Intraoperative Assessment in the Head & Neck: Building Confidence & Competency
Michelle D Williams, MD

Objectives:
1. To recognize anatomic and histologic features aiding in orienting head and neck specimens.
2. To be familiar with common head and neck specimens received for intraoperative evaluation and the clinical question being addressed.
3. To systematically approach margin assessment with recognition of guidelines and information available and limitations with each method (i.e. en face vs. perpendicular submissions)

Head and Neck is one of the most common areas that intraoperative assessment (frozen sections (FS)) are utilized. Moreover, there is a range of specimens encountered for initial assessment including many specimens for determination of margin status including composite resections. By being familiar with anatomic structures and the most common types of surgical procedures in the head and neck, you can be prepared to handle intraoperative requests real-time. Being prepared with this knowledge allows for improved dialogue with surgeons and pathologists, and greater efficiency when specimens are received.

Top 5 reasons for frozen section:
1. EUA- examine under anesthesia (direct laryngoscopy)
   - Patient with known neck squamous carcinoma metastasis, looking for primary tumor which will direct further treatment
     - Most commonly biopsies from tonsils/base of tongue/nasopharynx
     - If tumor is not identified on initial biopsies – often more biopsies submitted & bilateral tonsillectomies are considered.
     - Entirely submit tonsils for histologic examination in this setting
   - Evaluation of larynx, vocal cords, etc
     - Diagnostic tissue required for clinical management

2. Margin assessment
   - Separately submitted tissue samples (i.e. nerve, soft tissue, mucosa)
     - Typically entirely submitted at FS,
     - Maintain orientation if designated (i.e. reink true margin end of nerve)
     - En face sections vast majority of tissues (particularly if thin ≤ 5mm)
   - Simple mucosal resections
     - Prototypic specimen oral tongue resection (anterior 2/3rd of tongue)
       ▪ Tumors originate/located on the lateral aspect
       ▪ Consists of soft tissue only (mucosa and skeletal muscle)
       ▪ Orientation includes mucosal features
         • Dorsal tongue (thicker, bumpy mucosa)[medial]
         • Ventral tongue/floor of mouth (smooth, thin mucosa) [lateral]
- Serial sectioning assessment provides the most information including distance to peripheral and deep margins
- In addition to margin assessment (mucosal and deep), the surgeon often asks for tumor depth-needed to determine possible prophylaxis neck dissection and is part of AJCC 8th edition T staging

- Composite resections
  - Typically includes bone, mucosa, soft tissue and possibly skin (i.e. mandibulectomy for gingival or retromolar trigone tumor, maxillectomy)
    - Identify landmarks and maintain orientation
    - Determine areas of interest by surgeon (i.e. mucosal, muscle, skin margins, etc)
    - Examine/palpate the entire specimen and make a game-plan
    - Always consider perpendicular margins if tumor appears <5mm from margin
    - Diagrams are extremely helpful when localizing positive sections to relay detailed anatomic sites involved to surgeon
    - Limited bone assessment available at FS (scrape marrow)
    - For permanent sections – removing the soft tissue from the bone allows for visualization of bone involvement and distance to bone margins and easier sectioning of the soft tissue

Table 1. Benefits and limitations to the method of margin submission in the head & neck

<table>
<thead>
<tr>
<th>Separately submitted from surgical defect by surgeon (enface)</th>
<th>Pathologist review of specimen and margin assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros</strong></td>
<td><strong>Cons</strong></td>
</tr>
<tr>
<td>• Surgeon’s intraoperative assessment with clinical/radiographic findings selects directed tissue for sampling</td>
<td>• Distance to invasive tumor cannot be definitively determined</td>
</tr>
<tr>
<td>• The entire tissue face is examined (en face).</td>
<td>• Regional recurrence appears higher compared to when margins are taken from the specimen</td>
</tr>
<tr>
<td></td>
<td>• Complex anatomy</td>
</tr>
<tr>
<td></td>
<td>• If positive margins are present, relocalization of area of concern in situ may be challenging.</td>
</tr>
<tr>
<td><strong>Considerations</strong></td>
<td><strong>Considerations</strong></td>
</tr>
<tr>
<td>• Surgeon’s directed tissue sampling must be comprehensive enough to assure negative margins</td>
<td>• May review the main specimen with the surgeon before &amp;/or after margin assessment to aid relocalization for further resection</td>
</tr>
<tr>
<td>• Gross review of the main specimen may augment directed margins from the surgical defect</td>
<td>• Requires relaying 3-d information for readdressing positive or close areas</td>
</tr>
</tbody>
</table>
I. **A mucosal tongue resection**, serially sectioned for margin evaluation. Anterior and posterior margins will be enface with perpendicular central sections allowing for measuring the distance grossly and microscopically to the lateral, medial and deep margins. *Close margins should also be reported at FS. Anatomic location is helpful for surgeons i.e. the tumor is close in the deep (medial) muscle, distance A from anterior and distance B deep to the medial mucosal edge.*

II. separately submitted margins from the patient are 'en face' and are either positive or negative for tumor. *The distance to the tumor cannot be specifically determined when en face margins are utilized.*

*Close (margins) count!* - National Cancer Cooperative Network (NCCN) guidelines state a 5 mm clear margin from tumor is an adequate margin in most head and neck sites. i.e. reporting positive versus negative is not sufficient.

3. **Tissue identification**
   - Critical for safe thyroid surgery – to identify and protect parathyroid tissue
   - Frozen section of biopsy from possible parathyroid
     - Touch preparation may also be helpful to exclude lymph node

4. **Lymph node(LN)**
   - May direct extent of surgery (i.e. no central neck dissection unless positive LN)
   - May allow for diagnosis i.e. cystic mass must exclude squamous carcinoma and papillary thyroid carcinoma, entire nodule in general should be submitted for diagnosis; thyroid surgery with indeterminate fine needle aspiration (FNA) or for tissue triage (see below)
   - Sentinel lymph node evaluation is uncommon in head and neck and at FS
5. **Tissue triage (lymphoma evaluation)**

- Not a true frozen section – tissue is assessed often by touch prep for cellularity and selection for flow cytometric analysis

Regardless of what tissue is sent for intraoperative assessment, knowledge of general head and neck and oral anatomy along with clinical scenarios as described are useful to gain confidence and communicate effectively with other clinicians. **Communication is key!** Remember surgeons can assist with anatomic landmarks and mark their area of closest concern. Surgeons often will review the gross specimen with you based on your findings and areas of concern. Correlation of margins submitted and the corresponding regions from the resected specimen are critical for patient care.

**References**

   
   This is a multifaceted review on surgical margins specifically in head and neck cancers compiled by a multidisciplinary group of physicians specializing in the treatment of head and neck cancers.


   This is an oncologic network that develops guidelines and institute standards of care for the treatment of cancer and outcome research. This specific guidance is for the management of Head and Neck Cancers.