Diagnostic Imaging Pathways - Laryngeal Cancer (Staging)

Population Covered By The Guidance

This pathway provides guidance on the staging of adult patients with laryngeal cancer, prior to definitive treatment.

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Date of next review: 2017/2018

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Quick User Guide

Move the mouse cursor over the PINK text boxes inside the flow chart to bring up a pop up box with salient points.
Clicking on the PINK text box will bring up the full text.
The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

Date reviewed: January 2012
Please note that this pathway is subject to review and revision

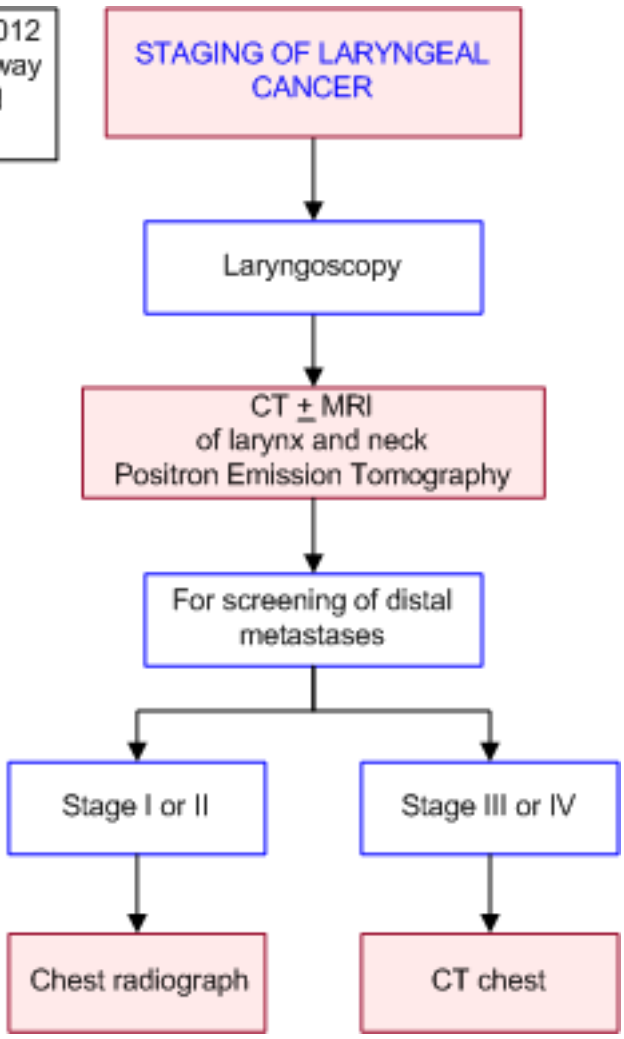
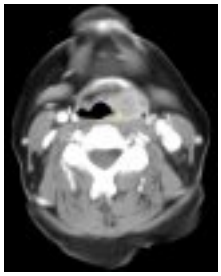


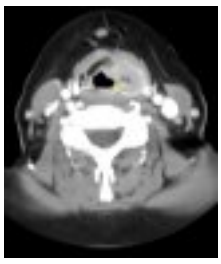
Image Gallery

Note: These images open in a new page

1a



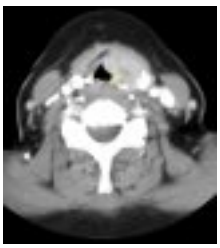
1b



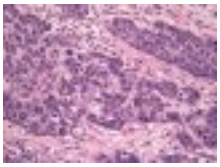
1c

Laryngeal Squamous Cell Carcinoma

Image 1a, b and c (Computed Tomography): There is a 27mm contrast-enhancing mass lesion seen arising from the left piriform fossa showing bony erosion and infiltration of the left thyroid cartilage into the surrounding fat (arrows). The mass lesion shows compression and displacement of the trachea to the right. There is significant lymphadenopathy along the left jugular chain. The largest lymph node measures 12mm in long axis.



2a 

2b 

Laryngeal Squamous Cell Carcinoma

Image 2a (H&E, x2.5) and 2b (H&E, x10): Histological sections of a moderately differentiated squamous cell carcinoma of the larynx. There is ulceration of the mucosa with nests of malignant squamous cells invading into the deep stroma. The malignant cells demonstrate marked nuclear atypia at high power.

Teaching Points

- Squamous cell carcinoma (SCC) accounts for the vast majority of laryngeal malignancies
- Multidetector CT is the first line radiological investigation for staging laryngeal cancer. Cross sectional imaging should be performed in addition to laryngoscopy for the most accurate results
- Screening for metastatic disease is dependant on locoregional staging of disease. In early stage disease, a chest radiograph is sufficient. However, in late stage disease a CT chest is required for accurate detection of metastatic disease

Computed Tomography (CT)

- Most laryngeal squamous cell carcinomas can be directly visualised and biopsied with laryngoscopy. Cross sectional imaging methods such as CT and MRI are used to assess the depth of invasion and extent of nodal involvement 4
- Multidetector CT is the first line imaging investigation for staging laryngeal carcinoma
- The overall staging accuracy for spiral CT alone is between 68 to 80%, with most false negative results found with superficial T1 tumours. Higher accuracy is demonstrated with a combination of clinical examination including laryngoscopy and CT 4,5
- Compared to spiral CT, multidetector CT with its rapid scanning time, high spatial resolution, and multi-planar reformatted images is expected to be more accurate. While further clinical trials are required, one study has shown sensitivity, specificity and accuracy rates of 92%, 100%, and 93% respectively 6
- Direct signs of laryngeal malignancy include presence of a circumscribed tumour mass, infiltration of fatty tissue, muscle, or cartilage, asymmetric soft tissue swelling, abnormal pattern of contrast enhancement. Indirect signs include metastatic cervical lymphadenopathy 4
- Dynamic manoeuvres such as phonation may increase the accuracy of detecting superficial mucosal lesions on CT 7,8
- CT of the chest is indicated if there is a high risk of metastatic disease 2,16,17

Magnetic Resonance Imaging (MRI)

- The goal of cross-sectional imaging is to determine the most appropriate therapeutic approach. Of particular importance is assessing the suitability for partial laryngectomy and/or chemoradiation therapy in an attempt to preserve the voice 1,9
- Contraindications for partial laryngectomy include: evidence of transglottic extension and extra-laryngeal spread of cancer 1,9
- Cartilage invasion has often been suggested as a contraindication to partial laryngectomy, but this was largely based on studies prior to the introduction of computer assisted cross-sectional imaging. One recent study has suggested that minor degrees of cartilage invasion seen on CT or MRI may not be associated with such a poor prognosis as previously thought 10
- Compared to CT, MRI has a similar ability to define the interface between fat and tumour, but is superior for assessing muscle and cartilage invasion 11,12
- MRI is indicated if there are equivocal findings on multidetector CT, including possible cartilage invasion
- Advantages - does not require iodinated contrast, no exposure to ionising radiation, no dental amalgam artifact, superior soft tissue contrast
- Limitations - images may be degraded by motion artifacts caused by breathing and swallowing, limited availability 11

Positron Emission Tomography (PET)

- PET has high accuracy (~90%), and is superior to CT or MRI for detecting malignant lymph nodes 13
- Physiological uptake of FDG into the striated laryngeal muscles is proportional to contractile activity during speech and may cause false positive results 14
- Superior to conventional imaging methods in evaluating patients with suspected disease recurrence, especially those who have previously had radiation therapy 14,15

Staging of Laryngeal Cancer

- The larynx is anatomically divided into three areas; the supraglottis, glottis, and subglottis
- Squamous cell carcinoma (SCC) accounts for the vast majority of laryngeal malignancies 1
- The incidence of SCC is highest in the glottis (60-65%), followed by the supraglottis (30-35%), and subglottis (5%) 2
- Glottic tumours tend to present early, especially if the vocal cords are affected. In contrast, supraglottic tumours are often locally advanced at presentation due to an extensive lymphatic drainage system and lack of symptoms early in the disease process 2
- The American Joint Committee on Cancer (AJCC) has designated clinical staging using the TNM classification as documented below 2
- **TNM Staging of Laryngeal Cancer** 2,3
    - Primary Tumour (T)
        - TX: Primary tumour cannot be assessed
        - T0: No evidence of primary tumour
        - Tis: Carcinoma in situ
        - Supraglottis
            - T1: Tumour limited to one subsite of supraglottis with normal vocal cord mobility
            - T2: Tumour invades mucosa of more than one adjacent subsite* of supraglottis or glottis or region outside the supraglottis (e.g. mucosa of base

of tongue, vallecula, medial wall of pyriform sinus) without fixation of the larynx
- T3: Tumour limited to larynx with vocal cord fixation and/or invades any of the following: postcricoid area, pre-epiglottic tissues, paraglottic space, and/or minor thyroid cartilage erosion (e.g. inner cortex)
- T4a: Tumour invades through the thyroid cartilage, and/or invades tissues beyond the larynx (e.g. trachea, soft tissues of the neck including deep extrinsic muscle of the tongue, strap muscles, thyroid, or esophagus)
- T4b: Tumour invades prevertebral space, encases carotid artery, or invades mediastinal structures. Subsites include the following: ventricular bands (false cords), arytenoids, suprahyoid epiglottis, infrahyoid epiglottis, aryepiglottic folds (laryngeal aspect)

▪ Glottis
- T1: Tumour limited to the vocal cord(s) (may involve anterior or posterior commissure) with normal mobility
- T2: Tumour extends to supraglottis and/or subglottis, and/or with impaired vocal cord mobility
- T3: Tumour limited to the larynx with vocal cord fixation and/or invades paraglottic space, and/or minor thyroid cartilage erosion (e.g. inner cortex)
- T4a: Tumour invades through the thyroid cartilage and/or invades tissues beyond the larynx (e.g. trachea, soft tissues of neck, including deep extrinsic muscle of the tongue, strap muscles, thyroid, or esophagus)
- T4b: Tumour invades prevertebral space, encases carotid artery, or invades mediastinal structures

▪ Subglottis
- T1: Tumour limited to the subglottis
- T2: Tumour extends to vocal cord(s) with normal or impaired mobility
- T3: Tumour limited to larynx with vocal cord fixation
- T4a: Tumour invades cricoid or thyroid cartilage and/or invades tissues beyond the larynx (e.g. trachea, soft tissues of neck, including deep extrinsic muscles of the tongue, strap muscles, thyroid, or esophagus)
- T4b: Tumour invades prevertebral space, encases carotid artery, or invades mediastinal structures

◦ Regional Lymph Nodes (N)
- NX: Regional lymph nodes cannot be assessed (e.g. previously removed)
- N0: No regional lymph node metastasis
- N1: Metastasis in a single ipsilateral lymph node, 3 cm or less in greatest dimension
- N2: Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension, or in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension, or in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension
- N3: Metastasis in a lymph node more than 6 cm in greatest dimension

◦ Distant Metastasis (M)
- MX Distant metastasis cannot be assessed
- M0 No distant metastasis
- M1 Distant metastasis

	STAGE GROUPING	T	N	M
	O	Tis	N0	M0
	I	T1	N0	

				M0
	II	T2	N0	M0
	III	T3	N0	M0
		T1-3	N1	M0
	IV a	T4a	N0-1	M0
		T1-4a	N2	M0
	IV b	T4b	Any N	M0
		Any T	N3	M0
	IV c	Any T	Any N	M1

References

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. Download the document

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