escape of saliva
Functional Considerations

- Alveolar Ridges
  - Covered with thin, adherent mucosa
  - Elevated above floor of mouth
  - Lingual and buccal sulci direct the flow of food and saliva during bolus processing
Functional Considerations

- Floor of the mouth
  - Allows unrestricted mobility of the oral tongue
  - Collects food and saliva (bolus preparation)
Functional Considerations

- Oral (mobile) tongue
  - Speech and deglutition
  - Mobility allows for:
    - Articulation of speech
    - Bolus manipulation in preparation for deglutition
  - Sensory functions: proprioception, pain, taste
    - Assists in mastication and bolus processing
Functional Considerations

- Hard palate
  - Opposes tongue
  - Important for speech and bolus preparation
Functional Considerations

- Buccal Mucosa
  - Lines the cheek
  - Functions in mastication and deglutition
  - Allows expansion for mastication
  - Thin to avoid restriction of dental closure
Functional Considerations

- **Base of tongue**
  - Often involved with oral cavity defects
  - Participates in taste, deglutition and speech
  - Must occlude oropharynx during deglutition
  - Some consonants require BOT to touch hard palate
Patient Factors

- Individualize options
  - Type of tissue
  - Anticipated functional gain
  - Anticipated donor morbidity
  - Need for innervation
  - Success rate
  - Intraoperative positioning
  - Operative time
  - Dental restoration
  - Overall medical status
Patient Factors

- Preoperative counseling
- Complete medical history
  - Diabetes, atherosclerosis, previous radiation
  - Cardiopulmonary status (operating time, aspiration risk)
- Smoking history
- Patient expectations and motivation are very important
Floor of Mouth Reconstruction

- Requires soft and mobile tissue
- Allow mobility of oral tongue
- Avoid scar contracture (i.e., secondary intention)
- Avoid bulk (glossoptosis, obliteration of lower lip sulcus)
Floor of Mouth Reconstruction

- Smaller defects
  - Split thickness skin graft
    - Harvest from lateral thigh at 0.017 in
    - Provides water-tight closure, no hair
    - Stabilize with bolster
    - Survives over muscle and cancellous bone (via imbibition and neovascularization)
  - Also good for lateral FOM and retromolar trigone
Floor of Mouth Reconstruction

- Moderate defects involving a larger portion of mylohyoid
  - Nasolabial flap
    - Based on angular artery
    - Better for older patients with lax skin
    - Requires two stages and temporary fistula
    - Bite block necessary
Floor of Mouth Reconstruction
Floor of Mouth Reconstruction

- Moderate defects (continued)
  - Regional flaps
    - Forehead flap (rarely used)
    - Platysma flap
    - Facial artery musculomucosal flap (FAMM)
    - Deltopectoral flap (historical significance)
Floor of Mouth Reconstruction

- Forehead flap
  - Superficial temporal artery
  - Reliable 2/3 across the forehead
  - Tunneled into cheek below zygoma
  - Requires orocutaneous fistula
  - Obvious donor site (skin graft)
  - Second stage to inset flap
Floor of Mouth Reconstruction

- Submental artery island flap
  - Thin, supple skin
  - Submental branch of facial artery
  - Primary closure of donor site
- Poor reliability if:
  - Facial artery sacrificed
  - Irradiated necks
Floor of Mouth Platysma Flap Reconstruction
Floor of Mouth Reconstruction

- FAMM flap
  - Branch of facial artery
  - Contains mucosa, buccinator muscle, and fat
  - 2 x 8 cm flap without injury to facial nerve
Floor of Mouth Reconstruction
Floor of Mouth Reconstruction

- Deltopectoral Flap
  - Axial distant flap
  - First four perforators of internal mammary
  - Deltoid portion is random
  - Preliminary delay procedure
  - Creates dependent orocutaneous fistula
Floor of Mouth Reconstruction

- Fasciocutaneous free flaps
  - Thin nature and pliability
  - Radial forearm has low incidence of failure to this site
  - Provides tongue mobility and free movement of food during deglutition
Floor of Mouth Reconstruction

- Radial forearm free flap
  - Based on radial artery
  - Outflow: two venae comitantes, basilic vein, cephalic vein
  - Long vascular pedicle with dependable supply
  - Potential sensation (posterior cutaneous nerve anastomosed to lingual)
  - Disadvantage: donor site morbidity (STSG, potential loss of thumb and index finger, potential decreased forearm function)
Floor of Mouth Reconstruction
Anterior Tongue Reconstruction

- Very difficult to reconstruct
- Complex intrinsic musculature and function
- Redundancy is advantageous
  - Near hemiglossectomy does not significantly alter function
Anterior Tongue Reconstruction

- Defects <50% can be closed primarily +/- STSG
- Larger or composite defects require more bulk (i.e., fasciocutaneous free flap)
- Lateral arm free flap is good for defects including posterior aspect of tongue/FOM
Anterior Tongue Reconstruction
Anterior Tongue Reconstruction
Anterior Tongue Reconstruction

- Lateral Arm free flap
  - Posterior radial collateral artery
  - Paired venae comitantes
  - 12 x 18 cm paddle possible (6 x 8 cm allows for primary closure)
  - Potential sensate flap (posterior cutaneous nerve)
- Disadvantages: donor site appearance, hair growth, elbow pain, lateral forearm numbness
Anterior Tongue Reconstruction
Buccal Cavity Reconstruction

- Small defects – primary closure possible
- Larger superficial defects
  - Quilted skin/mucosal grafts
  - Temporoparietal fascial flap (STSG for lining)
- Large full-thickness defects
  - Pectoralis major myocutaneous flap
  - Latissimus dorsi myocutaneous flap
  - Fasciocutaneous free flaps
Buccal Cavity Reconstruction
Mandibular Reconstruction

- **Goals**
  - Reconstitute mandibular continuity
  - Allow for future dental restoration
- **Anterior defects**
  - Worst functional defects
  - “Andy Gump” deformity
- **Lateral defects**
  - Easier to reconstruct
  - Less functional problems
Mandibular Reconstruction

- Fibula osseocutaneous free flap ideal for anterior defects (minimal soft tissue defect)
  - Based on peroneal vessels
  - Multiple osteotomies allowable (for contouring)
  - 25 cm of bone available (entire defects)
  - Sensate (lateral cutaneous nerve)
  - Reliable for osseointegrated dental implants
Fibula Free Flap
Fibula Free Flap
Mandibular Reconstruction

- Scapular free flap for anterior defects with massive soft tissue loss (i.e., total glossectomy)
  - Circumflex scapular artery and vein
  - 14 cm of bone available (lateral aspect)
  - Allows osseointegrated implants
  - Long pedicle to axillary artery
  - Multiple fasciocutaneous/musculocutaneous flaps available (scapular, parascapular, latissimus dorsi, serratus anterior)
- Major drawback: patient positioning
Scapula Free Flap
Mandibular Reconstruction

- Lateral mandible defects
  - Regional/Distant/Free flap with mandibular swing
  - Low profile reconstruction plate with soft tissue coverage
    - Patient factors which prevent dental restoration
    - Plate exposure rate of about 5%
    - Compared to anterior exposure rate near 20%
- Osseocutaneous free flaps (iliac, scapular, fibula)
Mandibular Reconstruction
Iliac crest free flap for lateral defects

- Internal oblique musculature included
- Contour similar to native mandible
- Reliable for osseointegrated implants
- Deep circumflex iliac artery
- Disadvantages (difficult harvest, donor site deformity, abdominal weakness, postoperative hematoma, lateral thigh pain/anesthesia)
- Split inner cortex modification reduces morbidity
Mandibular Reconstruction
Mandibular Reconstruction
Special Considerations

- **Total Glossectomy Defects**
  - Often accompany oral cavity defects with extensive disease
  - Require bulk for reconstruction

- **Goals**
  - Direct secretions laterally
  - Provide contact of neo-tongue with palate

- **Use flaps which will not atrophy over time**

- **Palatal drop prosthesis**
Special Considerations

- Total Glossectomy Defects
  - Rectus abdominis free flap
    - Inferior and superior epigastric arteries
    - Motor nerve (intercostal) anastomosis retains bulk
  - Latissimus dorsi myocutaneous free flap
    - Thoracodorsal artery
    - Motor nerve (thoracodorsal)
  - Pedicled flaps (PMMF, latissimus dorsi)
Special Considerations

- Total glossectomy with laryngeal preservation
  - Select patients
    - Good health without cardiopulmonary disease
    - Can tolerate aspiration
    - Disease does not involve valleculae or preepiglottic space
  - Must maintain intact superior laryngeal nerve
  - Laryngeal suspension lessens aspiration
Decision Making in Oral Cavity Reconstruction

**Defect Type**
- Soft Tissue
  - Floor of Mouth
  - Buccal Mucosa
  - Tongue

- Bone
  - Anterior Defect
  - Lateral Defect

**Small**
- STSG
- Regional Flaps
- Fasciocutaneous Free Flaps
- Pedicled Fasciocutaneous flap
- Fasciocutaneous free flaps

**Moderate**
- Regional Flaps
- Fasciocutaneous Free Flaps
- Large Fasciocutaneous free flaps
- Pedicled musculocutaneous flaps

**Large**
- Pedicled musculocutaneous flaps

**<50% Loss**
- Primary Closure
- Skin Graft
- Combined Defects
- Total Glossectomy
- Myocutaneous free flaps
- Osseocutaneous Free Flaps

**Regional/Distant Flap and Mandibular Swing**
- Reconstruction Plate and
  - Regional/Distant Flaps
  - Osseocutaneous Free Flaps

**Osseocutaneous free flaps**

**Superficial**
- Primary Closure
- Skin/Mucosal Grafts
- Full Thickness
- Regional Flaps
- Fasciocutaneous Free Flaps
- Large Full Thickness
- Fasciocutaneous Free Flaps
- Pedicled musculocutaneous flaps

**<50% Loss**
- Primary Closure
- Skin Graft
- Combined Defects
- Fasciocutaneous free flaps
- Total Glossectomy
- Myocutaneous free flaps
- Osseocutaneous Free Flaps
Conclusion

- Multitude of reconstructive options
- Remember functional characteristics of tissue involved
- Various patient factors to consider
- Preoperative counseling essential
- High success rates possible with proper patient selection
References