Reconstructive Surgery to Restore Oral Function after Ablative Oncologic Resection of Oral Cavity Center

Elizabeth Bradford Bell, MD
2021 Midwest Radiation Oncology Symposium
8/20/2021
Objectives

1. To review the role for surgery in oral cavity cancer
2. To discuss indications for reconstruction after ablative resection
3. To review outcomes and complications of reconstructive surgery
Surgery in Oral Cavity Malignancies

Oral Cavity Anatomy

Surgery in Oral Cavity Malignancies

Function

- Oral stage of swallow relies on functional capability of oral cavity anatomy
  - Oral preparatory stage:
    - lips must form a seal
    - teeth for grinding food, muscle of mastication
  - Oral propulsive stage:
    - tongue mobility
    - intact palate

Surgery in Oral Cavity Malignancies

Function

• Oral stage of swallow relies on functional capability of oral cavity anatomy
  - Oral preparatory stage:
    • lips must form a seal
    • teeth for grinding food, muscle of mastication
  - Oral propulsive stage:
    • tongue mobility
    • intact palate

→ Physical: bulk, volume of structures, surface area, mobility (lack of tether)

→ Motor and sensory activity: V2, V3, XII
Surgery in Oral Cavity Malignancies

Primary Treatment Modality

- Surgical resection is the first treatment line recommended by NCCN
- Exceptions:
  - Surgically unresectable disease
    - Internal carotid artery involvement
    - Prevertebral fascial/vertebral involvement
    - *Masticator space involvement
    - Poor surgical candidates
Buccal mucosa, floor of mouth, anterior tongue, alveolar ridge, retromolar trigone, hard palate

WORKUP

- H&P\(^a,b\) including a complete head and neck exam; mirror and fiberoptic examination as clinically indicated  
- Biopsy\(^c\)  
- As clinically indicated:  
  - Chest CT (with or without contrast)\(^d\)  
  - CT with contrast and/or MRI with contrast of primary and neck  
  - Consider FDG PET/CT\(^d,e\)  
  - Examination under anesthesia (EUA) with endoscopy  
  - Preanesthesia studies  
  - Dental/prosthodontic evaluation,\(^f\) including Panorex or dental CT without contrast\(^d\)  
  - Nutrition, speech and swallowing evaluation/therapy\(^g\)  
  - Smoking cessation counseling\(^a\)  
  - Fertility/reproductive counseling\(^h\)  
- Multidisciplinary consultation as indicated

CLINICAL STAGING

- T1–2,N0
- T3,N0
- T1–3,N1–3
- T4a,N0–3
- T4b,N0–3 or Unresectable nodal disease or Unfit for surgery  
- Metastatic (M1) disease at initial presentation

- See Treatment of Primary and Neck (OR-2)
- See Treatment of Primary and Neck (OR-3)
- See Treatment of Very Advanced Head and Neck Cancer (ADV-1)
- See Treatment of Very Advanced Head and Neck Cancer (ADV-2)

\(^a\) H&P should include documentation and quantification (pack years smoked) of tobacco use history. All current smokers should be advised to quit smoking, and former smokers should be advised to remain abstinent from smoking. For additional cessation support, refer to the Patient/Provider Smoking Cessation Resources in the NCCN Guidelines for Smoking Cessation.  
\(^b\) Screen for depression (See NCCN Guidelines for Distress Management).  
\(^c\) Image-guided (US or CT) needle biopsy of cystic neck nodes may offer better diagnostic yield than FNA by palpation alone for initial diagnosis in this setting.  
\(^d\) See Principles of Imaging (IMG-A).  
\(^e\) See Discussion.  
\(^f\) See Principles of Dental Evaluation and Management (DENT-A).  
\(^g\) See Principles of Nutrition: Management and Supportive Care (NUTR-A).  
\(^h\) See fertility and reproductive endocrine considerations in the NCCN Guidelines for Adolescent and Young Adult (AYA) Oncology.

Note: All recommendations are category 2A unless otherwise indicated.  
Clinical Trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.
NCCN Guidelines Version 3.2021
Cancer of the Oral Cavity

Buccal mucosa, floor of mouth, anterior tongue, alveolar ridge, retromolar trigone, hard palate

**CLINICAL STAGING**

- Resection of primary (without neck dissection) or
- Resection of primary + ipsilateral or bilateral neck dissection (guided by tumor location) or
- Resection of primary + SLN biopsy

**TREATMENT OF PRIMARY AND NECK**

- Surgery (preferred)
- Definitive RT

**ADJUVANT TREATMENT**

- No positive nodes and No adverse features
- One positive node without adverse features
- Extranodal extension ± positive margin

**FOLLOW-UP**

- Systemic therapy/RT (category 1)
- Follow-up (See FOLL-A)

- Recurrent or persistent disease (See ADV-3)

---

**Notes:**
- Principles of Radiation Therapy (OR-A).
- Principles of Surgery (SURG-A).
- Data are limited on the efficacy of SLN biopsy for oral cavity cancers. See Sentinel Lymph Node Biopsy in Principles of Surgery (SURG-A, 7 of 8).
- Adverse features: extranodal extension, positive margins, close margins, pT3 or pT4 primary, pN2 or pN3 nodal disease, nodal disease in levels IV or V, perineural invasion, vascular invasion, lymphatic invasion (See Discussion).
- See Principles of Systemic Therapy for Non-Nasopharyngeal Cancers (SYST-A).

**Note:** All recommendations are category 2A unless otherwise indicated.
Clinical Trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.
Buccal mucosa, floor of mouth, anterior tongue, alveolar ridge, retromolar trigone, hard palate

**CLINICAL STAGING**

<table>
<thead>
<tr>
<th>T3, N0; T1–3, N1–3; T4a, N0–3</th>
<th>or</th>
</tr>
</thead>
</table>
| N0–N1, N2a–b, N3            | Resection of primary, ipsilateral, or bilateral neck dissection | No adverse features → Consider RT
| N2c (bilateral)             | Resection of primary and bilateral neck dissection | Adverse features → Positive margin → Systemic therapy/RT (category 1) or Re-resection, if feasible and consider RT if negative margins → Follow-up (See FOLL-A)
| Surgery                     | | Other risk features → RT or Consider systemic therapy/RT (category 1) → Follow-up (See ADV-3)
| Clinical trials             | | |

**TREATMENT OF PRIMARY AND NECK**

- **Resection of primary, ipsilateral, or bilateral neck dissection**

**ADJUVANT TREATMENT**

- **Consider RT**
  - **Extranodal extension ± positive margin** → Systemic therapy/RT (category 1)
  - **Adverse features** → Positive margin → Systemic therapy/RT (category 1) or Re-resection, if feasible and consider RT if negative margins → Follow-up (See FOLL-A)

**FOLLOW-UP**

- **Follow-up (See FOLL-A)**
  - **Recurrent or persistent disease (See ADV-3)**

---

1. See Principles of Radiation Therapy (OR-A).
2. See Principles of Surgery (SURG-A).
3. Adverse features: extranodal extension, positive margins, close margins, pT3 or pT4 primary, pN2 or pN3 nodal disease, nodal disease in levels IV or V, perineural invasion, vascular invasion, lymphatic invasion (See Discussion).

**Note:** All recommendations are category 2A unless otherwise indicated.

Clinical Trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.
Surgery in Oral Cavity Malignancies

Surgery Requires Resection of Functional Tissue

- Partial glossectomy – volume loss, motor loss, sensory loss
- Wide local excision of the floor of mouth - volume/surface area loss
- Buccal space excision - volume/surface area loss
- Maxillectomy/palatectomy - volume/surface area loss, tooth baring
- Mandibulectomy - motor loss, tooth baring
- *Typically includes neck dissection
- *May include resection of multiple subsites, including facial skin
Goals of Reconstruction

Free Tissue Reconstruction

• Functional restoration
  • Volume (bulk)
  • Surface area
  • *Sensory
  • *Adjuvant treatment?
• Reconstructive Ladder:
  • Most basic up to most complex ➔ Free tissue or free flap
Goals of Reconstruction

Free Tissue Reconstruction

- Transplanting a segment of tissue (skin, fat, muscle, bone) from a distant area of the body to the head and neck
  - Donor sites: forearm skin +/- bone, thigh skin, abdominal skin, fibula bone +/- skin, scapula bone/muscle/skin
- Length of surgery: 6-14 hours
- Requires microvascular anastomosis, specialized equipment
- Close post operative monitoring, ICU vs step down
Goals of Reconstruction

Free Tissue Reconstruction

- Indications for free tissue:
  - ***Adjuvant therapy- defects that cannot be closed primarily, non vascularized tissue does not perform well under radiation
  - Oral tongue- >25-30% resection, +/- FOM resection, need to avoid tethering
  - Buccal space resection- soft tissue trismus
  - Maxilla- *patient preference, obturator may be an option
  - Mandible- segmental defects nearly universally require free tissue for best functional outcome
Free Tissue Reconstruction Oral Cavity 2019-2021

- Oral Cavity: 75%
- Other: 25%
Outcomes of Reconstruction

Oral Cavity

• Acute flap loss
  • Monitoring q1hr-q6hr for 72hrs post op
    • Skin pricks, doppler, ASA 325mg, heparin
    • ~10% return to OR
  • <1-3% complete loss of flap
    • Partial loss, leech therapy
    • Significant improvement in outcomes since introduction of free tissue reconstruction in head and neck 1980s to present day
Outcomes of Reconstruction

Oral Cavity

• Expected Tissue loss
  • 50-60% loss of volume with muscle, 30% loss with fat, no loss with skin surface area
  • → Increased in adjuvant XRT setting
  • ”Over” reconstruct the defect by approximately 60%
  • Can revise reconstructions 3 months post XRT, allows for tissue contracture, post treatment imaging complete
Outcomes of Reconstruction

Oral Cavity

- Functional outcomes:
  - Multiple studies have demonstrated improved speech and swallow function in free tissue reconstructed oral cavity patients
  - Innervated reconstruction-active area of research
    - Sensate free flaps for oral tongue- develop superior two point discrimination compared to non innervated flaps, no clear benefit with speech and swallow outcomes
    - Motor innervated free flaps for oral cavity- similar lack of evidence to support functional improvement

Summary

• To review the role for surgery in oral cavity cancer
  • Primary treatment for oral cavity malignancy
• To discuss indications for reconstruction after ablative resection
  • Free tissue reconstruction is the first choice for bulk, surface area and to withstand XRT
• To review outcomes and complications of reconstructive surgery
  • Favorable healing outcomes with low risk of complete flap loss
  • Improved functional outcomes with free tissue as compared to other reconstructive options
References
