CARCINOMA OF THE LARYNX

MedMentor EDU

ENT STUDY NOTES · HEAD & NECK ONCOLOGY

CARCINOMA OF THE

LARYNX

Anatomy · Pathology · Staging · Management · Rehabilitation

For MBBS · NEET-PG · INI-CET · DNB · Viva Voce

Ref: Dhingra · Ramalingam · Logan Turner

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· Important Diagrams, Radiology & Histopathology (consolidated)

SECTION 1 | Introduction

1.1 Definition

Carcinoma of the larynx is a **malignant epithelial neoplasm arising from the mucosal lining of the larynx**. More than 95–98% are squamous cell carcinomas (SCC). **[IMPORTANT]**

Simplified concept

The larynx is the "voice box" between the pharynx and trachea.

Because the vocal cords produce voice, even a small glottic tumour causes EARLY hoarseness — often detected while still curable.

It is one of the few cancers where cure AND voice preservation are both realistic goals.

1.2 Historical Evolution of Laryngeal Cancer Management

Billroth Laryngectomy

- Theodor Billroth performed the first successful total laryngectomy (Vienna, 1873).
- Established surgical removal as the original curative option for advanced disease.

Organ Preservation Era

- Landmark **VA Larynx Trial (1991)**: induction chemotherapy + radiotherapy preserved the larynx in ~64% without compromising survival vs total laryngectomy.
- **RTOG 91-11 trial** confirmed concurrent chemoradiotherapy as superior for larynx preservation. **[VERY HIGH-YIELD]**

Modern Functional Preservation

- Transoral laser microsurgery (TLM), transoral robotic surgery (TORS).
- Conservation partial laryngectomies (supraglottic, supracricoid).

- Concurrent chemoradiation and targeted therapy — voice, swallow & airway preserved.

1.3 Epidemiology

Global Burden

- Larynx cancer is among the commonest head & neck malignancies worldwide.
- Strong male preponderance (historically M:F ? 4–5:1; narrowing as female smoking rises).
- Peak incidence in the 6th–7th decades.

Indian Scenario

- India has a **high incidence**, particularly in North & Central India, driven by bidi/tobacco and alcohol use. **[IMPORTANT]**
- Frequently presents at an ADVANCED stage due to late referral and low awareness.
- Supraglottic and glottic subsites are both common in Indian series.

Importance in ENT Practice

- Persistent hoarseness > 3 weeks is a red-flag warranting laryngoscopy.
- Early diagnosis dramatically changes prognosis and organ preservation.

SECTION 2 | Surgical Anatomy Relevant to Laryngeal Cancer

The larynx is divided into three tumour-relevant regions — **supraglottis, glottis and subglottis** — each with distinct lymphatic behaviour that governs prognosis and management. **[VERY HIGH-YIELD]**

2.1 Anatomical Subsites

Supraglottis

- Extends from the tip of the epiglottis to the apex of the laryngeal ventricle.
- Includes: epiglottis (suprahyoid + infrahyoid), aryepiglottic folds, arytenoids, false cords (ventricular bands), ventricle.
- Rich **bilateral** lymphatics ? high rate of nodal metastasis.

Glottis

- True vocal cords + anterior and posterior commissures.
- Extends ~1 cm below the free edge of the cords.

- **Sparse lymphatics** ? early glottic cancer rarely metastasizes; best prognosis subsite. **[COMMON MCQ]**

Subglottis

- From the lower boundary of the glottis to the lower border of the cricoid cartilage.
- Drains to prelaryngeal (Delphian) and paratracheal (Level VI) nodes.

Transglottic Region

- Not a true subsite — a tumour crossing the ventricle to involve BOTH supraglottis and glottis.
- Associated with cord fixation, cartilage invasion and poorer prognosis.

2.2 Key Surgical Spaces & Landmarks

Anterior Commissure

- Junction of the two vocal cords anteriorly; tendon of cords inserts here.

Posterior Commissure

- Interarytenoid region; posterior limit of the glottis.

Broyles Ligament

- Anterior commissure tendon inserting into the thyroid cartilage; **devoid of perichondrium** ? a direct conduit for cartilage and extralaryngeal spread. **[FAVORITE EXAM QUESTION]**

Reinke Space

- Potential subepithelial space of the vocal cord (superficial lamina propria); loose, avascular — spread occurs along the cord.

Pre-Epiglottic Space (Boyer space)

- Fat-filled space bounded by hyoid, thyrohyoid membrane and epiglottis.
- Invaded early in **infrahyoid epiglottic** supraglottic cancers ? upstages tumour to T3.

Paraglottic Space

- Fat space lateral to the ventricle; key route of transglottic and submucosal spread; involvement ? T3.

2.3 Laryngeal Cartilages

Thyroid Cartilage

- Largest cartilage; forms the laryngeal prominence; invasion ? T3 (inner cortex) or T4a (through cortex).

Cricoid Cartilage

- The only **complete cartilaginous ring** of the airway; its integrity determines whether conservation surgery is feasible. **[IMPORTANT]**

2.4 Lymphatic Drainage

Subsite	Lymphatics	Nodal levels
Supraglottis	Rich, bilateral	II, III, IV
Glottis	Sparse / almost none	Rare (late)
Subglottis	Moderate	VI (pre/paratracheal), Delphian

2.5 Blood Supply

- Superior laryngeal artery — branch of superior thyroid artery (from external carotid).
- Inferior laryngeal artery — branch of inferior thyroid artery (from thyrocervical trunk).

2.6 Neural Anatomy

- **Superior laryngeal nerve** — external branch ? cricothyroid muscle; internal branch ? sensation above the cords.
- **Recurrent laryngeal nerve** — all intrinsic muscles (except cricothyroid) + sensation below the cords.

2.7 Surgical Implications

- Supraglottic drainage justifies elective bilateral neck treatment.
- Glottic sparse lymphatics allow observation of the N0 neck in early disease.
- Anterior commissure & cartilage status decide organ-preservation feasibility.

SECTION 3 | Epidemiology and Risk Factors

Laryngeal SCC is a **lifestyle-driven cancer**. Tobacco and alcohol account for the overwhelming majority of cases. **[VERY HIGH-YIELD]**

3.1 Tobacco

- The **single most important risk factor**; risk is dose- and duration-dependent. **[FAVORITE EXAM QUESTION]**

Cigarette

- Classic Western risk factor; risk falls after cessation but remains above baseline for years.

Bidi

- Major contributor in India; higher tar/nicotine delivery per gram.

Cigar & Pipe

- Independent risk; more associated with supraglottic/oral sites.

Smokeless Tobacco

- Khaini, gutka, zarda — significant in the Indian subcontinent.

3.2 Alcohol

- Independent risk factor, dose-dependent; strongest link with supraglottic cancer.

Synergism with Tobacco

- Alcohol + tobacco act **synergistically (multiplicative, not additive)** — combined use multiplies risk far beyond the sum of each. **[COMMON MCQ]**

3.3 Occupational Exposure

- Asbestos — fibre inhalation.
- Nickel and nickel refining.
- Wood dust.
- Sulfuric acid mist.
- Other industrial chemicals: mustard gas, polycyclic aromatic hydrocarbons.

3.4 Viral Factors

- **HPV** (esp. type 16) — implicated in a subset; less prominent in larynx than oropharynx.
- **EBV** — weak/uncertain association in laryngeal SCC.

3.5 Nutritional Factors

- Vitamin A and C deficiency — reduced mucosal protection.
- Malnutrition and low fruit/vegetable intake.

3.6 Other Factors

- Laryngopharyngeal reflux (LPR) — chronic acid irritation.
- Prior radiation exposure.
- Genetic susceptibility / p53 mutations.
- Chronic irritation (vocal abuse, chronic laryngitis).
- Immunosuppression (transplant, HIV).

SECTION 4 | Premalignant and Precursor Lesions

These lesions represent a **histological continuum** from reactive change to invasive carcinoma; the degree of dysplasia predicts malignant potential.

4.1 Clinical Precursor Lesions

- **Hyperkeratosis** — thickened keratin layer; low malignant potential.

- **Leukoplakia** — a white patch that cannot be wiped off; a clinical (not histological) term; requires biopsy. [COMMON MCQ]
- **Erythroplakia** — a red velvety patch; HIGHER malignant potential than leukoplakia. [VERY HIGH-YIELD]
- **Pachydermia** — heaped-up epithelial thickening, usually posterior (interarytenoid).

4.2 Dysplasia

- Mild — atypia confined to the lower third of the epithelium.
- Moderate — atypia up to the middle third.
- Severe — atypia in the upper third (approaches full thickness).

WHO Dysplasia Classification

- Traditional 3-tier: mild / moderate / severe dysplasia.
- WHO 2017 simplified binary system: low-grade vs high-grade squamous intraepithelial dysplasia.

4.3 Carcinoma In Situ (CIS)

- Full-thickness epithelial atypia with an **INTACT basement membrane** (no invasion). [FAVORITE EXAM QUESTION]

4.4 Malignant Transformation Risk

Risk gradient

Transformation risk rises with grade of dysplasia.

Severe dysplasia / CIS carry the highest risk of progression to invasive SCC.

Erythroplakia > leukoplakia in malignant potential — biopsy all suspicious patches.

SECTION 5 | Field Cancerization

5.1 Definition

The concept (Slaughter, 1953) that the **entire aerodigestive mucosa is diffusely exposed to carcinogens**, creating a "condemned mucosa" prone to multiple independent primaries. **[IMPORTANT]**

5.2 Pathogenesis

- Chronic carcinogen exposure produces widespread genetic damage across the mucosal field.
- Multiple foci undergo malignant change independently.

5.3 Molecular Basis

- Clonal patches with p53 and other mutations spread laterally across the epithelium.

5.4 Clinical Relevance

- Explains second primaries, multifocal disease and local recurrence after apparently complete excision.

5.5 Second Primary Tumors

- Higher lifetime risk of a **second primary** in lung, oesophagus and head & neck — mandates panendoscopy and lifelong surveillance. **[VERY HIGH-YIELD]**

SECTION 6 | Pathology

6.1 Histological Types

- **Squamous cell carcinoma (SCC)** — >95%; keratin pearls, intercellular bridges. **[VERY HIGH-YIELD]**
- **Verrucous carcinoma** — well-differentiated SCC variant; warty, locally invasive, rarely metastasizes; excellent prognosis. **[COMMON MCQ]**
- **Basaloid SCC** — aggressive, high-grade variant.
- **Spindle cell (sarcomatoid) SCC** — biphasic; polypoid; may mimic sarcoma.
- **Papillary SCC** — exophytic papillary growth; better prognosis.

- Adenocarcinoma — from minor salivary/mucous glands; rare.
- Neuroendocrine tumours — carcinoid, small-cell (aggressive).
- Chondrosarcoma — commonest laryngeal sarcoma, usually from cricoid.
- Lymphoma — rare; from supraglottic lymphoid tissue.
- Sarcoma — rhabdomyosarcoma, fibrosarcoma.
- Metastatic tumours — from kidney, melanoma, lung, breast (rare).

6.2 Histological Grading (Broders)

- Well differentiated — abundant keratinization; resembles normal epithelium.
- Moderately differentiated — intermediate features.
- Poorly differentiated — little keratin; marked pleomorphism; worse prognosis.

6.3 Molecular Biology

- HPV-related cancer — p16 overexpression as surrogate marker.
- EGFR overexpression — target for cetuximab; poorer prognosis.
- p53 mutation — commonest and earliest genetic event in tobacco-related SCC.
- Biomarkers — Ki-67 (proliferation), cyclin D1, EGFR, PD-L1 (immunotherapy).

Histopathology slide — classic SCC

Nests/islands of malignant squamous cells invading stroma.

Keratin pearls (concentric whorls of keratin) — hallmark of well-differentiated SCC.

Intercellular bridges, nuclear pleomorphism, increased mitoses.

SECTION 7 | Classification of Laryngeal Cancer

7.1 Anatomical Classification

- Supraglottic cancer — false cords, epiglottis, aryepiglottic folds, arytenoids.
- Glottic cancer — true vocal cords, anterior/posterior commissure (commonest overall).
- Subglottic cancer — below the cords (rarest).

- Transglottic cancer — spans the ventricle across supraglottis and glottis.

7.2 AJCC 8th Edition TNM Classification

Reading the T stage

Glottic T-stage hinges on cord MOBILITY; supraglottic T-stage hinges on the NUMBER of subsites and fixation.

Cord fixation = T3 (both glottic and supraglottic).

Thyroid/cricoid cortex breach with extralaryngeal spread = T4a.

T Classification — Glottis

T	Glottic tumour
T1	Limited to cord(s), NORMAL mobility (T1a one cord, T1b both cords)
T2	Extends to supraglottis/subglottis and/or IMPAIRED cord mobility
T3	Cord FIXATION and/or paraglottic space / inner thyroid cortex
T4a	Through thyroid cartilage / extralaryngeal (trachea, strap muscles, thyroid, oesophagus)
T4b	Prevertebral space, carotid encasement, mediastinum

T Classification — Supraglottis

T	Supraglottic tumour
T1	One subsite, normal mobility
T2	More than one adjacent subsite / glottis, normal mobility
T3	Cord fixation and/or pre-epiglottic / paraglottic space, inner thyroid cortex
T4a	Through thyroid cartilage / extralaryngeal spread
T4b	Prevertebral / carotid / mediastinum

N Classification (clinical)

N	Regional nodes
N1	Single ipsilateral node ?3 cm, ENE(?)
N2a	Single ipsilateral 3–6 cm, ENE(?)
N2b	Multiple ipsilateral ?6 cm, ENE(?)
N2c	Bilateral / contralateral ?6 cm, ENE(?)
N3a	>6 cm, ENE(?)

N3b	Any node with clinical ENE(+)

- AJCC 8 formally introduced **extranodal extension (ENE)** into N staging. **[VERY HIGH-YIELD]**

M Classification

- M0 — no distant metastasis; M1 — distant metastasis present.

7.3 Stage Grouping

Stage	Grouping
Stage I	T1 N0 M0
Stage II	T2 N0 M0
Stage III	T3 N0, or T1–T3 N1, M0
Stage IVA	T4a N0–N1, or T1–T4a N2, M0
Stage IVB	Any T N3, or T4b any N, M0
Stage IVC	Any T, any N, M1

SECTION 8 | Patterns of Spread

8.1 Local Spread

- Supraglottic spread — upward to vallecula/base of tongue; into pre-epiglottic space.
- Glottic spread — along the cord (Reinke space) to commissures; late vertical spread.
- Subglottic spread — circumferential; early cricoid involvement.
- **Anterior commissure spread —** via Broyles ligament to cartilage and out of the larynx. **[FAVORITE EXAM QUESTION]**
- Posterior commissure spread — to interarytenoid and postcricoid region.
- Pre-epiglottic space invasion — from infrahyoid epiglottis (T3).
- Paraglottic space invasion — key transglottic conduit (T3).

Cartilage Invasion

- Thyroid cartilage — inner cortex (T3) or full-thickness/extralaryngeal (T4a).
- Cricoid cartilage — associated with poorer prognosis; limits conservation surgery.
- Extralaryngeal spread — strap muscles, thyroid gland, trachea, oesophagus.

8.2 Regional Spread

- Nodal metastasis — commonest in supraglottic and advanced glottic cancers.
- **Occult nodal metastasis —** clinically N0 neck with micrometastasis; justifies elective neck treatment in supraglottic cancer. **[COMMON MCQ]**

Neck Node Levels

- Larynx drains mainly to Levels II, III, IV; subglottis to Level VI.

8.3 Distant Spread

- **Lung —** the commonest site of distant metastasis. **[COMMON MCQ]**
- Liver, bone and brain — less common.

8.4 Other Routes

- Perineural spread — along nerves; associated with recurrence.
- Lymphovascular spread — adverse histological feature indicating adjuvant therapy.

Overall Spread of Laryngeal Cancer

Mucosal origin

?

Local: submucosal + spaces (pre-epiglottic / paraglottic)

?

Cartilage invasion (thyroid / cricoid)

?

Regional nodes (levels II–IV, VI)

?

Distant metastasis (LUNG > liver > bone > brain)

SECTION 9 | Supraglottic Carcinoma

9.1 Epidemiology

- Strong association with alcohol; presents late; high nodal metastasis rate.

9.2 Sites

- Epiglottis (commonest supraglottic site), false cords, aryepiglottic folds, arytenoids.

9.3 Clinical Features

- Throat pain, odynophagia, referred otalgia (via CN IX/X), muffled "hot-potato" voice.
- **Hoarseness and neck node appear LATE** ? frequently advanced at diagnosis. **[IMPORTANT]**

9.4 Endoscopic Findings

- Exophytic or ulcerative mass on epiglottis/false cords; may efface the ventricle.

9.5 Spread Pattern

- Into pre-epiglottic space, vallecula, base of tongue; bilateral lymphatics.

9.6 Nodal Metastasis

- **High incidence** (up to 30–50%), often BILATERAL — mandates elective bilateral neck treatment. **[VERY HIGH-YIELD]**

9.7 Diagnosis

- Laryngoscopy + biopsy; CT/MRI for pre-epiglottic space and cartilage.

9.8 Treatment

- Early (T1–T2): radiotherapy or supraglottic (horizontal) laryngectomy / TLM.
- Advanced: chemoradiation (organ preservation) or total laryngectomy + neck dissection.

9.9 Prognosis

- Poorer than glottic due to late presentation and nodal spread.

SECTION 10 | Glottic Carcinoma

10.1 Epidemiology

- The **commonest subsite of laryngeal cancer**; strongly linked to smoking; best prognosis. **[VERY HIGH-YIELD]**

10.2 Clinical Features

Early Hoarseness

- Hoarseness is the **EARLIEST and commonest symptom** — any hoarseness > 3 weeks needs laryngoscopy. **[FAVORITE EXAM QUESTION]**

Vocal Cord Mobility

- Normal mobility ? T1.
- Impaired mobility ? T2.
- Fixed cord ? T3.

10.3 Endoscopic Findings

- Rough, thickened or exophytic lesion, usually on the anterior half / free edge of the cord.

10.4 Spread Pattern

- Along the cord to commissures; anterior commissure ? cartilage; vertical spread is late.

10.5 Diagnosis

- Videolaryngostroboscopy, microlaryngoscopy + biopsy; CT for cartilage in advanced cases.

10.6 Treatment

- T1–T2: TLM (endoscopic cordectomy) OR radiotherapy — comparable cure, voice-driven choice.
- T3: chemoradiation (organ preservation) or partial/total laryngectomy.
- T4a: total laryngectomy + adjuvant RT ± chemo.

10.7 Prognosis

- **Excellent for early glottic cancer** — T1 cure rates 90–95% due to early symptoms and sparse lymphatics.

SECTION 11 | Subglottic Carcinoma

11.1 Epidemiology

- The **RAREST** laryngeal subsite; often diagnosed late.

11.2 Clinical Features

- Progressive stridor and dyspnoea (airway narrowing); hoarseness only when cords involved.

11.3 Spread Pattern

- Circumferential; early cricoid invasion; to paratracheal (Level VI) nodes and thyroid gland.

11.4 Diagnosis

- Laryngoscopy (subglottis hard to see), CT neck/chest, biopsy.

11.5 Treatment

- Total laryngectomy (often with paratracheal node clearance ± thyroidectomy) ± RT; RT for early lesions.

11.6 Prognosis

- Poor — late presentation and early cartilage/nodal involvement.

SECTION 12 | Transglottic Carcinoma

12.1 Definition

A tumour that **crosses the laryngeal ventricle** to involve both the supraglottis and glottis, typically via the paraglottic space.

12.2 Clinical Features

- Hoarseness + airway symptoms; frequent cord fixation.

12.3 Spread Pattern

- Paraglottic space spread, cartilage invasion, higher nodal metastasis.

12.4 Treatment

- Usually advanced ? total laryngectomy + neck dissection ± chemoradiation; conservation surgery rarely suitable.

12.5 Prognosis

- Poor due to cartilage invasion and nodal disease.

SECTION 13 | Anterior Commissure Cancer

13.1 Anatomy

- Cords insert here via the **Broyles ligament**, which lacks perichondrium — a weak point for cartilage spread. **[IMPORTANT]**

13.2 Routes of Spread

- Contralateral cord, subglottis, and thyroid cartilage via Broyles ligament.

13.3 Prognostic Significance

- **Anterior commissure involvement worsens local control** and increases recurrence after RT or endoscopic surgery. **[VERY HIGH-YIELD]**

13.4 Management

- Careful endoscopic assessment; TLM with clear margins, RT, or open partial laryngectomy; adequate exposure is essential.

SECTION 14 | Clinical Features

14.1 Symptoms

- **Hoarseness** — earliest in glottic cancer; red-flag if > 3 weeks. **[FAVORITE EXAM QUESTION]**
- Dysphagia — supraglottic/advanced disease.
- Odynophagia — painful swallowing.
- Foreign body sensation in throat.
- Cough (may be irritant or with aspiration).
- Haemoptysis — blood-streaked sputum in advanced disease.
- Neck mass — nodal metastasis (may be presenting feature in supraglottic).
- Stridor — advanced airway obstruction (emergency).
- Weight loss — advanced/systemic disease.
- **Referred otalgia** — via the vagus (Arnold nerve) — a classic supraglottic clue. **[COMMON MCQ]**

14.2 Signs

- Cord fixation — indicates deep invasion (T3).
- Palpable neck node.
- Airway obstruction / stridor.
- Endoscopic findings — mass, ulceration, restricted mobility, pooling of saliva.

SECTION 15 | Investigations

15.1 Endoscopic Evaluation

- Flexible laryngoscopy — OPD assessment of mucosa and cord mobility.
- Videolaryngoscopy — documented, magnified view.
- **Stroboscopy** — assesses the mucosal wave; loss of wave suggests invasion of deeper layers.
- Direct laryngoscopy (under GA) — full assessment and mapping.
- Microlaryngoscopy — magnified precise biopsy and TLM.

15.2 Tissue Diagnosis

- **Biopsy** — the DEFINITIVE diagnostic step (histopathology confirms SCC). **[VERY HIGH-YIELD]**
- FNAC — of a palpable neck node for cytological confirmation.

15.3 Imaging

- CT scan (contrast) — cartilage invasion, deep spread, nodes.
- MRI — soft tissue, pre-epiglottic/paraglottic spaces, early cartilage invasion.
- PET-CT — distant metastasis, second primaries, post-treatment residual disease.
- Chest imaging (X-ray/CT) — lung metastasis and second primary.

15.4 Panendoscopy

- **Panendoscopy** (laryngoscopy + oesophagoscopy + bronchoscopy) screens for **synchronous second primaries** (field cancerization). **[IMPORTANT]**

SECTION 16 | Imaging of Laryngeal Cancer

16.1 CT Findings

- Best for cartilage invasion (sclerosis, erosion, extralaryngeal soft tissue), fast, evaluates nodes.

16.2 MRI Findings

- Superior soft-tissue contrast; sensitive for early cartilage invasion but may overstage (inflammation).

16.3 PET-CT Findings

- Detects distant metastasis, occult second primaries, and post-chemoradiation residual/recurrent disease.

16.4 Assessment Priorities

- **Cartilage invasion assessment —** decides T3 vs T4a and conservation feasibility.
- Extralaryngeal spread assessment — strap muscles, thyroid, trachea.
- Nodal assessment — size, necrosis, extranodal extension.

Radiology figures to know

Contrast CT axial — thyroid cartilage sclerosis/erosion in T3–T4a glottic cancer.

CT/MRI — obliteration of pre-epiglottic (fat) space in supraglottic cancer.

PET-CT — FDG-avid primary and nodal / distant deposits.

SECTION 17 | Treatment Principles

17.1 Multidisciplinary Team Approach

- Tumour board: ENT/head-neck surgeon, radiation oncologist, medical oncologist, radiologist, pathologist, speech therapist, dietician.

17.2 Organ Preservation

- **Concurrent chemoradiotherapy** preserves the larynx in advanced disease without compromising survival (RTOG 91-11). **[VERY HIGH-YIELD]**

17.3 Functional Preservation

- Preserve voice, swallowing and airway using TLM, TORS and conservation partial laryngectomy where oncologically safe.

17.4 Curative vs Palliative Intent

- Curative — early/locally advanced disease amenable to definitive treatment.
- Palliative — metastatic or unresectable disease; focus on airway, nutrition and comfort.

Broad Treatment Algorithm

Confirmed laryngeal SCC + full staging

?

Early (T1–T2 N0): single modality — TLM / RT

?

Locally advanced (T3, selected T4): chemoradiation (organ preservation) OR surgery

?

Advanced destructive T4a: total laryngectomy + adjuvant RT ± chemo

?

Metastatic / unresectable: systemic therapy + palliation

SECTION 18 | Surgical Management

18.1 Endoscopic Surgery

- **Transoral laser microsurgery (TLM)** — CO? laser excision; preferred for early glottic/supraglottic cancer; excellent voice/airway.

ELS Cordectomy Classification (European Laryngological Society)

Type	Cordectomy
Type I	Subepithelial — epithelium only
Type II	Subligamental — up to vocal ligament
Type III	Transmuscular — through vocalis muscle
Type IV	Total cordectomy
Type V	Extended (Va commissure, Vb arytenoid, Vc subglottis, Vd contralateral cord)
Type VI	Anterior commissurectomy with bilateral anterior cordectomy

- **Transoral robotic surgery (TORS)** — robot-assisted resection, chiefly for selected supraglottic tumours.

18.2 Partial Laryngectomy

- Vertical partial laryngectomy — for selected glottic cancers with limited spread.
- Frontolateral laryngectomy — anterior cord + anterior commissure.
- **Supraglottic (horizontal) laryngectomy** — removes supraglottis above the ventricle, preserving cords/voice; needs good pulmonary reserve.

Supracricoid Laryngectomy

- CHEP — cricohyoidoepiglottopexy (preserves epiglottis).
- CHP — cricohyoidopexy (epiglottis removed).
- Hemilaryngectomy — removal of one vertical half of the larynx.

18.3 Near Total Laryngectomy

- Pearson technique — preserves a dynamic phonatory shunt on the uninvolved side.
- Functional shunt — allows lung-powered voice while removing most of the larynx.

18.4 Total Laryngectomy

Indications

- T4a with extensive cartilage/extralaryngeal spread; extensive transglottic/subglottic disease.
- Radiation failure (salvage); non-functional larynx after chemoradiation.

Surgical Principles

- The whole larynx is removed and the airway is diverted to a **permanent end tracheostome**; the airway and food passage are permanently separated. **[IMPORTANT]**

Complications

- Pharyngocutaneous fistula (commonest), stomal stenosis, dysphagia, hypothyroidism, carotid blowout.

18.5 Salvage Laryngectomy

- Indications — recurrent/persistent disease after definitive (chemo)radiation.
- Outcomes — higher fistula rates; salvage nonetheless offers cure in selected patients.

SECTION 19 | Neck Dissection

- Selective neck dissection — clears levels at risk (usually II–IV) in the N0 supraglottic neck.
- Modified radical neck dissection — clears levels I–V, preserving one or more of IJV, SCM, CN XI.
- Radical neck dissection — removes levels I–V + IJV + SCM + CN XI (for bulky nodal disease).
- Bilateral neck dissection — for midline/supraglottic tumours with bilateral drainage.

19.1 Indications

- **Clinically positive nodes**; elective dissection for high occult-risk necks (supraglottic, advanced T). **[COMMON MCQ]**

SECTION 20 | Radiotherapy

20.1 Principles

- External beam RT (IMRT) delivers tumouricidal dose while sparing normal tissue; preserves voice in early cancer.

20.2 Early Cancer

- **T1–T2 glottic** — RT gives cure comparable to TLM with good voice outcomes.

20.3 Advanced Cancer

- Combined with chemotherapy (concurrent chemoradiation) for organ preservation.

20.4 Adjuvant RT

- **Post-operative RT/CRT** for adverse features: positive margins, extranodal extension, multiple nodes, perineural/lymphovascular invasion. **[VERY HIGH-YIELD]**

20.5 Toxicities

- Mucositis, xerostomia, laryngeal oedema, dysphagia, chondronecrosis, hypothyroidism, dysgeusia.

SECTION 21 | Chemotherapy

- Induction (neoadjuvant) chemotherapy — before definitive treatment; assesses response and shrinks tumour (larynx preservation selection).
- **Concurrent chemoradiotherapy** — cisplatin with RT; the standard organ-preservation regimen for advanced disease. **[VERY HIGH-YIELD]**
- Palliative chemotherapy — metastatic/recurrent disease not amenable to local treatment.

21.1 Common Regimens

- Cisplatin — the backbone agent (radiosensitizer).
- 5-Fluorouracil (5-FU) — often combined with cisplatin.
- **Taxanes** (docetaxel/paclitaxel) — the **TPF regimen** (docetaxel + cisplatin + 5-FU) for induction.

SECTION 22 | Targeted Therapy and Immunotherapy

- **Cetuximab** — anti-EGFR monoclonal antibody; with RT for patients unfit for cisplatin.
- **Pembrolizumab** — anti-PD-1; first-line/subsequent for recurrent-metastatic disease (PD-L1 guided).
- **Nivolumab** — anti-PD-1; for platinum-refractory recurrent/metastatic HNSCC.

22.1 Current Indications

- Recurrent/metastatic disease; radiosensitization when platinum contraindicated (cetuximab).

SECTION 23 | Stage-wise Management

Stage	Preferred approach
Stage I	Single modality — TLM / cordectomy OR radiotherapy
Stage II	Single modality — TLM / partial laryngectomy OR RT
Stage III	Concurrent chemoradiation (organ preservation) OR surgery + adjuvant RT
Stage IV	T4a ? total laryngectomy + adjuvant CRT; other T4 ? CRT ± surgery
Recurrent	Salvage laryngectomy ± neck dissection; re-irradiation in selected cases

Metastatic	Palliative systemic therapy (chemo / immunotherapy) + supportive care

Decision rule

A DESTROYED / non-functional larynx (extensive T4a, cartilage destruction) ? total laryngectomy, not organ preservation.

A FUNCTIONAL larynx amenable to cure ? prefer organ-preserving chemoradiation.

SECTION 24 | Post-Laryngectomy Rehabilitation

- Voice rehabilitation — restore communication (esophageal, tracheoesophageal, electrolarynx).
- Swallow rehabilitation — SLT-guided swallowing therapy; manage stricture/dysphagia.
- Nutritional rehabilitation — high-protein diet, feeding support, correct weight loss.
- Psychological rehabilitation — counselling for altered body image, depression, loss of natural voice.
- Social rehabilitation — support groups, stoma care education, family involvement.
- Occupational rehabilitation — return to work with voice/airway adaptations.

SECTION 25 | Speech Rehabilitation

25.1 Methods

- Esophageal speech — patient swallows/injects air and eructates it to vibrate the pharyngoesophageal segment; no device but hard to learn.
- **Tracheoesophageal (TE) speech —** via a voice prosthesis; the **gold-standard, best-quality laryngectomy voice**. **[VERY HIGH-YIELD]**
- Electrolarynx — external hand-held vibrating device; robotic quality but easy and reliable.

25.2 Voice Prosthesis

- Blom-Singer prosthesis.
- Provox prosthesis.
- **Mechanism —** a one-way valve in a tracheoesophageal puncture (TEP) shunts lung air into the oesophagus to produce voice while preventing aspiration.

Indications

- Motivated patient after total laryngectomy with adequate pharyngoesophageal segment.

Care

- Regular cleaning, periodic replacement, candida management.

Complications

- Leakage (through/around prosthesis), aspiration, granulation, dislodgement, candida colonization.

SECTION 26 | Complications

26.1 Disease-Related

- Airway obstruction — from bulky tumour (may need emergency tracheostomy).
- Aspiration — supraglottic/advanced disease.
- Recurrence — local, regional or distant.
- Metastasis — commonly to lung.

26.2 Postoperative

- **Pharyngocutaneous fistula** — the commonest complication after total/salvage laryngectomy (higher after prior RT). **[FAVORITE EXAM QUESTION]**
- Stomal stenosis — narrowing of the tracheostome.
- Dysphagia — from pharyngeal stricture.
- Prosthesis problems — leakage, dislodgement, candida.

Carotid blowout — surgical emergency

Rupture of the carotid artery, usually from fistula, infection, tumour erosion or prior radiation.

A "herald bleed" (sentinel small bleed) may precede catastrophic haemorrhage.

Manage airway, control haemorrhage, resuscitate and obtain emergency vascular/IR control.

SECTION 27 | Follow-up and Surveillance

27.1 Follow-up Schedule

- Intensive early: every 1–3 months in year 1, 2–4 months in year 2, then 4–6 monthly to year 5, annually thereafter.
- Most recurrences occur within the first 2–3 years.

27.2 Detection of Recurrence

- Serial endoscopy, imaging (CT/MRI/PET-CT), and evaluation of new symptoms.

27.3 Multiple Primaries

- Synchronous primary — a second cancer diagnosed within 6 months of the index tumour.
- Metachronous primary — a second cancer diagnosed after 6 months.
- **Second primary tumours** — a lifelong risk (field cancerization); lung and oesophagus require ongoing screening. [IMPORTANT]

SECTION 28 | Palliative Care

- Airway care — tracheostomy/stenting to relieve obstruction.
- Nutritional support — feeding tube/gastrostomy for dysphagia.
- Pain management — WHO analgesic ladder, opioids.
- End-of-life care — symptom control, psychological and family support, hospice input.

SECTION 29 | Prevention

- **Tobacco cessation** — the single most effective preventive measure. [VERY HIGH-YIELD]
- Alcohol reduction — lowers risk, especially with concurrent tobacco use.
- HPV prevention — vaccination reduces HPV-related head & neck cancers.
- Early detection — evaluate hoarseness > 3 weeks; treat precancerous lesions.

SECTION 30 | Prognosis

30.1 Prognostic Factors

- Stage — the single most important prognostic factor.
- **Site** — glottic (best) > supraglottic > subglottic/transglottic (worst).
- Nodal status — presence and extranodal extension worsen outcome markedly.
- Cartilage invasion — indicates advanced disease and poorer control.
- Histological grade — poorly differentiated tumours fare worse.

30.2 Survival Rates (indicative 5-year)

Setting	Approx. 5-year survival
Early glottic (T1)	90–95%
Early supraglottic	~70–80%
Advanced (Stage III–IV)	~30–50%
Subglottic (late)	Poor (<40%)

SECTION 31 | High-Yield Exam Facts

MUST-KNOW ONE-LINERS

Commonest site of laryngeal cancer = GLOTTIS.

Commonest histology = squamous cell carcinoma (>95%).

Earliest symptom of glottic cancer = HOARSENESS.

Best prognosis subsite = glottis (sparse lymphatics, early symptoms).

Worst / rarest subsite = subglottis.

Verrucous carcinoma = well-differentiated SCC; locally invasive, rarely metastasizes.

Broyles ligament = anterior commissure tendon; NO perichondrium ? cartilage spread.

Pre-epiglottic space invasion = T3.

Cord fixation = T3; through-cartilage/extralaryngeal = T4a.

Commonest distant metastasis = LUNG.

Commonest post-laryngectomy complication = pharyngocutaneous fistula.

Best laryngectomy voice = tracheoesophageal (voice prosthesis).

First total laryngectomy = Billroth (1873).

Organ-preservation landmark = RTOG 91-11 (concurrent chemoradiation).

AJCC 8 added extranodal extension (ENE) to N staging.

31.1 Viva Questions

- Why does glottic cancer present early? — Cords produce voice ? early hoarseness + sparse lymphatics.
- Why is supraglottic cancer more likely to metastasize? — Rich bilateral lymphatics.
- What is field cancerization? — Diffuse carcinogen-exposed mucosa prone to multiple primaries (Slaughter).
- Which space involvement upstages supraglottic cancer to T3? — Pre-epiglottic space.
- What decides organ preservation vs total laryngectomy? — Laryngeal function & cartilage destruction.

SECTION · | Important Diagrams / Figures

Anatomy Diagrams

- Sagittal section of the larynx — supraglottis, glottis, subglottis divisions.
- Coronal section — pre-epiglottic and paraglottic spaces, ventricle.
- Anterior commissure with Broyles ligament insertion.
- Lymphatic drainage map of the larynx (levels II–IV, VI).

Pathology Diagrams

- Dysplasia continuum — mild ? moderate ? severe ? carcinoma in situ.
- Field cancerization — "condemned mucosa" concept diagram.

Surgical Diagrams

- ELS cordectomy Types I–VI (extent of resection).
- Supraglottic (horizontal) laryngectomy — resection plane.
- Supracricoid laryngectomy — CHEP vs CHP.
- Total laryngectomy — end tracheostome and neopharynx closure.
- Tracheoesophageal puncture with voice prosthesis in situ.

SECTION · | Important Radiology Images

- Contrast CT axial — thyroid cartilage sclerosis/erosion (T3–T4a).
- CT/MRI — obliteration of pre-epiglottic fat space (supraglottic cancer).
- MRI — paraglottic space and soft-tissue extent.
- PET-CT — FDG-avid primary, nodal and distant deposits.
- CT chest — lung metastasis / synchronous second primary.

SECTION · | Important Endoscopy Images

- Flexible laryngoscopy — exophytic glottic cord lesion; impaired mobility.
- Videostroboscopy — loss of mucosal wave over the tumour.
- Supraglottic mass on/around the epiglottis and false cords.

SECTION · | Important Histopathology Slides

Slides to recognise

Well-differentiated SCC — keratin pearls + intercellular bridges.

Carcinoma in situ — full-thickness atypia with INTACT basement membrane.

Verrucous carcinoma — pushing, bulbous rete pegs; minimal atypia.

Basaloid / spindle cell SCC — aggressive variant morphology.

SECTION · | Master Comparison Tables

Glottic vs Supraglottic vs Subglottic Cancer

Feature	Glottic	Supraglottic	Subglottic
Frequency	Commonest	Common	Rarest
Lymphatics	Sparse	Rich (bilateral)	Moderate
Nodal spread	Late/rare	Early/common	Paratracheal
Early symptom	Hoarseness	Throat pain/dysphagia	Stridor
Prognosis	Best	Intermediate	Poor

Radiotherapy vs Surgery (Early Glottic)

Feature	Radiotherapy	TLM / Surgery
Cure (T1)	High (~90%)	High (~90%)
Voice	Often good	Depends on extent
Duration	Several weeks	Single procedure
Salvage	Surgery later	RT still available
Re-treatment	Limited (once)	Repeatable

Esophageal vs TE Speech vs Electrolarynx

Feature	Esophageal	TE speech	Electrolarynx
Device	None	Voice prosthesis	External devic
Voice quality	Fair	Best	Robotic
Learning	Difficult	Moderate	Easy

Aspiration risk	Nil	Prevented by valve	Nil

Leukoplakia vs Erythroplakia

Feature	Leukoplakia	Erythroplakia
Appearance	White patch	Red velvety patch
Malignant risk	Lower	HIGHER
Action	Biopsy	Biopsy (urgent)

SECTION · | Rapid Revision Exam Pearls

ANATOMY & PATHOLOGY

Three subsites: supraglottis, glottis, subglottis; transglottic crosses the ventricle.

Glottis = sparse lymphatics = best prognosis; supraglottis = rich bilateral lymphatics.

Pre-epiglottic (Boyer) & paraglottic space invasion = T3.

Broyles ligament (anterior commissure) lacks perichondrium ? cartilage spread.

>95% SCC; verrucous = indolent variant; p53 = earliest mutation.

STAGING & MANAGEMENT

Glottic T-stage = cord mobility; supraglottic T-stage = subsites + fixation.

Cord fixation = T3; extralaryngeal/through-cartilage = T4a; AJCC 8 adds ENE.

Early (T1–T2): TLM or RT (single modality).

Advanced functional larynx: concurrent chemoradiation (RTOG 91-11).

Destroyed larynx / extensive T4a: total laryngectomy + adjuvant CRT.

Adjuvant CRT for +margins or extranodal extension.

COMPLICATIONS & REHAB

Commonest metastasis = lung; commonest post-op complication = pharyngocutaneous fistula.

Carotid blowout — herald bleed warns; surgical emergency.

Best voice restoration = tracheoesophageal (Blom-Singer / Provox).

Lifelong surveillance for second primaries (field cancerization).

Tobacco cessation = most effective prevention.

End of Carcinoma of the Larynx — Study Notes

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