

The impact of head and neck lymphoedema on swallowing and communication

Eimear Hannigan, Speech and Language Therapist
South-Infirmary Victoria University Hospital



Head and neck cancer

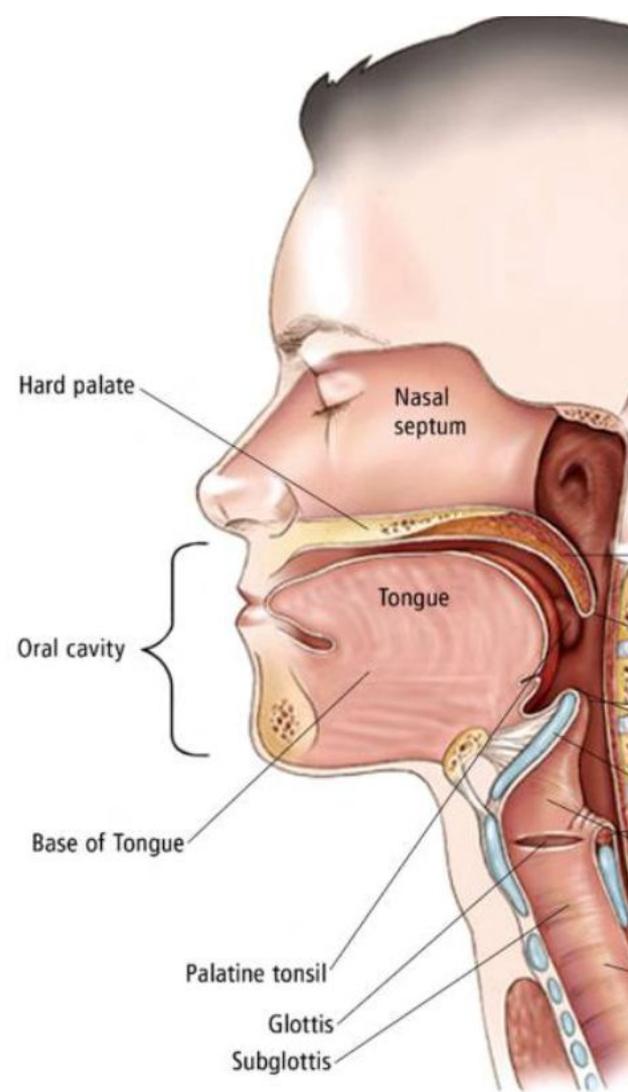
Squamous cell carcinomas of oral cavity, oropharynx, nasopharynx, hypopharynx, larynx, nasal cavity, nasal/paranasal sinuses, salivary glands

Large proportion have regional lymph node metastases

7th most common cancer with number projected to grow; increasing number aged under 65

Improved survival (patients living longer with side effects of treatment)

Majority of survivors experience impairments of swallowing and communication



Speech/voice/swallowing impairments in HNC

Surgery: removal or damage to relevant structures in upper aerodigestive tract

Radiotherapy: acute effects (mucositis, oedema) - chronic changes (neuromuscular & sensory impairments, **lymphoedema**, fibrosis, trismus) - sometimes, new late effects (cranial neuropathy, atrophy).

Rate of aspiration (food/fluid entering trachea when swallowing) after radiotherapy range from 30 - 62% (Roe et al 2010)

Swallowing dysfunction/aspiration most significantly associated with radiotherapy to “Dysphagia and aspiration-related structures”/“DARS” - upper oesophageal sphincter, larynx, pharyngeal constrictor muscles, base of tongue, floor of mouth, genioglossus muscle, salivary glands (Eisburch et al 2002).

SLT intervention can reduce risk and/or severity of impairments (e.g. prophylactic swallowing & jaw mobility exercises pre radiotherapy is standard of care).

Lymphoedema in HNC

Disruption of lymphatic drainage from damage to nodes or vessels; may be due to compression from tumour, surgical removal of lymph nodes, irradiation

Includes external and internal lymphoedema

Affects 80-91% of HN patients post-treatment (Rajaram, 2025)

Chronic, progressive: lymphoedema to fibrosis continuum

Impacts movement, breathing, swallowing, communication, quality-of-life, self-image, wellbeing

Treatment: importance of the lymphatic system

Lymph from different head and neck areas is transported into specific cervical lymph node chains (surgically classified as levels - see next slide). For example, the oropharynx drains to level II nodes.

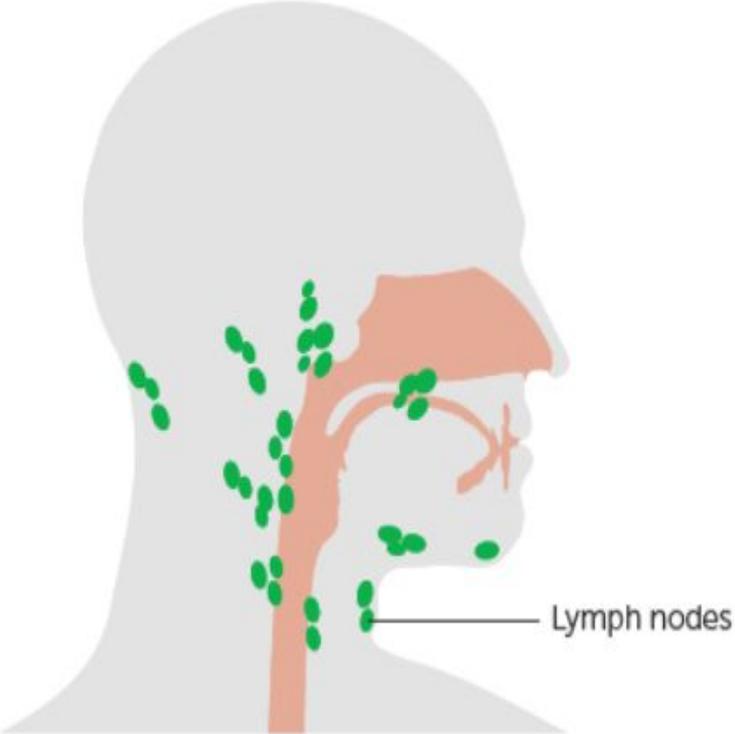
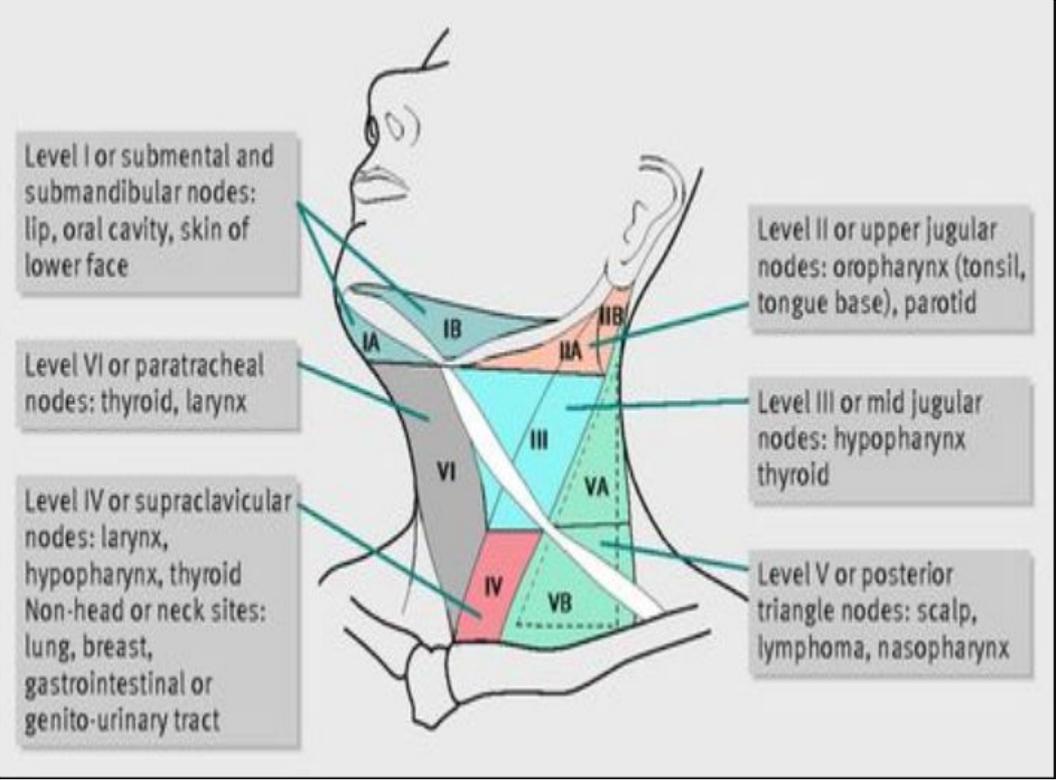
When cancer cells from primary tumour spread via lymphatic system, they form new tumours in lymph nodes of the neck corresponding to the deep drainage pathways

If lymph nodes are involved, more aggressive treatment is required

Neck dissections (removal of cervical lymph nodes) may be performed either to accurately stage a cancer, to remove definitive disease or to reduce risk of regional recurrence.

Areas of neck at risk of occult metastasis are also often electively treated with radiotherapy

Head and neck lymphatic drainage pathways



TNM classification (8th edition) : Lymph nodes

N CATEGORY	N CRITERIA ^b
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Metastasis in a single ipsilateral lymph node, 3 cm or less in greatest dimension and ENE-negative
N2	Metastasis in a single ipsilateral lymph node, 3 cm or less in greatest dimension and ENE-positive; or more than 3 cm but not more than 6 cm in greatest dimension and ENE-negative; or metastases in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension and ENE-negative; or metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension, ENE-negative
N2a	Metastasis in a single ipsilateral or contralateral lymph node 3 cm or less in greatest dimension and ENE-positive; or metastasis in a single ipsilateral lymph node more than 3 cm but not more than 6 cm in greatest dimension and ENE-negative
N2b	Metastasis in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension and ENE-negative
N2c	Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension and ENE-negative
N3	Metastasis in a lymph node more than 6 cm in greatest dimension and ENE-negative; or metastasis in a single ipsilateral lymph node more than 3 cm in greatest dimension and ENE-positive; or metastasis in multiple ipsilateral, contralateral, or bilateral lymph nodes, with any ENE-positive
N3a	Metastasis in a lymph node more than 6 cm in greatest dimension and ENE-negative
N3b	Metastasis in a single ipsilateral node more than 3 cm in greatest dimension and ENE-positive; or metastasis in multiple ipsilateral, contralateral, or bilateral lymph nodes, with any ENE-positive

Predictors of head and neck lymphoedema

- Degree of nodal disease (N - stage)
- Extent of neck dissection
- Bilateral neck radiotherapy
- Amount of RT to contralateral lymph nodes
- Multi-modality treatment
- Internal lymphoedema - higher radiotherapy dose to the larynx

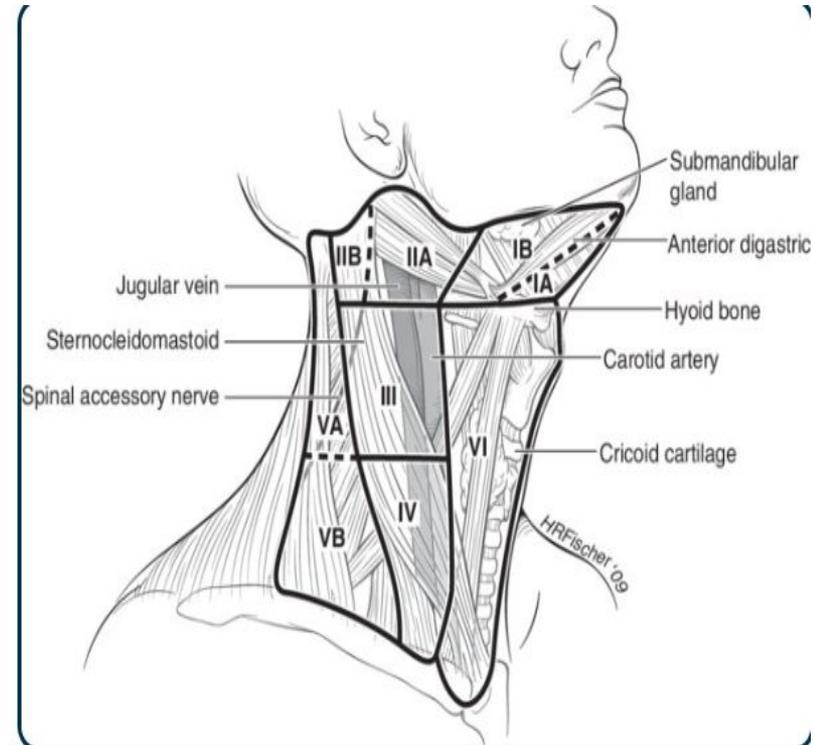
Types of neck dissection

Radical neck dissection - clearance of nodal levels I - V from one side of the neck; removes spinal accessory nerve, internal jugular vein, sternocleidomastoid

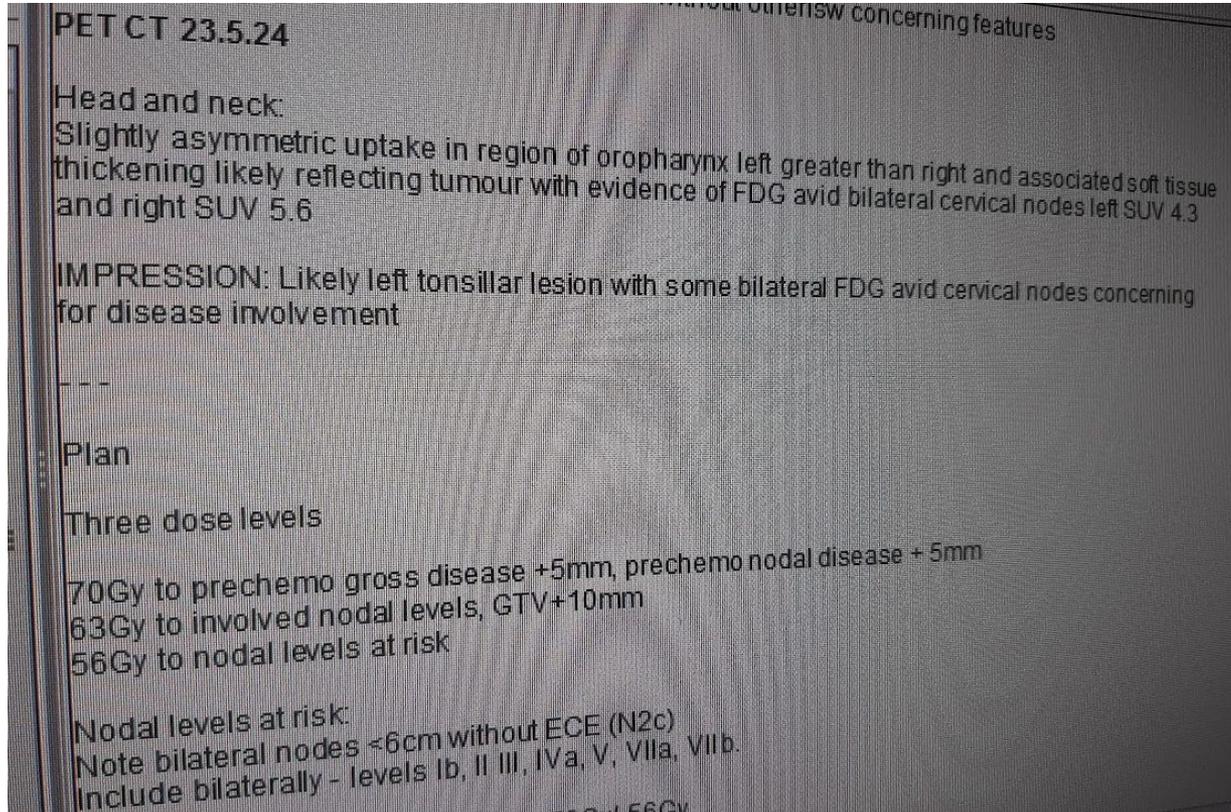
Modified radical neck dissection - same as above but preserving one of either SAN, IJV, SCM

Selective neck dissection - removes certain lymph node groups and preserves others; preserves other structures

Extended neck dissection - additional lymph node groups or other structures removed

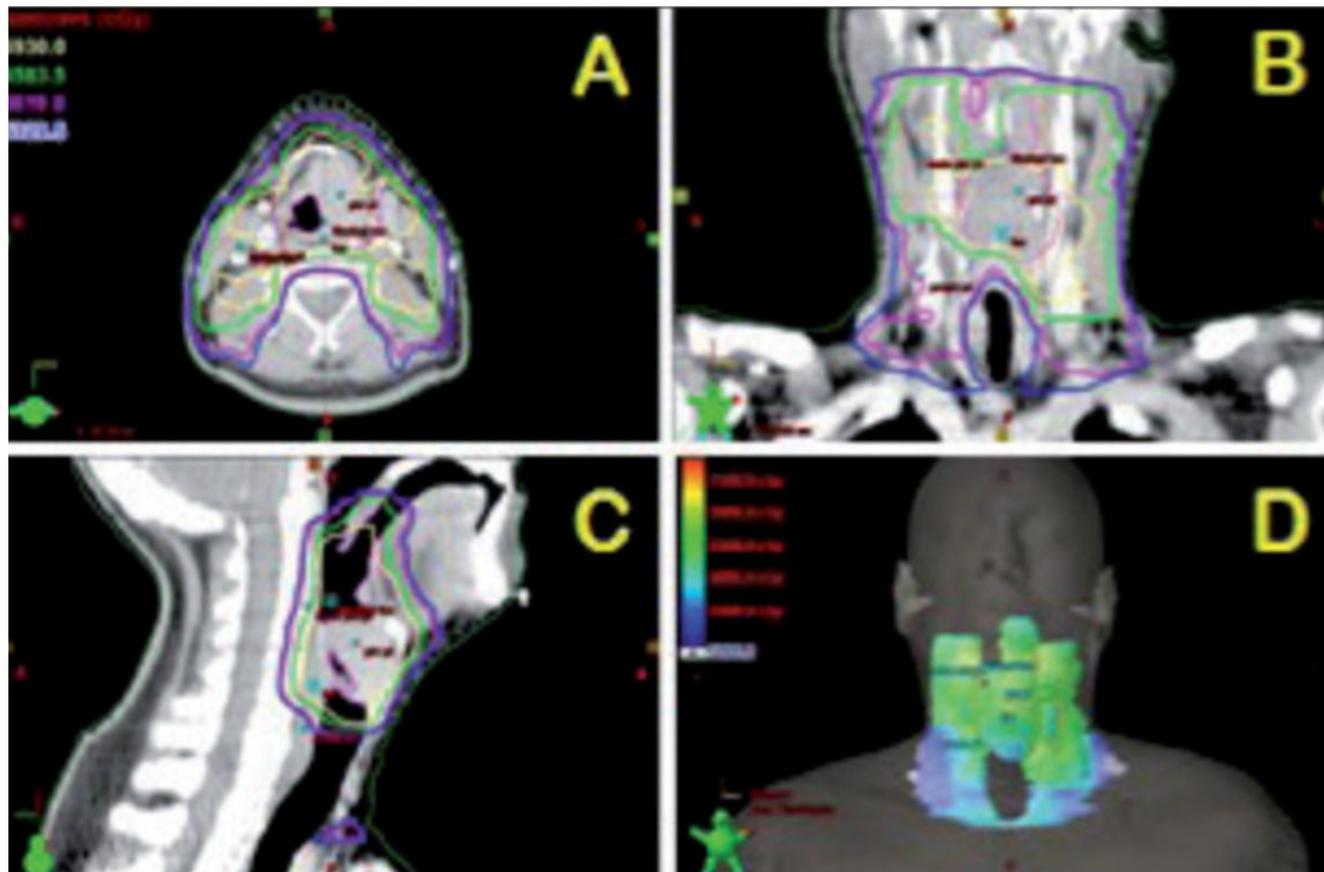


Example of a radiotherapy plan - T2N2cM0 left tonsil



Note areas to be treated include involved cervical lymph nodes and bilateral nodal levels at risk (lower dose)

Sampe radiation dosimetry - T4N2cM0 left supraglottis



Taken from Deng et al 2018:

yellow/green lines - primary tumour site and grossly involved lymph nodes

blue/purple lines - prophylactic dose to uninvolved lymph nodes

Internal lymphoedema

Accumulation of fluid between between mucosa and soft tissue of upper aerodigestive tract

Cheeks, tongue, palate, epiglottis, vallecula, pharyngoepiglottic folds, aryepiglottic folds, arytenoids, false vocal cords, true vocal cords, pyriform sinuses

More prevalent than external lymphoedema in HNC survivors (Gaitatzis 2025) and may persist longer (Jeans et al 2023)

Associated with more severe swallowing impairments in HNC patients (Jeans et al 2021)

Normal vs irradiated larynx



Laryngeal oedema

Related to altered pitch, resonance and quality of voice

Airway patency may be compromised if oedema is severe, necessitating long-term tracheostomy

Nasendoscopic view of larynx one year post radiotherapy for T2N2cM0 left tonsil SCC



Internal lymphoedema and its relationship to swallowing

Space-occupying oedema - reduced capacity of pharynx to hold residue which is then more likely to overspill into airway after the swallow



Assessment: Revised Patterson Edema Scale

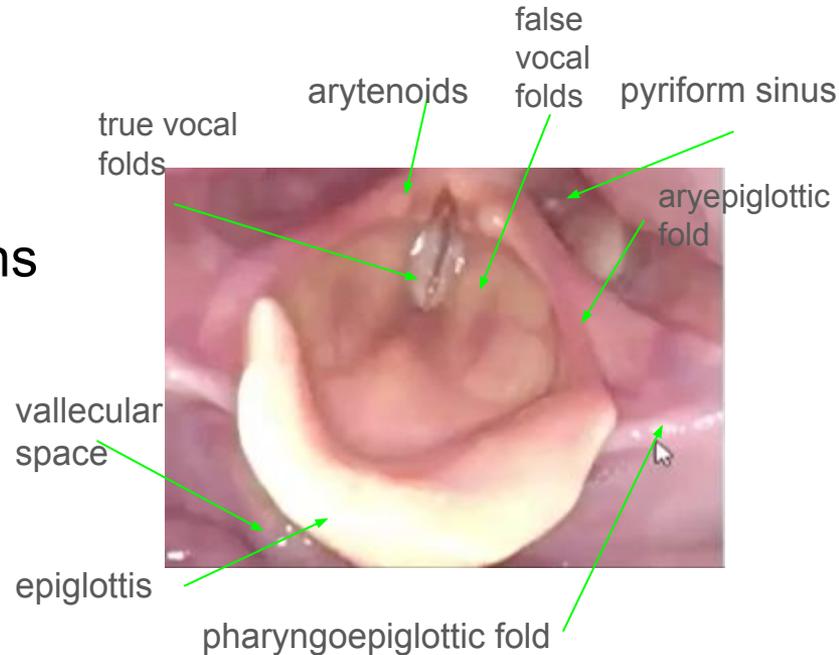
Validated rating scale for internal lymphoedema in HNC patients

Classifies level of oedema in larynx and pharynx based on images and descriptions

Rates eight individual structures/spaces separately (shown opposite)

Assess patient endoscopically while performing specific tasks e/g. voicing/movement

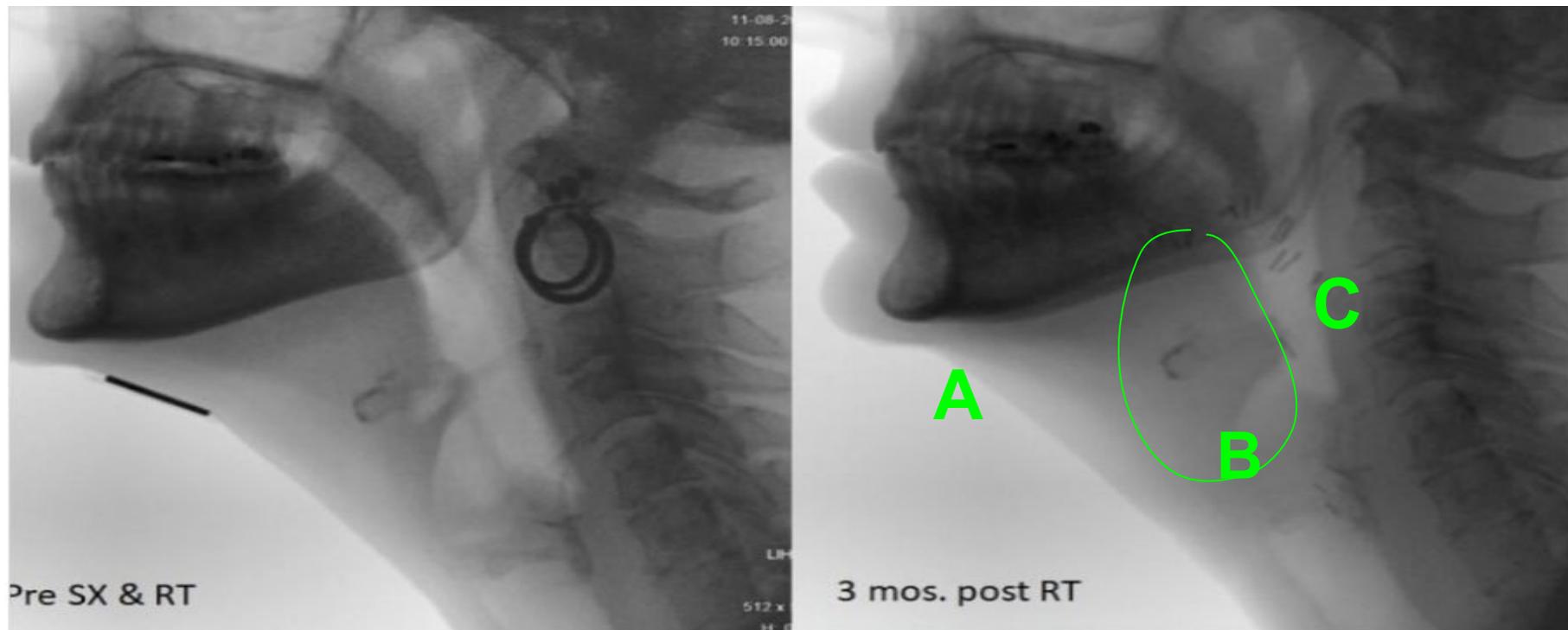
Extract on next slide - rating the epiglottis



Epiglottis

Normal	Mild
 A laryngoscopic view of a normal epiglottis, showing a well-defined, white, crescent-shaped structure with sharp, crisp edges.	 A laryngoscopic view of a mild epiglottitis, showing a white, crescent-shaped structure with some definition to its overall shape and defined edges. The oral surface appears slightly thickened and may be asymmetric.
<p data-bbox="396 437 799 470">Well defined, crisp edges.</p>	<p data-bbox="1002 437 1649 552">Some definition to overall shape. Defined edges. Oral surface maybe slightly thickened. May be asymmetric.</p>
Moderate	Severe
 A laryngoscopic view of a moderate epiglottitis, showing a thickened, white, crescent-shaped structure with thickened edges, still maintaining some curved appearance and recognizable as an epiglottis. It may be asymmetric.	 A laryngoscopic view of a severe epiglottitis, showing a flat, white, horseshoe-shaped structure with very little to no definition of edges. The laryngeal and oral surfaces are severely thickened, and it may be asymmetric.
<p data-bbox="320 932 875 1049">Thickened edges, still some curved appearance, still recognizable as an epiglottis. May be asymmetric</p>	<p data-bbox="979 932 1673 1087">Flat, no curl, horseshoe shaped. Very little to no definition of edges, severely thickened laryngeal and oral surfaces. May be asymmetric.</p>

Pre- and post-radiotherapy



Note in post treatment picture - (A) submental and anterior neck lymphoedema, (B) thickening of laryngeal structures (C) increased bulk of posterior pharyngeal wall

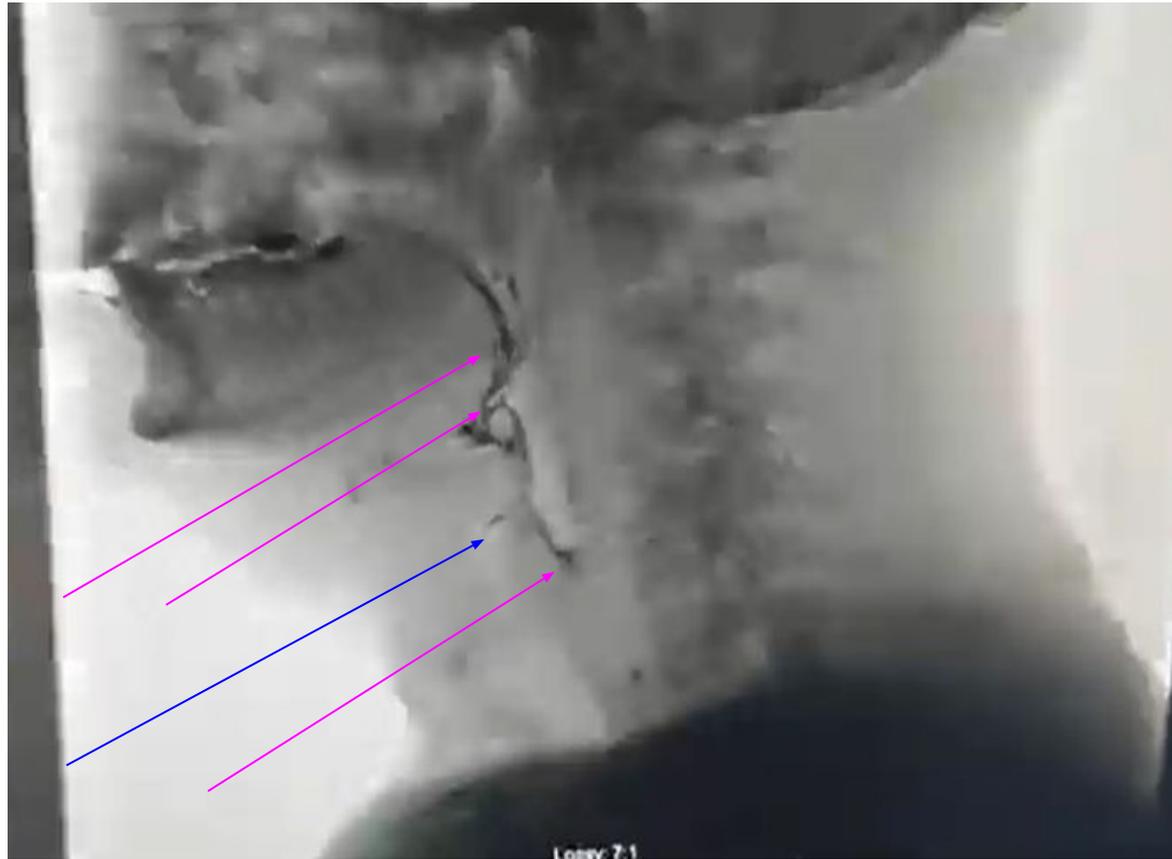
Videofluoroscopy

Post-radiotherapy for
oropharyngeal SCC

External and internal
lymphoedema notable

Pink arrows show
pharyngeal residue of
thin liquid (dark material)

Blue arrow shows trace
amount of liquid in
airway

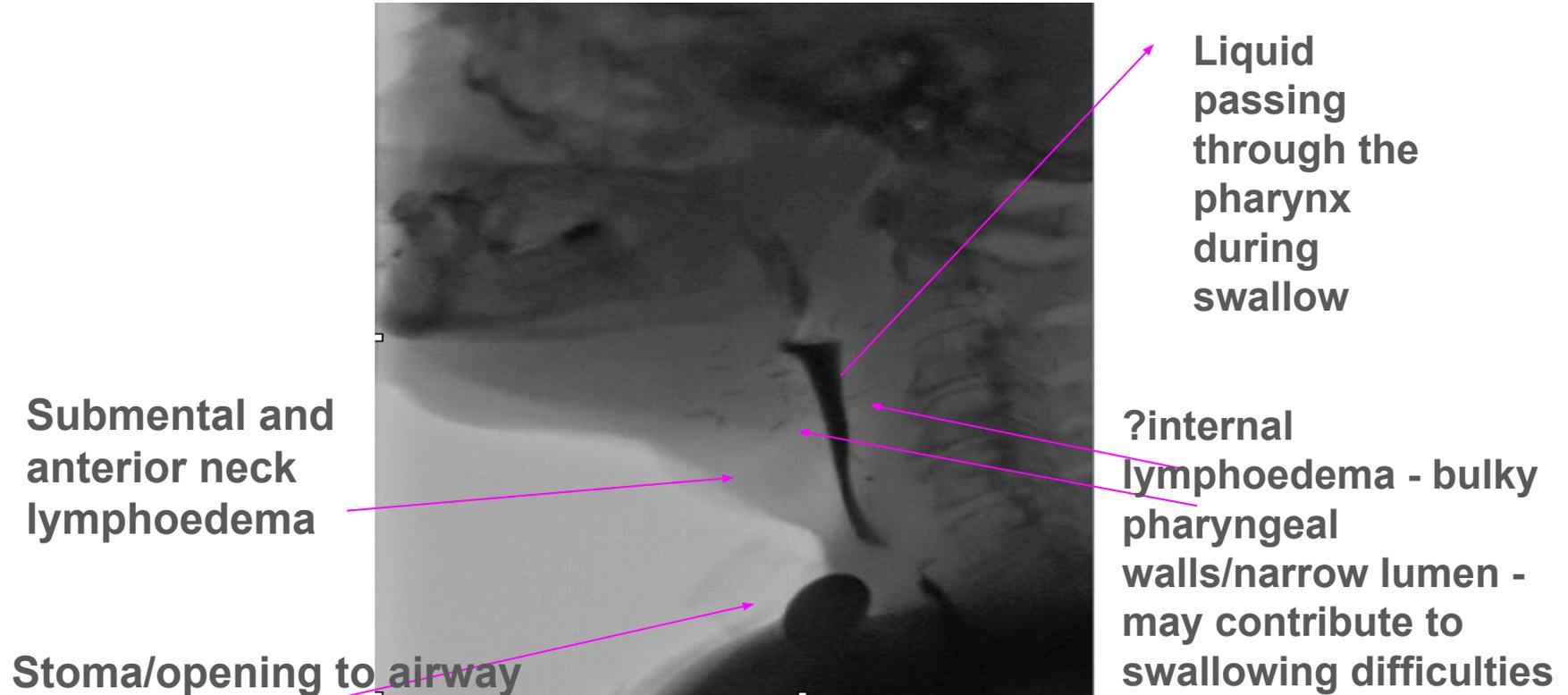


Lymphoedema and laryngectomy



Implications for management of the stoma (airway); may contribute to difficulties with voicing and swallowing

Lymphoedema post-laryngectomy (on videofluoroscopy)



Treatment of internal head & neck lymphoedema

Extremely limited evidence & published guidance for IL specifically...

Complete decongestive therapy principles apply:

- Compression
- Manual lymphatic drainage (including intra-oral)
- Exercise

Muscle contraction aids lymphatic drainage - focus on swallowing activity

Combine external compression/taping with swallowing exercises (Atar et al 2023) ; joint working with SLT and lymphoedema therapist

Surgical options? (emerging area in HN lymphoedema)

Rhotational Ligation (Rosen et al 2021) - more research needed

References

- Roe JW, Carding PN, Dwivedi RC, et al. Swallowing outcomes following intensity modulated radiation therapy (IMRT) for head & neck cancer—a systematic review. *Oral Oncol*. 2010;46:727-733.
- Eisbruch M, Schwartz C, Rasch K, Vineberg E, Damen CJ, Van As CJ, et al. Dysphagia and aspiration after chemoradiotherapy for head-and-neck cancer: which anatomic structures are affected and can they be spared by IMRT? *Int J Radiat Oncol Biol Phys*. 2004;60:1425-1439.
- Homer JJ, Winter SC, Abbey EC, Aga H, Agrawal R, ap Dafydd D, et al. Head and neck cancer: United Kingdom national multidisciplinary guidelines, sixth edition. *J Laryngol Otol*. 2024;138(S1):S1-S224.
- Rajaram J, Lee E, Lok S, Ng S, Yamamoto T. The management of head and neck lymphoedema: a 2025 systematic review. *Head Neck*. 2025;47(10):2897-2910.
- Jeans C, Ward EC, Brown B, Vertigan AE, Pigott AE, Nixon JL, Wratten C, Boggess M. Association between external and internal lymphedema and chronic dysphagia following head and neck cancer treatment. *Head Neck*. 2021 Jan;43(1):255-267
- Gaitatzis K, Thompson B, Blake FT, et al. Patient-reported outcome measures and physical function following head and neck lymphedema—a systematic review. *J Cancer Surviv*. Published online September 26, 2024. doi:10.1007/s11764-024-01683-3

References

- Jeans C, Brown B, Ward EC, Vertigan AE, Pigott AE, Nixon JL, et al. A prospective, longitudinal and exploratory study of head and neck lymphoedema and dysphagia following chemoradiotherapy for head and neck cancer. *Dysphagia*. 2023;38(4):1059-1071.
- Starmer HM, Drinnan M, Bhabra M, Watson LJ, Patterson J. Development and reliability of the revised Patterson Edema Scale. *Clin Otolaryngol*. 2021;46(4):752-757.
- Arends C, de Veij Mestdagh P, Al-Mamgani A, Stuiver M, van der Molen L, van den Brekel M. Severity of internal lymphedema in unilateral or bilateral radiotherapy patients: an exploratory study. *Radiother Oncol*. 2025;206:110834.
- Jeng J, Fleischer AC, Niermann KJ, Bré B, Byram D. Head and neck lymphoedema and fibrosis: a case study. *J Lymphoedema*. 2018;13(1):24-28.
- Deng J, Lukens JN, Swisher-McClure S, et al. Photobiomodulation therapy in head and neck cancer-related lymphedema: a pilot feasibility study. *Integr Cancer Ther*. 2021;20:15347354211037938.
- Atar S, Atar Y, Uygan U, Karaketir SG, Kumral TL, Sari H, et al. The efficacy of Kinesio taping on lymphedema following head and neck cancer therapy: a randomized, double blind, sham-controlled trial. *Physiother Theory Pract*. 2023;39(9):1832-1846.
- Rogacki KR, Teo PT, Gopalakrishnan M, Pachigolla SL, Lyons CE, Abazeed ME, et al. Clinical, pathologic, and dosimetric predictors of head and neck lymphedema following definitive or adjuvant radiation therapy for head and neck cancer. *Adv Radiat Oncol*. 2024;9(9):101545.