Oral cavity cancers - Radiation

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Agenda

• Anatomy & sites
• Staging
• Management overview
• Surgery
• Adjuvant Radiation indications
• Adjuvant Radiation- Fields & Contouring
• Chemotherapy
• Definitive treatments
• Brachytherapy
• Side effects
Oral cavity cancers: Tumour sites

- Buccal mucosa
- Gingivo-buccal sulcus
- Tongue
- Floor of mouth
- Hard palate
- Retromolar trigone
- Lip
Oral cavity cancers: T Staging

<table>
<thead>
<tr>
<th>T stage, AJCC 8th edition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T0</strong></td>
</tr>
<tr>
<td><strong>T1</strong></td>
</tr>
<tr>
<td><strong>T2</strong></td>
</tr>
<tr>
<td><strong>T3</strong></td>
</tr>
<tr>
<td><strong>T4</strong></td>
</tr>
<tr>
<td><strong>T4a</strong></td>
</tr>
<tr>
<td><strong>T4b</strong></td>
</tr>
</tbody>
</table>

*AJCC 8th edition includes depth of invasion (DOI)
Depth of invasion (DOI) versus Tumor Thickness

**DOI** = perpendicular distance from the basement membrane region to the deepest point of the infiltrative front of the tumor

**Tumor Thickness** = perpendicular distance between the highest point of the tumor surface to the deepest point of the infiltrative front of the tumor
Oral cavity cancers: N staging

<table>
<thead>
<tr>
<th>N stage, AJCC 8th edition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis in a single ipsilateral lymph node, ≤ 3 cm, ENE-</td>
</tr>
<tr>
<td>N2</td>
<td>Single ipsilateral LN (&gt; 3 cm but ≤ 6 cm) or multiple LN (≤ 6 cm)</td>
</tr>
<tr>
<td>N2a</td>
<td>Metastasis in single ipsilateral lymph node (&gt; 3 cm but ≤ 6 cm)</td>
</tr>
<tr>
<td>N2b</td>
<td>Metastasis in multiple ipsilateral lymph nodes (all ≤ 6 cm)</td>
</tr>
<tr>
<td>N2c</td>
<td>Metastasis in bilateral or contralateral lymph nodes (all ≤ 6 cm)</td>
</tr>
<tr>
<td>N3*</td>
<td>Metastasis in a lymph node &gt; 6 cm and ENE- OR clinically overt ENE+</td>
</tr>
<tr>
<td>N3a</td>
<td>Metastasis in a lymph node &gt; 6 cm and ENE-</td>
</tr>
<tr>
<td>N3b</td>
<td>Clinically overt ENE+</td>
</tr>
</tbody>
</table>

*N3 in AJCC 8th edition is now N3a and N3b*
Oral cavity cancers: Stage grouping

<table>
<thead>
<tr>
<th>Stage</th>
<th>T Classification</th>
<th>N Classification</th>
<th>M Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Tis</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>I</td>
<td>T1</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>II</td>
<td>T2</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>III</td>
<td>T3</td>
<td>N0 or N1</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T1 or T2</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td>IVA</td>
<td>T4a</td>
<td>N0, N1, or N2</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T1, T2, or T3</td>
<td>N2</td>
<td>M0</td>
</tr>
<tr>
<td>IVB</td>
<td>Any T</td>
<td>N3</td>
<td>M0</td>
</tr>
<tr>
<td>IVC</td>
<td>Any T</td>
<td>Any N</td>
<td>M1a or M1b</td>
</tr>
</tbody>
</table>
Oral cavity cancers: Management

**Early stage lesions: T1-2 N0-1**
- Surgery preferred
- Chemo-radiation if inoperable
- Brachytherapy for very early tumours

**Locally advanced tumours: T3-4, N+**
- Surgical resection
- Followed by adjuvant radiation therapy
- Add chemotherapy as indicated
- Definitive chemo-radiation if unresectable
Surgery (preferred) or:

T1–2, N0

Resection of primary\(^j\) ± neck dissection\(^k\) (guided by tumor location, depth of invasion, and imaging)

or:

SLN pN0

Resection of primary\(^j\) + sentinel lymph node (SLN) biopsy\(^l\)

or:

Definitive RT\(^i\)

No positive nodes and No adverse features\(^m\)

One positive node without adverse features\(^m\)

Extranodal extension ± positive margin

Adverse features\(^m\)

Positive margin

Other risk features

See Post Systemic Therapy Neck Evaluation (FOLL-A, 20...
What does the surgery look like?

• Primary tumour excised as wide local excision or simultaneous mandibulectiomy (COMMANDO)

• Extent of neck dissection based on location of tumour; clinical and imaging findings.

• Grafts used for support, symmetry and cosmesis
Surgery- Additional details

• Neck dissection- always or selected patients

•Extent

• When bilateral
Radiation therapy

**Indications**

- T3/T4
- LVI
- PNI
- N+
- Margins (R2/R1/close)
- WPOI*
- DOI*
Concurrent chemotherapy

**Indications:**

- ENE
- Positive margin

Always, keep the patient in mind!

(age, KPS, comorbidities)
**Included**
Stage III and IV

- pT3/pT4; any N
- T1/2 with a N2/3 M0
- Patients with stage T1/ T2 and N0/1 with unfavorable pathological findings
  - ENE
  - positive resection margins
  - PNI+
  - LVI
- oral-cavity or oropharyngeal tumors with involved lymph nodes at level IV or V,
RTOG 9501

Included

- Resection margin positive
- ENE
- 2 or more nodes

No significant OS benefit!
EORTC 22931 (n=334)
- Stage III-IV
- OC/OP Level 4/5 LN
- Perineural invasion
- Vascular invasion
- 101 (30%) patients not included

RTOG 9501 (n=416)
- ≥ 2 positive lymph nodes
- 170 (41%) patients not included

"High-risk" ECS +/or positive margin

479/750 (64%)
Pre- radiation counselling

• Dental prophylaxis : Caries/cavities/Fluoride treatment

• Speech and swallowing assessment

• Feeding assessment and counselling
RT planning

CT simulation:

**Position:** Supine in thermoplastic mask (3 or 4 clamp)
- Head rest: Comfortable neck position
- ± Bite block
- CT with IV contrast
- Consider wiring scars
- Extent: Entire skull/orbits to carina
Treatment volumes

• OARs
• Targets
• Pertinent anatomy

For contouring/dose guidelines with conventional fractionation/SIB see: https://econtour.org/cases/28
**Buccal mucosa:** Due to lack of barriers to submucosal spread, CTV extends cranially to include bucco-gingival sulcus and infra-temporal fossa; caudally to buccogingival sulcus and submandibular salivary glands; anteriorly to behind the lip commissure and posteriorly to include retromolar trigone

**Tongue:** whole tongue (extrinsic and intrinsic musculature), floor of mouth, glosso-tonsillar sulcus and anterior tonsillar pillar

**Floor of mouth:** Genioglossus, geniohyoid, sublingual and submandibular salivary glands (ipsilateral or bilateral), adjoining alveolar ridge and mandible, muscles at root of tongue
Contouring- primary

- GTVpre-op
- CTV-HR- areas of positive margin or ENE
- CTV- (Pre-op GTV/tumour bed)+margin
CARCINOMA TONGUE
CARCINOMA BUCCAL MUCOSA
Neck

In pN0,
Pathologic nodal disease by T Stage and site for cN0 neck

<table>
<thead>
<tr>
<th>Site</th>
<th>Tx-T1-T2</th>
<th>T3-T4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral tongue (n=48)</td>
<td>18.6%</td>
<td>31.6%</td>
<td>25%</td>
</tr>
<tr>
<td>FOM (n=62)</td>
<td>18.6%</td>
<td>26.3%</td>
<td>21%</td>
</tr>
<tr>
<td>Lower gum (n=41)</td>
<td>11.5%</td>
<td>13.3%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Buccal mucosa (n=10)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Retromolar trigone (n=23)</td>
<td>36.4%</td>
<td>33%</td>
<td>34.8%</td>
</tr>
</tbody>
</table>

Byers et al 1992

Should the undissected level IV be included in RT fields?
– Warshavsky et al, JAMA OHNS 2019
– Rate of level IV involvement in cN0 neck is 2.53% in fixed-effects model
In pN+,
  Ipsilateral neck IA + Level IB to V is included to 46-54Gy
  Involved nodal levels to receive 60Gy
  ENE area to 66Gy

• If level II is involved, extend superior border to base of skull
  (including retrostyloid space)
• If level IV or Vb involved, extend lower border down to clavicle (including SCF)
• If pre-operatively nodes abuts/infiltrates muscle, include it
• Include adjacent levels of involved node levels to be included

Vincent Gregoire et al, Green Journal, 2006
Target volume selection and delineation (T and N) for primary radiation treatment of oral cavity, oropharyngeal, hypopharyngeal and laryngeal squamous cell carcinoma

Vincent Grégoire\textsuperscript{a,*}, Cai Grau\textsuperscript{b}, Michel Lapeyre\textsuperscript{c}, Philippe Maingon\textsuperscript{d}

Recommendations for selection of Clinical Target Volume in the neck for oral cavity and oropharyngeal tumors.

<table>
<thead>
<tr>
<th>Nodal category (AJCC/UICC 8th ed.)</th>
<th>Levels to Be Included in CTV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ipsilateral neck</td>
</tr>
<tr>
<td>Oral cavity</td>
<td></td>
</tr>
<tr>
<td>N0-1 (in level I, II, or III)</td>
<td>Ia-b, II, III, + IVA\textsuperscript{f}</td>
</tr>
<tr>
<td>N2a-b</td>
<td>Ia-b, II, III, IVa\textsuperscript{g}, Va,b\textsuperscript{5,6}</td>
</tr>
<tr>
<td>N2c</td>
<td>According to N category on each side of the neck</td>
</tr>
<tr>
<td>N3</td>
<td>Ia-b, II, III, IVa\textsuperscript{g}, Va,b ± adjacent structures according to clinical and radiologic data\textsuperscript{8}</td>
</tr>
</tbody>
</table>
Dose prescription

46 - 50Gy to low risk volume (elective nodal areas)

60Gy to tumour bed and involved nodal areas

66Gy to focal areas of margin positivity and ENE

Conventional fractionation; 2Gy/fr, 5Fr/week over 6 weeks
Radiation therapy

- IMRT or VMAT preferred; Tomotherapy!

- Verification with MV/KV or CBCTs

- Weekly reviews
2D planning

➢ Superior border based on site

➢ Caution: anterior border!
Definitive RT

• In selected early tumours T1-2 N0 (when medically inoperable or refusing surgery)

• Ext RT or Brachytherapy may be performed

• Volumes:
  • Primary: disease+margin
  • Nodes: as per nodal involvement or elective nodal irradiation
Brachytherapy

• It is placement of sealed sources into or immediately in vicinity of target tissues

• Sites in oral cavity amenable to brachytherapy
  Lip, buccal mucosa, anterior tongue, floor of mouth (interstitial) & hard palate (surface mould)
## Patient selection

<table>
<thead>
<tr>
<th>Site</th>
<th>Brachytherapy Alone</th>
<th>Ext RT+ BRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lip</td>
<td>Tumors &lt;5cm</td>
<td>Larger tumors</td>
</tr>
<tr>
<td>Buccal Mucosa</td>
<td>Tumor &lt;4cm, thickness &lt;1.5cm</td>
<td>Larger tumors</td>
</tr>
<tr>
<td>Tongue</td>
<td>Upto 3cm,N0</td>
<td>&gt;3-4cm, N1</td>
</tr>
<tr>
<td>Floor of mouth</td>
<td>T1N0M0</td>
<td>&gt;3-4cm, N1</td>
</tr>
</tbody>
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### General principles

T1/2, N0, accessible for BT, adequate mouth opening, not abutting bone
Procedure nitgrits

- Under GA with head extended (round pillow under head and soft towel under shoulder)

- Nasal intubation

- Tongue stitch and throat pack

- EUA

- Steel needles and plastic catheters
Dose 65Gy as monotherapy or 15-25Gy as boost (LDR equivalent)
Side effects: On RT management

• Pain (post op and RT induced)
  - pain management

• Dermatitis
  - Skin cream, gentian violet

• Mucositis
  - Topical gels, syp sucrafil, anti-inflammatory, benzydamine

• Xerostomia
  - counselling, frequent sips of liquids

• Nutritional deficit
  - counselling, altered recipes by dietician

• Lab abnormalities
Thank you