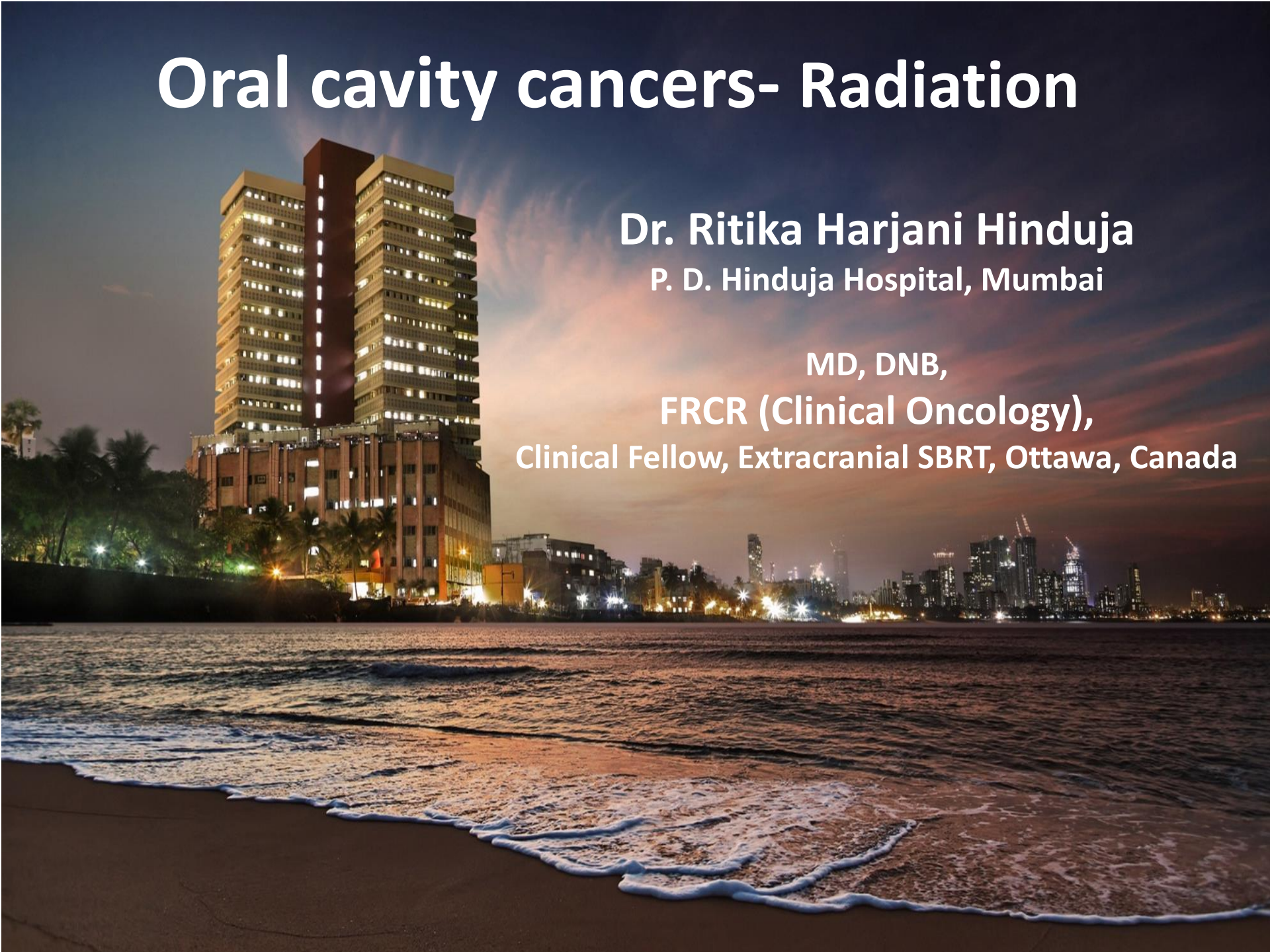
Oral cavity cancers- Radiation



Dr. Ritika Harjani Hinduja

P. D. Hinduja Hospital, Mumbai

MD, DNB,

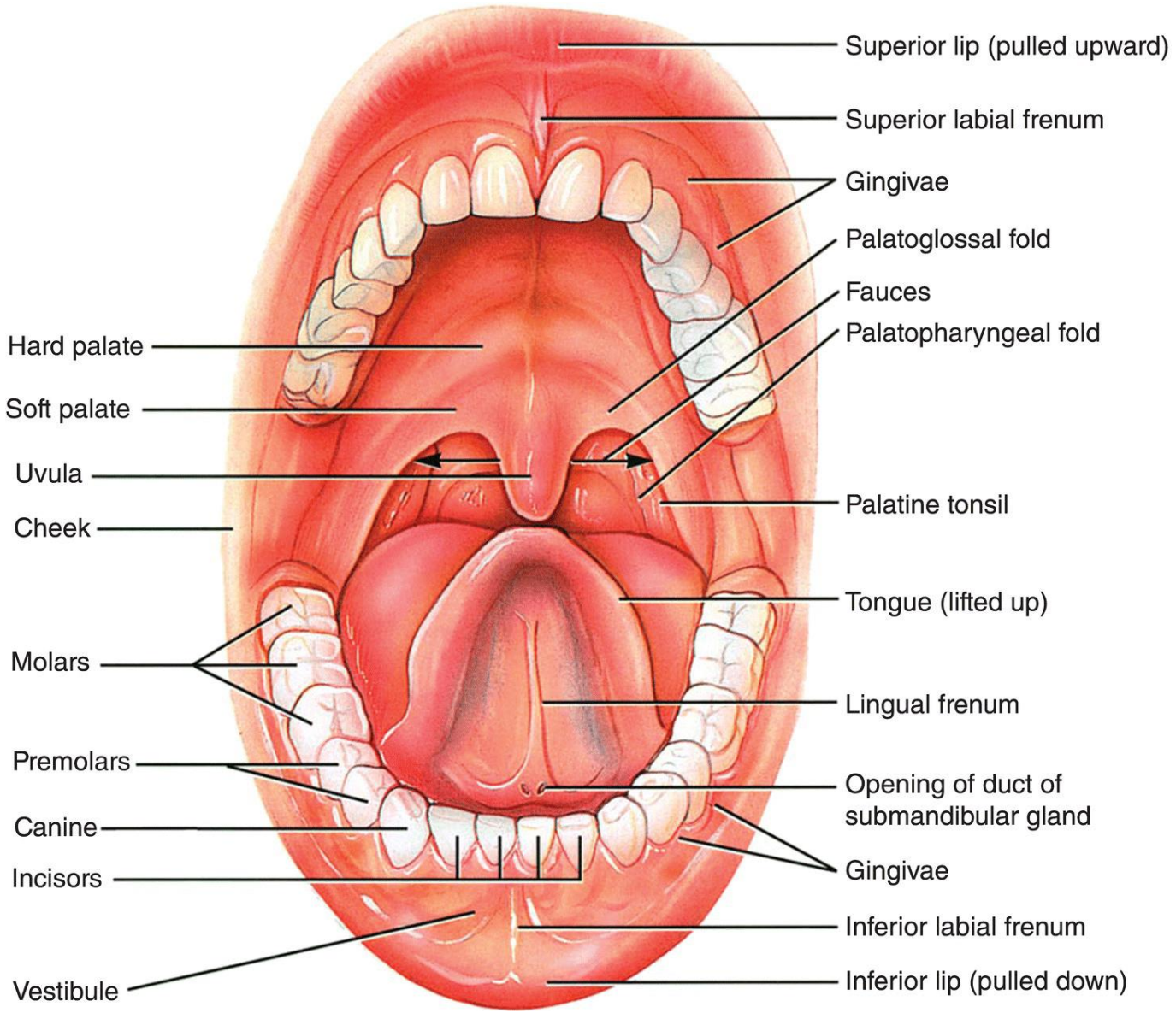
FRCR (Clinical Oncology),

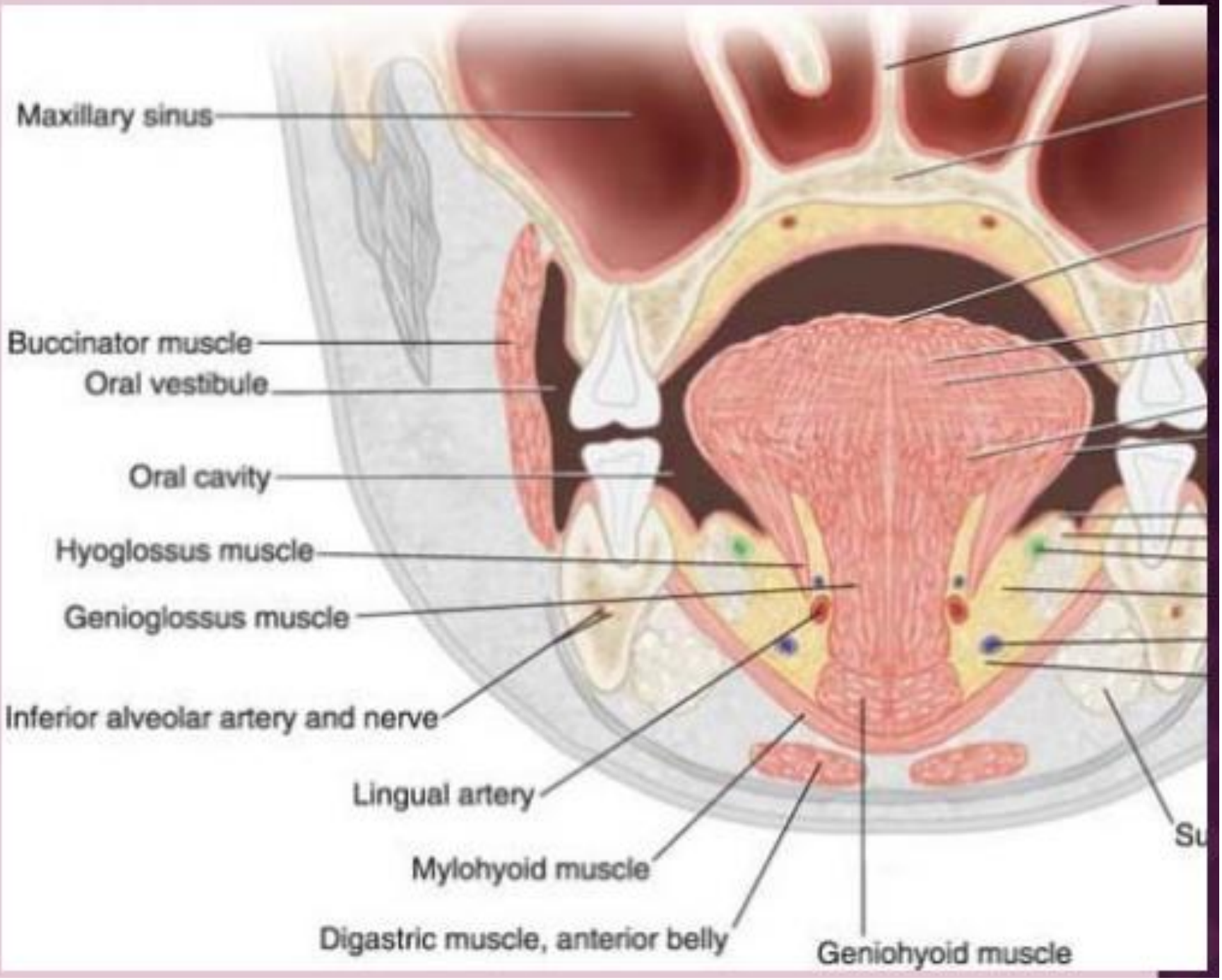
Clinical Fellow, Extracranial SBRT, Ottawa, Canada

Agenda

- Anatomy & sites
- Staging
- Management overview
- Surgery
- Adjuvant Radiation indications
- Adjuvant Radiation- Fields & Contouring
- Chemotherapy
- Definitive treatments
- Brachytherapy
- Side effects

Anatomy: Oral cavity




Maxillary sinus
Buccinator muscle
Oral vestibule
Oral cavity
Hyoglossus muscle
Genioglossus muscle
Inferior alveolar artery and nerve
Lingual artery
Mylohyoid muscle
Digastric muscle, anterior belly
Geniohyoid muscle

Oral cavity cancers: Tumour sites

- Buccal mucosa
- Gingivo-buccal sulcus
- Tongue
- Floor of mouth
- Hard palate
- Retromolar trigone
- Lip

Oral cavity cancers: T Staging

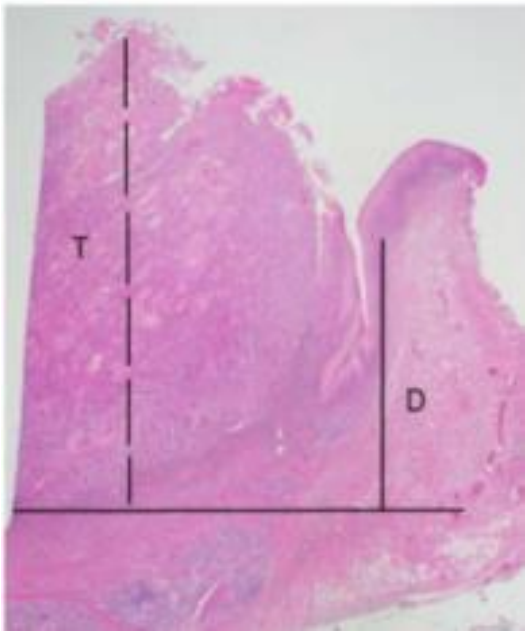
T stage, AJCC 8th edition	
T0	No evidence of primary tumor
T1	≤ 2 cm size **AND*** ≤ 5mm depth
T2	≤ 2 cm size AND depth > 5 mm but ≤ 10 mm **OR** > 2 cm but ≤ 4 cm with depth ≤ 10 mm
T3	Tumor > 4 cm **OR** > 10 mm depth
T4	Locally advanced disease
T4a	Moderately advanced local disease (e.g. invades through cortical bone, inferior alveolar nerve, FOM/intrinsic tongue muscles, skin of face, maxillary sinus)
T4b	Very advanced local disease (e.g. invades masticator space, pterygoid plates/space, skull base, encases internal carotid artery

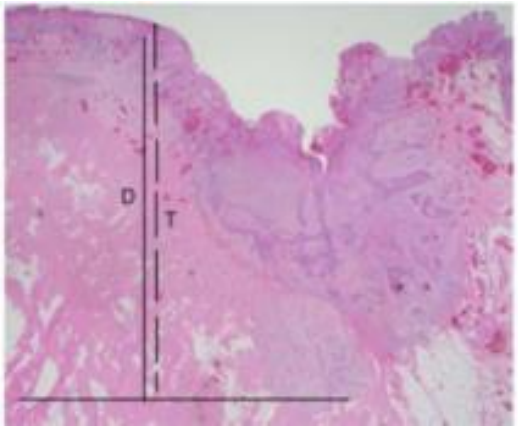
*AJCC 8th edition includes depth of invasion (DOI)

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

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

*N3 in AJCC 8th edition is now N3a and N3b

Oral cavity cancers: Stage grouping

AJCC 8th Edition Stage Grouping			
0	Tis	N0	M0
I	T1	N0	M0
II	T2	N0	M0
III	T3	N0 or N1	M0
	T1 or T2	N1	M0
IVA	T4a	N0, N1, or N2	M0
	T1, T2, or T3	N2	M0
IVB	Any T	N3	M0
	T4b	Any N	M0
IVC	Any T	Any N	M1a or M1b

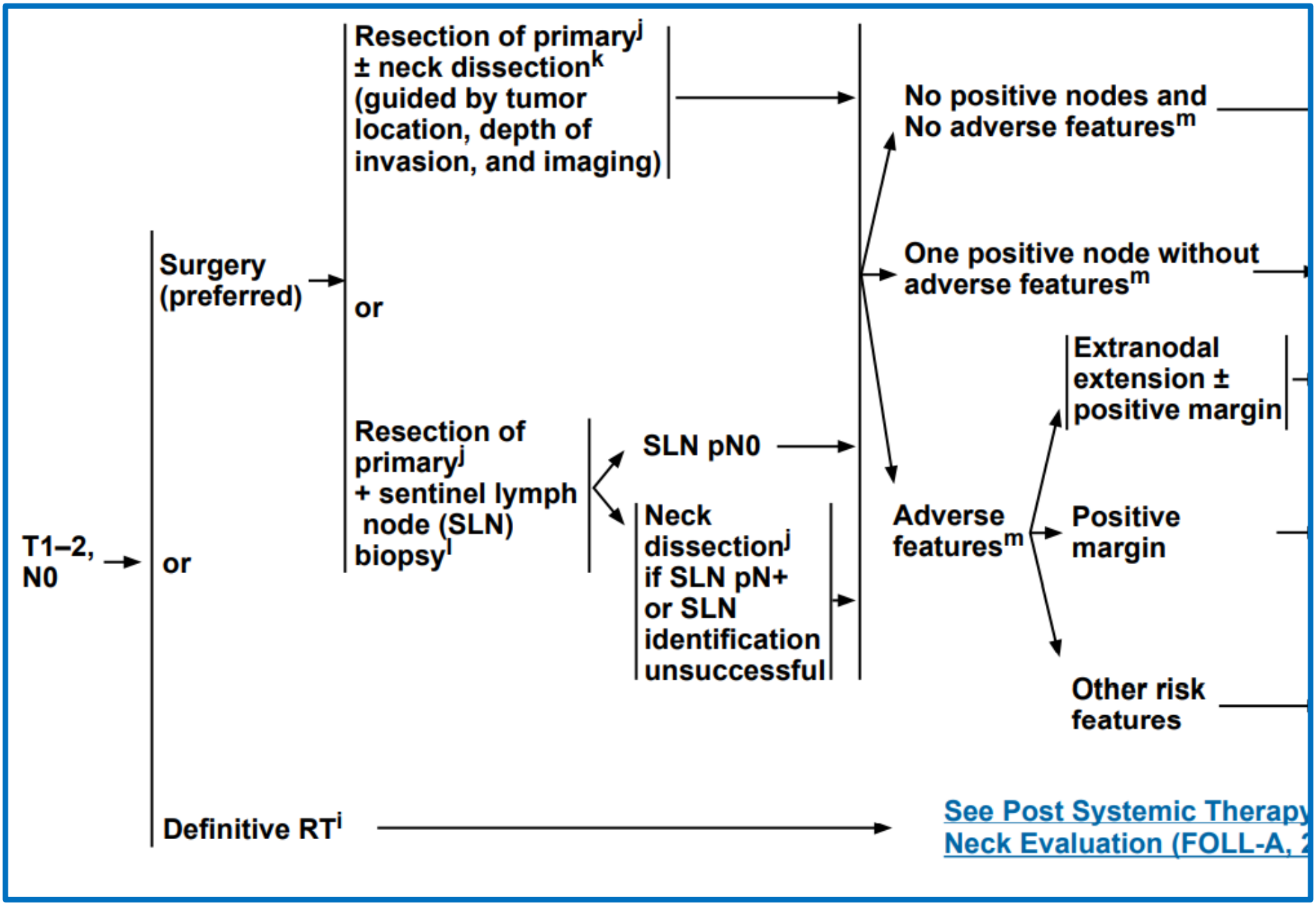
Oral cavity cancers: Management

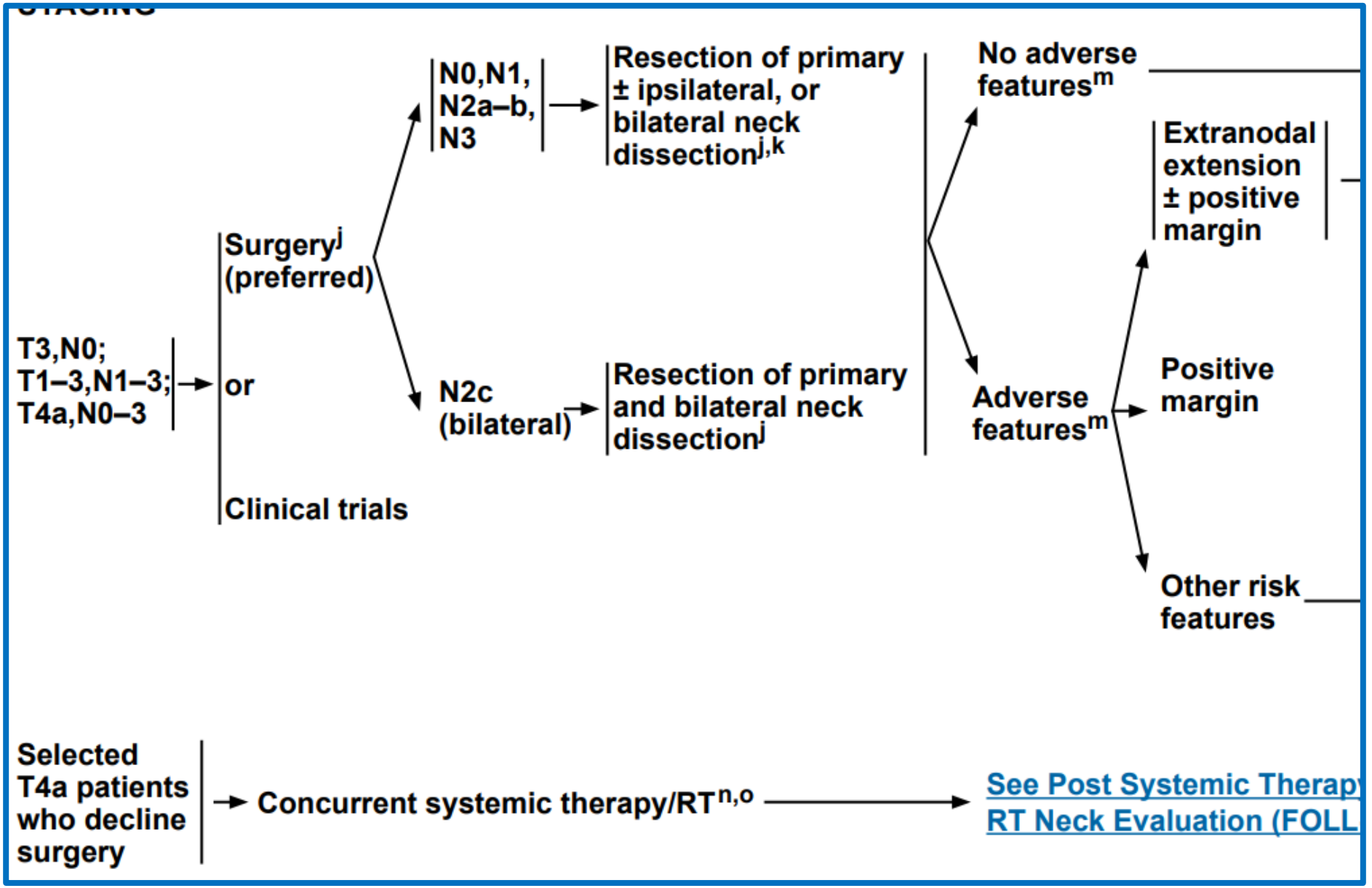
Early stage lesions: T1-2 N0-1

- 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


T1–2, N0
Surgery (preferred)
or
Definitive RT[i]
Resection of primary[j] ± neck dissection[k] (guided by tumor location, depth of invasion, and imaging)
Resection of primary[j] + sentinel lymph node (SLN) biopsy[l]
SLN pN0
Neck dissection[j] if SLN pN+ or SLN identification unsuccessful
No positive nodes and No adverse features[m]
One positive node without adverse features[m]
Adverse features[m]
Extranodal extension ± positive margin
Positive margin
Other risk features
See Post Systemic Therapy
Neck Evaluation (FOLL-A, 2


T3,N0;
T1–3,N1–3;
T4a,N0–3
Surgery[j] (preferred)
or
Clinical trials
N0,N1, N2a–b, N3
Resection of primary ± ipsilateral, or bilateral neck dissection[j,k]
N2c (bilateral)
Resection of primary and bilateral neck dissection[j]
No adverse features[m]
Adverse features[m]
Extranodal extension ± positive margin
Positive margin
Other risk features
Selected T4a patients who decline surgery
Concurrent systemic therapy/RT[n,o]
See Post Systemic Therap
RT Neck Evaluation (FOLL

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!

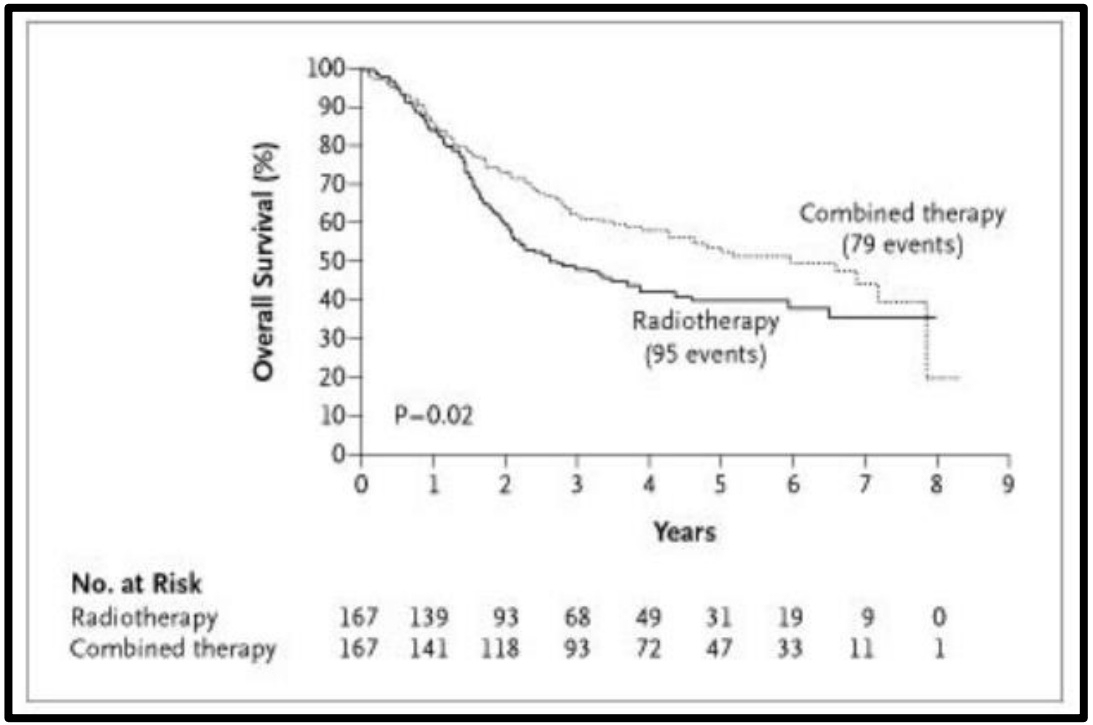
(age, KPS, comorbidities)

EORTC 22931

Included

Stage III and IV

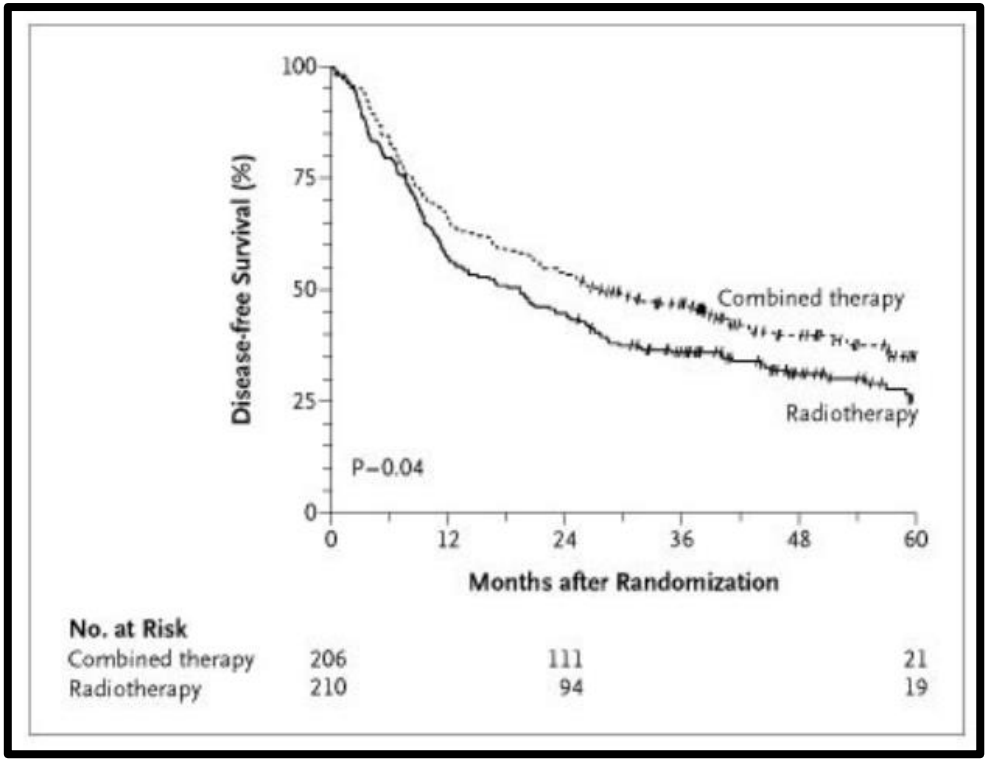
- pT3/pT4; any N
- T1/2 with a N2/3 M0
- Patients with stage T1/ T2 and N0/1 with unfavorable pathological findings
  - ENE
  - positive resection margins
  - PNI+
  - LVI
- oral-cavity or oropharyngeal tumors with involved lymph nodes at level IV or V,



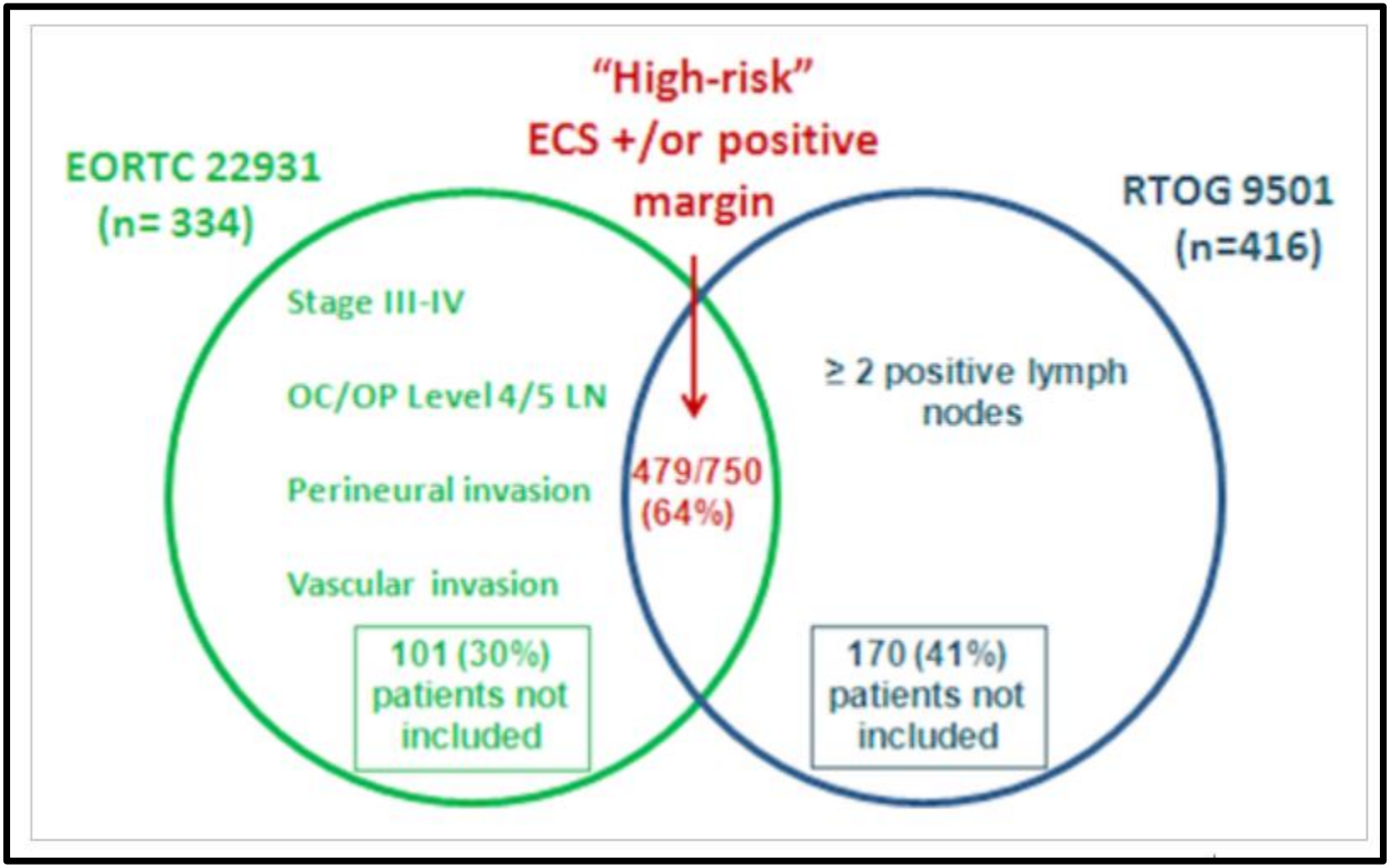
RTOG 9501

Included

- Resection margin positive
- ENE
- 2 or more nodes



No significant OS benefit!


"High-risk"
ECS +/or positive
margin
EORTC 22931
(n= 334)
RTOG 9501
(n=416)
Stage III-IV
OC/OP Level 4/5 LN
Perineural invasion
Vascular invasion
≥ 2 positive lymph
nodes
479/750
(64%)
101 (30%)
patients not
included
170 (41%)
patients not
included

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**

Intensity-Modulated Radiation Therapy for Head and Neck Cancer: Emphasis on the Selection and Delineation of the Targets

Avraham Eisbruch, Robert L. Foote, Brian O'Sullivan, Jonathan J. Beitler, and Bhadrasain Vikram

Seminars in Radiation Oncology, 2002

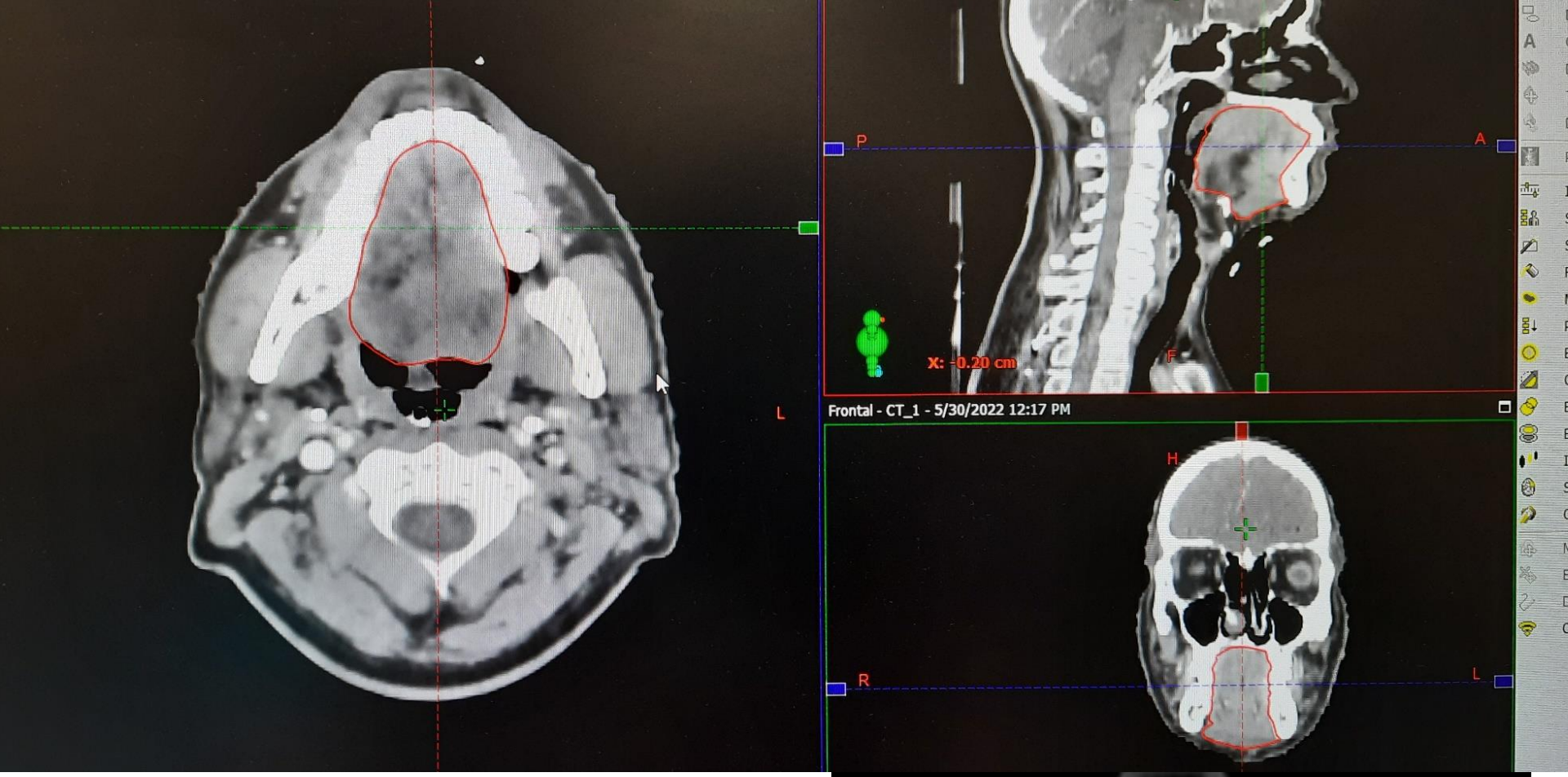
Buccal mucosa: Due to lack of barriers to submucosal spread, CTV extends cranially to include bucco-gingival sulcus and infra-temporal fossa; caudally to buccogingival sulcus and submandibular salivary glands; anteriorly to behind the lip commissure and posteriorly to include retromolar trigone

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

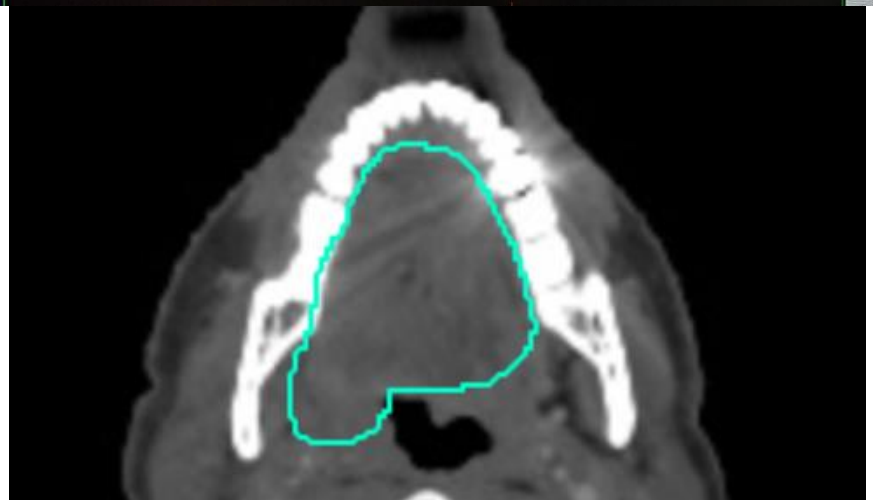
Floor of mouth: Genioglossus, geniohyoid, sublingual and submandibular salivary glands (ipsilateral or bilateral), adjoining alveolar ridge and mandible, muscles at root of tongue

Contouring- primary

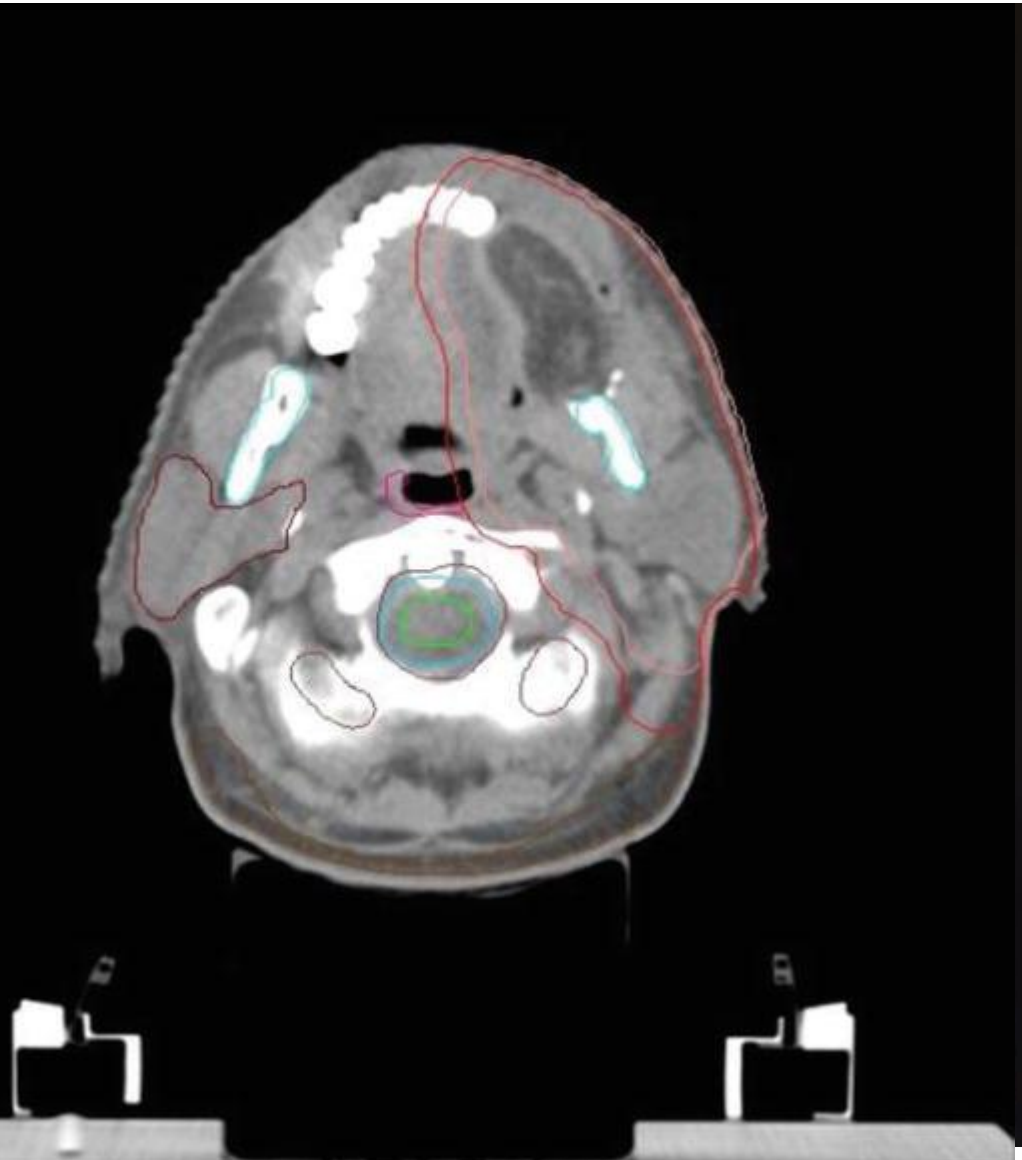
- GTVpre-op
- CTV-HR- areas of positive margin or ENE
- CTV- (Pre-op GTV/tumour bed)+margin

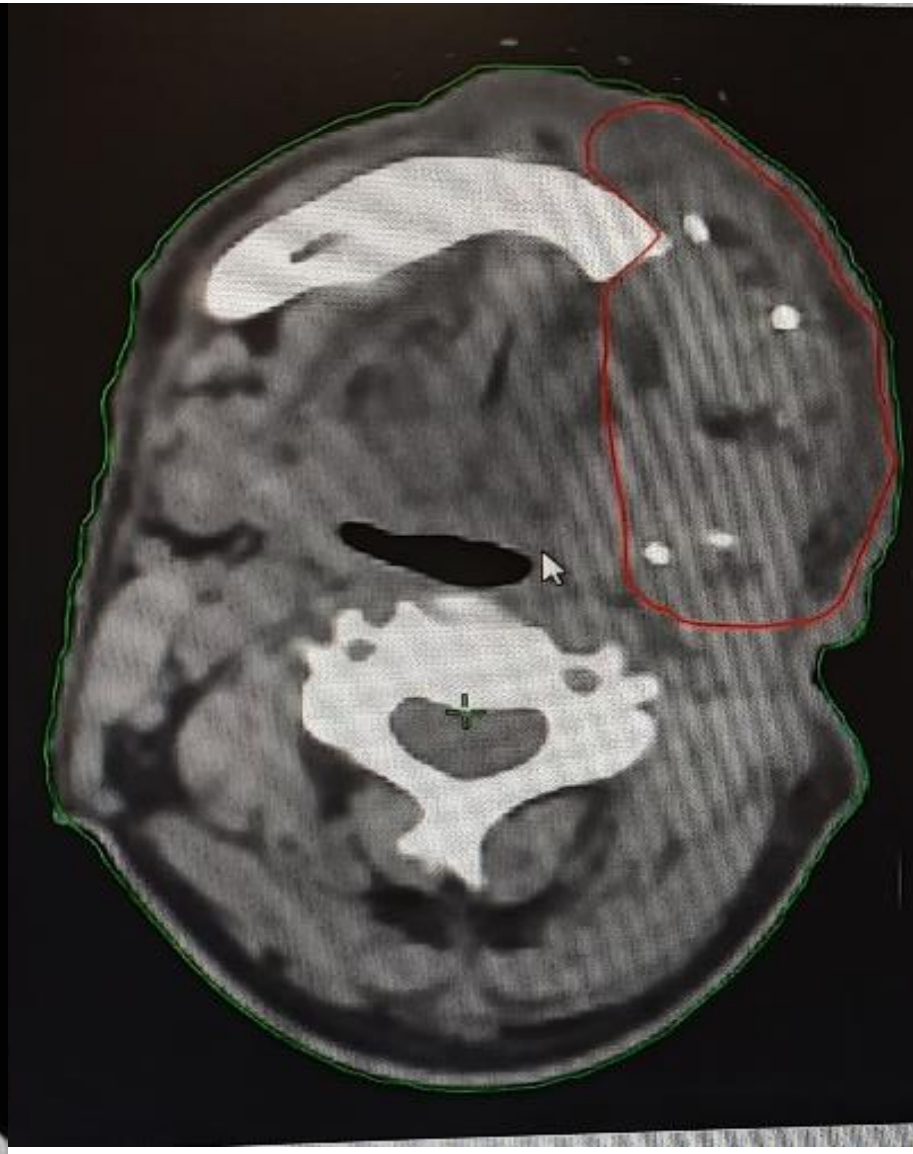


CARCINOMA TONGUE



CARCINOMA BUCCAL MUCOSA





Neck

In pN0,

Pathologic nodal disease by T Stage and site for cN0 neck

– Byers et al. Head Neck Surg 1988

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

Byers et al 1992

Should the undissected level IV be included in RT fields?

– Warshavsky et al, JAMA OHNS 2019

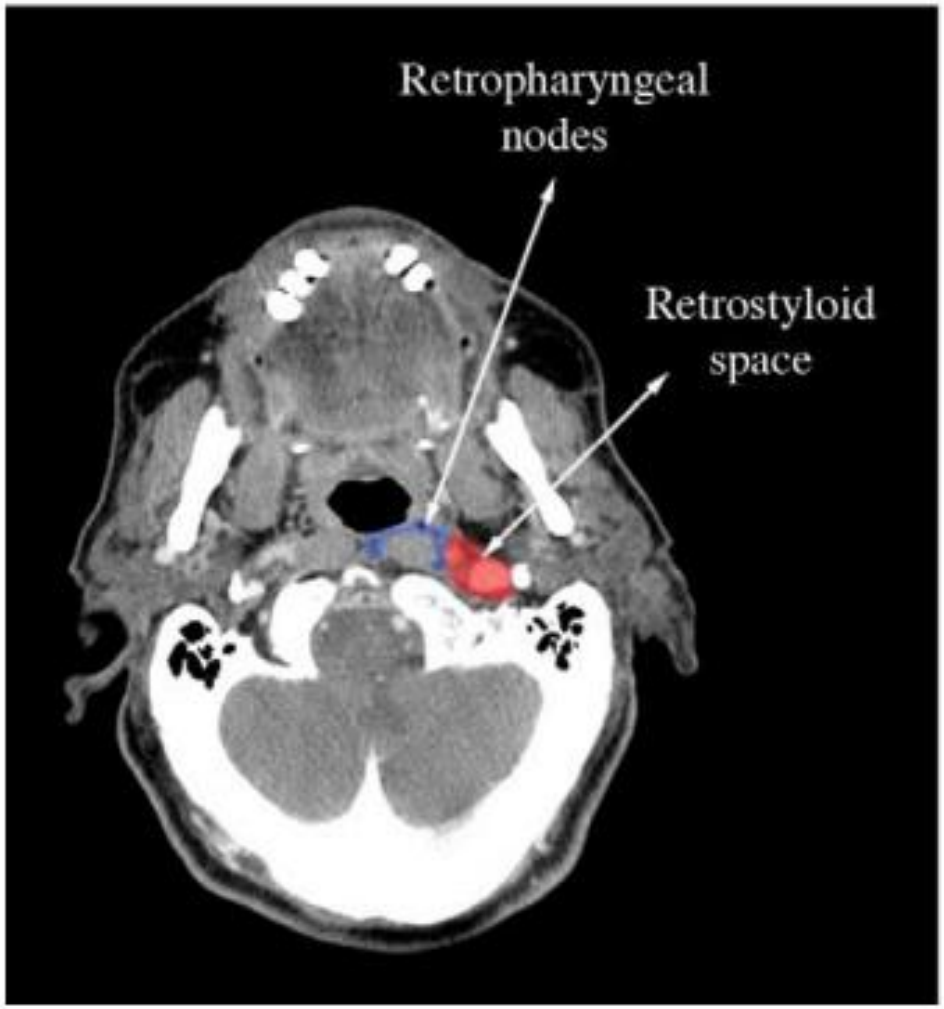
– Rate of level IV involvement in cN0 neck is 2.53% in fixed-effects model

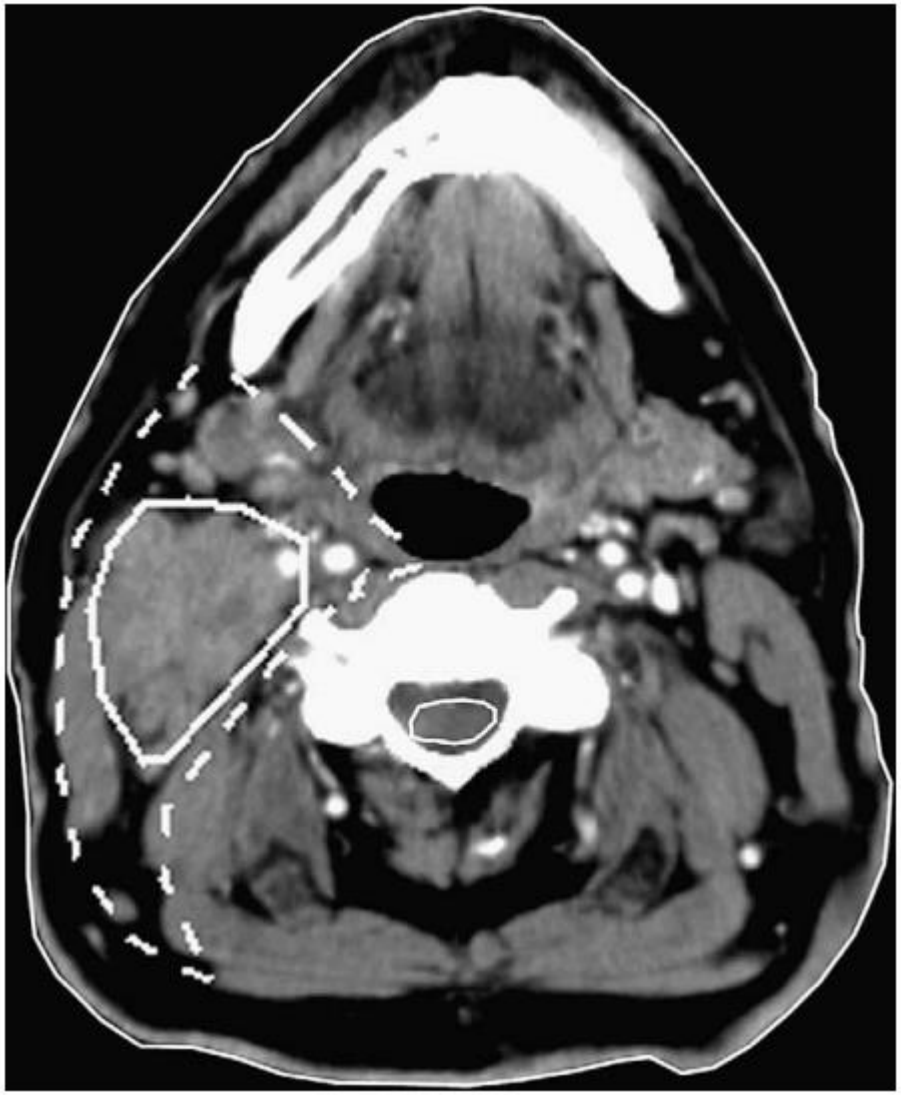
In pN+,

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


Retropharyngeal
nodes
Retrostyloid
space



Oral Oncology 87 (2018) 131–137

Contents lists available at ScienceDirect

Oral Oncology

journal homepage: www.elsevier.com/locate/oraloncology

Target volume selection and delineation (T and N) for primary radiation treatment of oral cavity, oropharyngeal, hypopharyngeal and laryngeal squamous cell carcinoma

Vincent Grégoire[a,*], Cai Grau[b], Michel Lapeyre[c], Philippe Maingon[d]

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

Nodal category (AJCC/UICC 8th ed.)	Levels to Be Included in CTV	
	Ipsilateral neck	Contralateral neck (when indicated)
Oral cavity		
N0-1 (in level I, II, or III)	Ia-b, II,[*] III, + IVa[†]	Ia-b, II,[*] III, + IVa[†]
N2a-b	Ia-b, II, III, IVa[#], Va,b[‡,§]	Ia-b, II,[*] III, + IVa for anterior tongue tumor
N2c	According to N category on each side of the neck	According to N category on each side of the neck
N3	Ia-b, II, III, IVa[#], Va,b ± adjacent structures according to clinical and radiologic data,[§]	Ia-b, II,[*] III, + IVa for anterior tongue tumor

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 tumoursT1-2 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

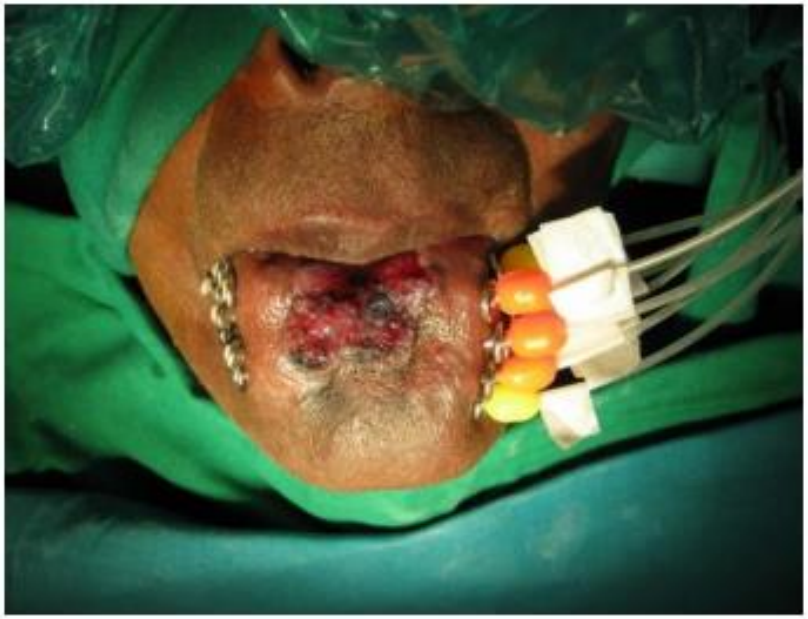
Site	Brachytherapy Alone	Ext RT+ BRT
Lip	Tumors <5cm	Larger tumors
Buccal Mucosa	Tumor <4cm, thickness <1.5cm	Larger tumors
Tongue	Upto 3cm,N0	>3-4cm, N1
Floor of mouth	T1N0M0	>3-4cm, N1

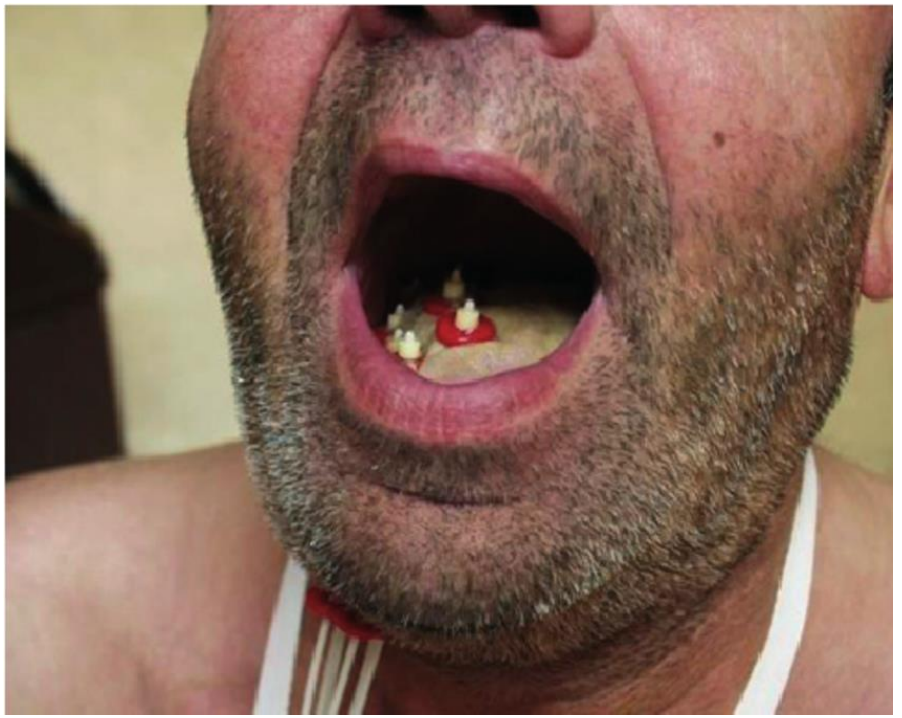
General principles

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





APPLICATIONS

Dose 65Gy as monotherapy or 15-25Gy as boost (LDR equivalent

Images sourced online

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