

Carcinoma of the Larynx

Squamous carcinogenesis, morphology and clinicopathologic interpretation

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Learning outcomes

- Recognize the predominantly squamous histology and its characteristic risk profile.
- Explain the hyperplasia–dysplasia–carcinoma sequence and the meaning of invasion.
- Describe gross and microscopic appearances of laryngeal carcinoma.
- Connect clinical symptoms and stage with management and prognosis.

The central disease entity

Squamous cell carcinoma

- Laryngeal carcinoma is predominantly squamous cell carcinoma (SCC).
- It occurs classically in adults with chronic exposure to tobacco smoke.
- The disease links epithelial injury, neoplastic transformation and impaired laryngeal function.

How predominant is squamous histology?

$\approx 95\%$

- That about 95% of laryngeal carcinomas are SCCs.
- Laryngeal SCC therefore anchors the pathology of malignant laryngeal tumors.
- The remaining fraction is not further classified in the cited passage.

Anatomic regions orient the pathology

SUPRAGLOTTIC

Epiglottis / aryepiglottic folds

GLOTTIC

True vocal cords

SUBGLOTTIC

Below the cords

Vocal cords are the dominant site

True vocal cords

- Most laryngeal SCCs arise on the vocal cords.
- Small surface lesions here may alter the voice before becoming bulky.
- Site description is important when correlating morphology with presentation.

Origins above, at and below the cords

Region	Site concept	Pathologic relevance
Above the cords	Supraglottic region	Epiglottis and aryepiglottic folds are mentioned
At the cords	Glottic region	True vocal cords: commonest origin
Below the cords	Subglottic region	Laryngeal carcinoma can also arise here

Pyriform sinus involvement: Anatomic caution

- The pyriform sinus among sites involved by tumors in the laryngeal region.
- Anatomically, the pyriform sinus belongs to the hypopharynx rather than the larynx proper.
- In clinical and pathologic descriptions, distinguish the site of origin from extension to adjacent mucosa.

Typical age at presentation

Sixth decade

- The sixth decade of life as the commonest presenting period.
- The overview characterizes affected patients as adult chronic smokers.
- The chapter's summary notes a predominance in older males.

Tobacco exposure is the principal etiologic link



This is a conceptual teaching pathway; The cited section establishes smoking-related risk and epithelial progression, not a quantified molecular mechanism.

Smoking risk rises with exposure

Dose–risk association

- Laryngeal carcinoma is most often related to tobacco smoke.
- Risk is proportional to exposure.
- An exposure history is therefore central when evaluating a suspicious laryngeal lesion.

Alcohol amplifies tobacco-associated risk



The source says alcohol synergizes with tobacco; Diagram does not quantify the interaction.

Additional risk modifiers

- Nutritional factors are listed as contributors to cancer risk.
- Asbestos exposure and prior irradiation are also listed.
- High-risk human papillomavirus (HPV) infection is recognized as an additional risk factor.
- The supplied passage does not assign a specific proportion of cases to these exposures.

Smoking cessation before malignant change

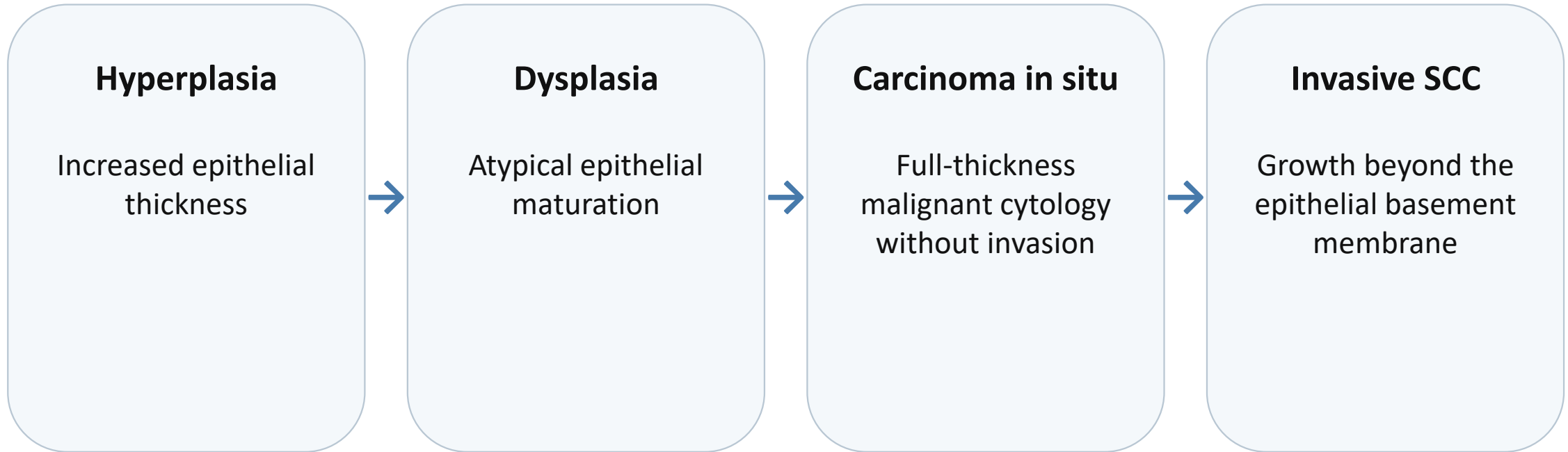


Source qualification: Epithelial changes frequently regress BEFORE malignant transformation; This does not imply established carcinoma regresses with cessation.

Chronic laryngitis is relevant context

- Laryngitis may accompany heavy exposure to tobacco smoke.
- Persistent irritation can promote squamous epithelial metaplasia.
- This background of smoking-related mucosal change to laryngeal carcinoma.

Multistep squamous carcinogenesis



Definitions for in situ and invasion are general histopathologic interpretation of the source sequence.

Hyperplasia is not equivalent to cancer

- Hyperplasia denotes an increased epithelial cell population or thickness.
- Non-dysplastic hyperplasia has almost no potential for malignant transformation in the Robbins passage.
- The presence or absence of dysplasia alters interpretation more than surface thickness alone.

Hyperplasia versus dysplasia

Feature	Nondysplastic hyperplasia	Dysplasia
Fundamental change	Increased epithelial proliferation	Cytologic/architectural atypia
Biological implication	Almost no transformation potential	Risk depends on dysplasia severity
Diagnostic question	Is atypia present?	How extensive/severe is atypia?

Keratosis is a surface appearance, not a grade

- Gross laryngeal mucosa can be roughened by keratosis.
- White thickening or a plaque may accompany the epithelial changes.
- Surface appearance alone cannot establish the histologic grade of dysplasia.

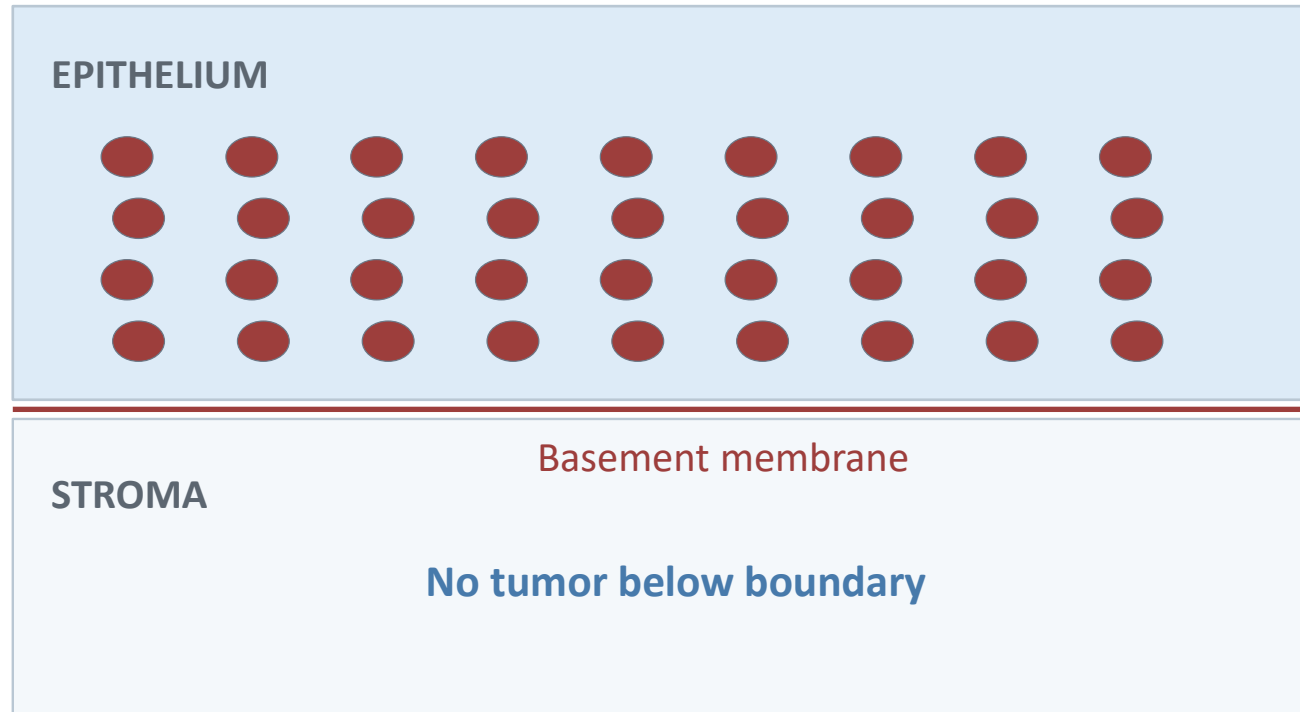
Dysplasia requires microscopic assessment

- Dysplasia is a histologic alteration along the progression sequence.
- Its severity is associated with risk of later carcinoma.
- Histology is the only way to grade dysplasia.

Why severity matters biologically

Initial finding	Transformation interpretation	Practical lesson
Nondysplastic hyperplasia	Almost no transformation potential	Do not equate thickened mucosa with malignancy
Mild dysplasia	Lower but nonzero risk	Grade requires tissue assessment
Severe dysplasia	Higher subsequent risk	Escalation is grounded in histologic grade

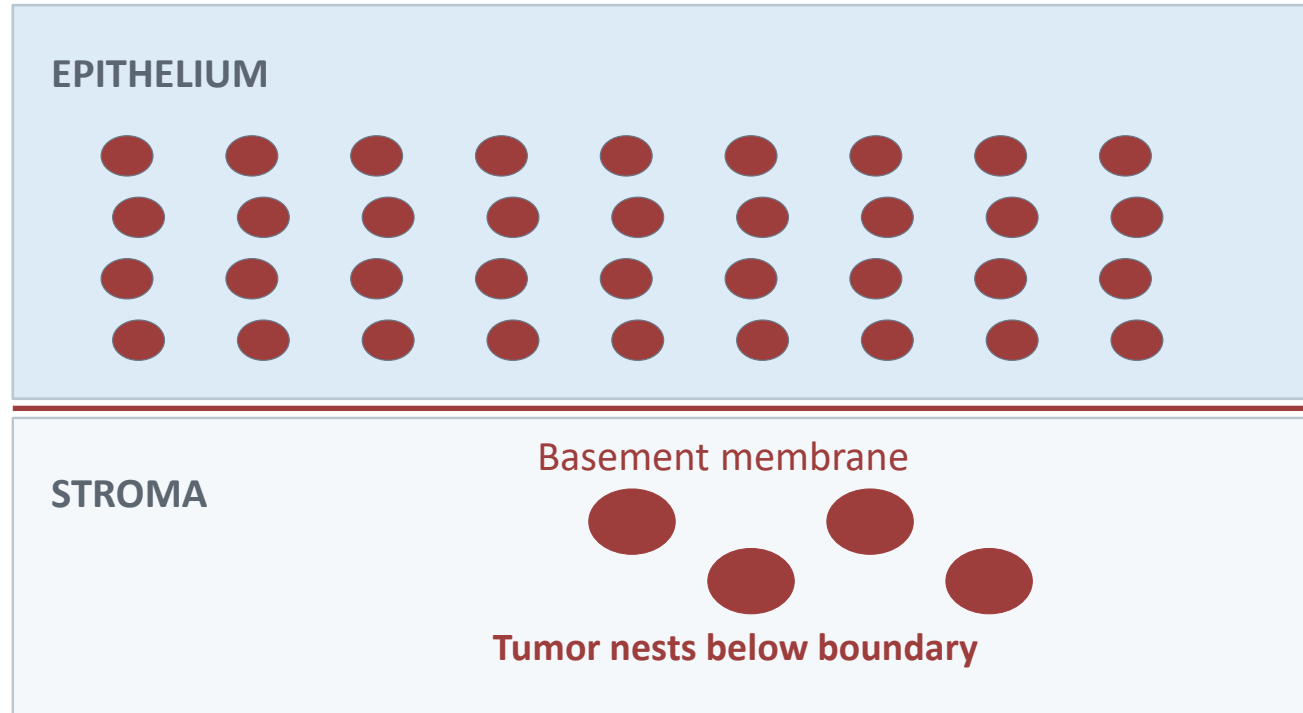
Carcinoma in situ remains above the boundary



- Carcinoma in situ is a preinvasive neoplastic stage in the sequence.
- Atypical epithelial cells remain confined above the basement membrane.
- Invasion has not yet been demonstrated.

Schematic — not a histologic specimen

Invasion changes the diagnosis



- The transition to invasive carcinoma entails stromal penetration by malignant epithelial cells.
- Unlike carcinoma in situ, invasive SCC is no longer confined to the epithelial compartment.
- A demonstrable invasive component is a decisive morphologic distinction.

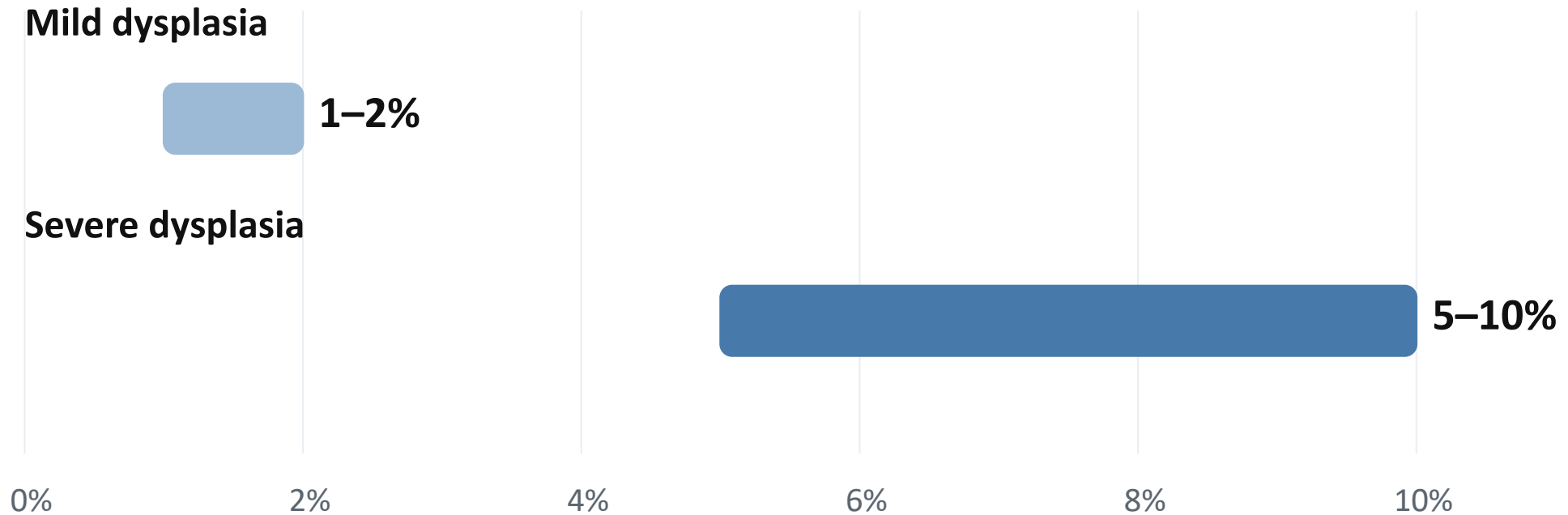
Schematic — not a histologic specimen

In situ and invasive SCC: Diagnostic contrast

Question	Carcinoma in situ	Invasive SCC
Are cells malignant?	Yes	Yes
Is the epithelial boundary breached?	No	Yes
Where is the tumor?	Within epithelium	In epithelium and/or underlying stroma
Key interpretive task	Confirm confinement	Identify unequivocal invasion

Transformation risk increases with dysplasia grade

Reported transformation risk over 5–10 years



Ranges reproduced from the textbook; Observational context and external validation are not supplied.

Interpreting the numerical estimates correctly

- Mild dysplasia: About 1%–2% risk of transformation over 5–10 years.
- Severe dysplasia: About 5%–10% over a comparable period.
- The difference illustrates the direction of risk across grades; These are not treatment thresholds.

A visible plaque has several interpretations

- Laryngeal epithelial surfaces may be smooth despite microscopic change.
- White or reddened focal thickening may reflect a range of epithelial abnormalities.
- Biopsy interpretation, not color alone, resolves the important diagnostic category.

The gross appearance evolves with progression

Subtle surface change

Smooth mucosa or localized thickening



Plaque formation

White / pearly gray, wrinkled mucosa

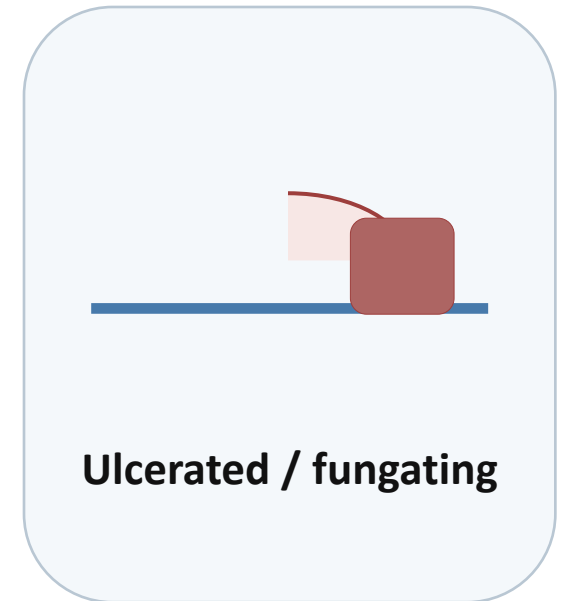
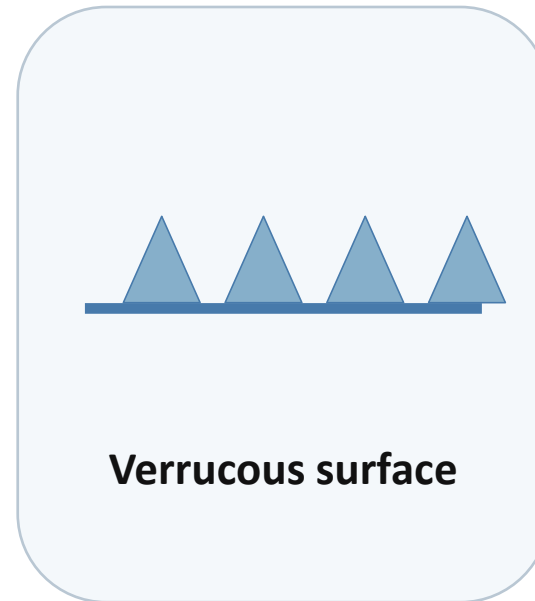
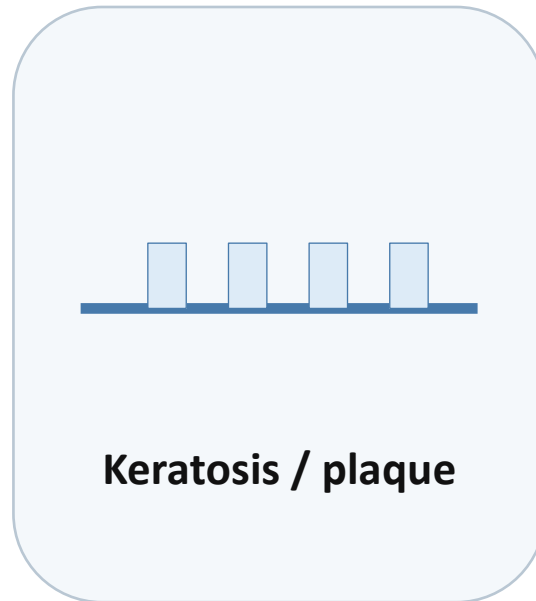


Destructive mass

Ulceration or fungating growth

Schematic teaching progression; Individual lesions do not necessarily follow every illustrated gross stage.

Four gross descriptions used in the chapter



- These are verbal gross patterns, not four mutually exclusive tumor diagnoses.
- The same clinical appearance can require histologic confirmation.

Original simplified surface schematics; They are not diagnostic photographs.

White plaques and altered mucosal texture

- Early malignant lesions may manifest as pearly gray, wrinkled mucosal plaques.
- White color and surface keratosis describe gross appearance.
- These findings do not by themselves distinguish high-grade dysplasia from invasion.

Roughened and verrucous mucosa

- Irregular verrucous or white-pink laryngeal lesions.
- The term “verrucous” describes the gross surface pattern in this discussion.
- It should not automatically be read as a specific histopathologic SCC variant.

Ulceration signals tissue destruction

- Invasive carcinoma may produce an ulcerated mucosal lesion.
- The chapter illustrates a large ulcerated mass involving the right vocal cord and pyriform sinus.
- Ulceration raises concern for advanced local growth but cannot independently assign a clinical stage.

Fungating lesions form bulky exophytic masses

- Later lesions may become fungating, projecting into the laryngeal lumen.
- Robbins pairs ulceration and fungation in its gross carcinoma example.
- Gross tumor size and configuration are distinct from microscopic differentiation.

Microscopic identity: Invasive squamous carcinoma

- The dominant tumor lineage is malignant squamous epithelium.
- Histologic differentiation varies substantially between tumors.
- Adjacent epithelial dysplasia or carcinoma in situ may coexist.

Histologic differentiation is variable

Morphologic axis	Better differentiated appearance	More anaplastic appearance
Squamous maturation	More recognizable squamous features	Less orderly squamous differentiation
Cellular appearance	Relatively cohesive tumor cells	Greater cellular/nuclear pleomorphism
Interpretation	Tumor retains more maturation	Tumor demonstrates loss of maturation

Anaplasia may be striking

Variable atypia

- The source describes highly variable degrees of anaplasia.
- Marked cytologic atypia does not change the basic diagnosis of SCC.
- The severity and pattern of atypia are assessed on tissue sections.

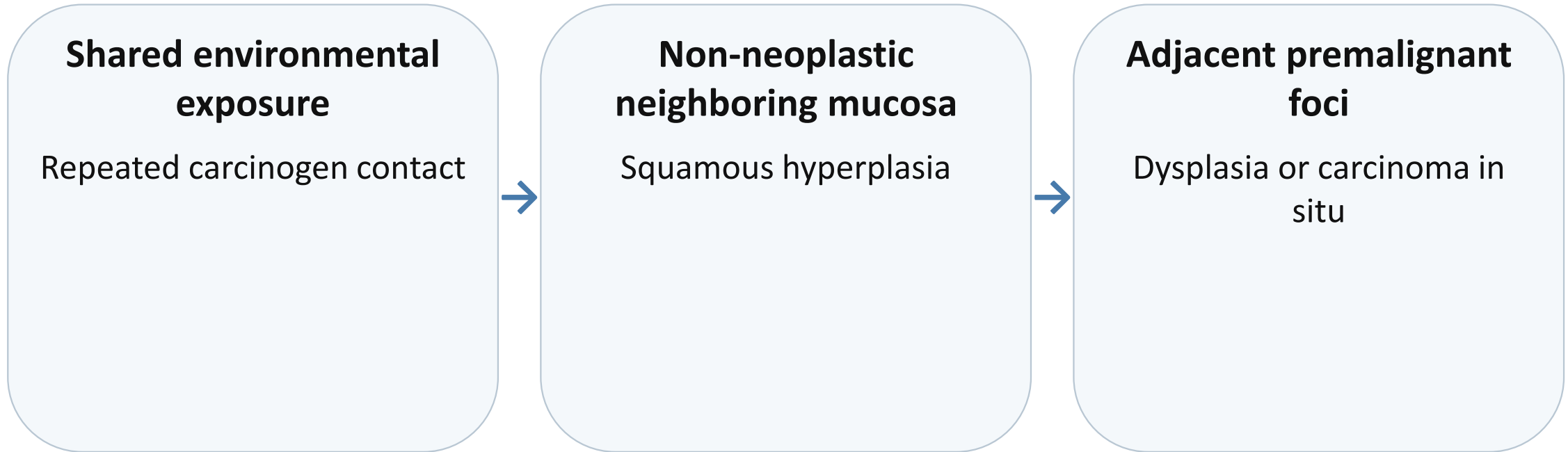
Tumor giant cells may be present

- Robbins explicitly mentions tumor giant cells within the histologic spectrum.
- These represent marked cellular atypia in this context.
- Their presence should be interpreted with the architecture and other malignant features, not alone.

Bizarre mitotic figures indicate disordered division

- Bizarre mitoses are another feature specifically mentioned in the chapter.
- Atypical mitotic morphology supports high-grade neoplastic cytology.
- Mitotic atypia must be interpreted alongside invasion and tumor differentiation.

The adjacent mucosa can be abnormal too



This is a schematic representation of the source statement regarding adjacent mucosa.

A single tumor can sit within a broader field

- The chapter notes hyperplasia and foci of dysplasia or carcinoma in situ in nearby mucosa.
- The surrounding epithelium is therefore informative on pathologic examination.
- This supports consideration of both the invasive lesion and associated epithelial changes.

Gross appearance and histologic grade are different

Gross examination can show	Histology is needed to establish
Color: white, pink, erythematous	Presence and severity of dysplasia
Plaque, keratosis or surface roughening	Carcinoma in situ versus invasive carcinoma
Ulcerated or fungating mass	Squamous differentiation and cellular anaplasia

Reactive vocal cord nodules mimic some symptoms

- Reactive nodules or polyps commonly occur with vocal overuse or smoking.
- They often cause hoarseness because of their position and inflammation.
- Their malignant transformation risk is almost nonexistent.

Nodule and polyp: Benign clinical context

Property	Reactive nodule	Reactive polyp
Usual distribution	Bilateral by convention	Unilateral by convention
Typical location	True vocal cord	True vocal cord
Morphologic setting	Reactive, often myxoid stroma	Reactive, often myxoid stroma
Cancer risk	Almost nonexistent	Almost nonexistent

Squamous papilloma is another exophytic lesion

- Laryngeal squamous papillomas are benign neoplasms, often on true vocal cords.
- They form soft projections with fibrovascular cores and orderly squamous covering.
- Papilloma histology and biologic behavior differ from SCC.

Papillomatosis is usually low-risk HPV associated

- Recurrent laryngeal papillomatosis is associated with HPV types 6 and 11.
- It frequently recurs but rarely transforms to SCC.
- Robbins particularly associates rare transformation with smoking or radiation exposure.

Laryngeal surface lesions: Key distinctions

Entity	Core nature	Malignant implication
Reactive nodule / polyp	Non-neoplastic reactive process	Transformation risk nearly absent
Squamous papilloma	Benign HPV-related epithelial neoplasm	Rare malignant transformation
Dysplasia / in situ SCC	Neoplastic epithelial atypia	Risk of / transition toward invasion
Invasive SCC	Malignant squamous epithelial tumor	Established invasive carcinoma

Do not label every benign lesion “precancer”

- Reactive nodules and vocal polyps are not usual obligatory precursors of carcinoma.
- Papillomas caused by HPV 6/11 are biologically distinct from typical tobacco-associated SCC.
- Dysplastic epithelium is the meaningful precursor in the chapter’s principal cancer pathway.

Persistent hoarseness is a key warning symptom

Hoarseness

- Persistent hoarseness among the common initial manifestations.
- A lesion at the vocal cords can change vibratory function early.
- Persistent symptoms need attention because benign reactive lesions can also cause hoarseness.

Dysphonia describes impaired voice production

- Dysphonia is listed as a typical presenting symptom of laryngeal carcinoma.
- It is clinically related to disrupted laryngeal phonation.
- Dysphonia and hoarseness overlap but are not histologic diagnoses.

Dysphagia suggests functional disturbance

- The chapter also lists dysphagia as an initial manifestation.
- Its presence links tumor location or extent with swallowing mechanics.
- Clinical symptoms require anatomic assessment; They cannot substitute for a tissue diagnosis.

Link symptoms to the affected function

Manifestation	Functional context	Pathology question
Persistent hoarseness	Vocal-fold vibration	Is the cord surface affected?
Dysphonia	Phonation	How much does the lesion interfere with voice?
Dysphagia	Swallowing	Does the lesion affect neighboring passage/function?

Symptom patterns do not replace morphology

- Hoarseness can arise from benign nodules, polyps or carcinoma.
- Gross appearance helps direct attention to a suspicious region.
- The histologic distinction among reactive change, dysplasia and invasive SCC remains decisive.

Clinical stage is the central prognostic variable

Clinical stage

- Robbins directly relates prognosis to clinical stage.
- More advanced disease generally requires more complex treatment.
- The cited source does not specify a TNM edition or detailed stage-group definitions.

Treatment intensity reflects disease extent

Clinical context	Approaches named by Robbins	General therapeutic aim
Early disease	Laser surgery, microsurgery or radiotherapy	Organ preservation where feasible
Advanced or recurrent disease	Combined chemotherapy and radiotherapy $\pm$ laryngectomy	Control more extensive disease

Organ-preserving treatment in early disease

- Increasing use of organ-preserving approaches.
- Laser surgery and microsurgery are specifically listed.
- Radiotherapy is another stated option in the early-disease setting.

Advanced or recurrent disease needs escalation

- Combined chemotherapy and radiation are typical options in advanced or recurrent disease.
- Laryngectomy may or may not be incorporated according to clinical context.
- The textbook section does not supply a treatment algorithm for individual stages.

Cancer control and voice preservation may conflict

Functional cost

- The larynx is central to production of the natural voice.
- Tumors may be resectable at the price of loss of natural voice.
- Treatment discussions therefore address both oncologic outcome and function.

Case 1 — persistent change in voice

An adult with a long tobacco exposure history reports progressive persistent hoarseness. A focal lesion is seen on a true vocal cord.

What are the two most important interpretive steps?

- Consider laryngeal SCC among the causes, without assuming malignancy.
- Characterize the lesion and obtain histologic assessment to distinguish reactive change, dysplasia and carcinoma.

Case 2 — a white vocal-fold plaque

A white, roughened laryngeal plaque is biopsied. The question is whether epithelial atypia is present and whether invasion can be identified.

Why is the surface color not sufficient?

- Grossly white/keratotic lesions can have different epithelial abnormalities.
- Histology establishes dysplasia grade and distinguishes in situ from invasive carcinoma.

Case 3 — large ulcerated mass

A patient has an ulcerated, exophytic lesion involving a vocal cord and neighboring mucosa. Histology shows markedly atypical malignant squamous cells.

Which findings are established, and what remains to be assessed?

- The described morphology supports a malignant squamous lesion; Tissue evaluation defines invasion.
- The extent of disease must be clinically staged to guide prognosis and treatment.

Integrated clinicopathologic interpretation

Domain	Principal finding	Why it matters
Etiology	Chronic smoking; alcohol synergy	Frames risk assessment
Pathogenesis	Dysplasia → in situ → invasion	Identifies the malignant transition
Morphology	Plaque → ulcerated/fungating mass; variable atypia	Explains gross and microscopic spectrum
Clinical	Persistent hoarseness, dysphonia, dysphagia	Links site to functional effect
Prognosis	Clinical stage	Shapes treatment intensity and outcome

Five essential conclusions

- Most laryngeal carcinomas are squamous and strongly associated with tobacco exposure.
- A dysplastic precursor can progress through carcinoma in situ to invasive SCC.
- Lesion color or keratosis alone cannot establish dysplasia grade.
- Persistent hoarseness is clinically important but not specific for carcinoma.
- Clinical stage governs prognosis and the broad treatment approach.

Core references

- Robbins, Cotran & Kumar. Pathologic Basis of Disease. 11th edition (2026).
- Relevant source sections: Larynx; Carcinoma of the Larynx; Hyperplasia–Dysplasia–Carcinoma Sequence.
- Contextual comparisons: Reactive Nodules (Vocal Cord Nodules and Polyps); Squamous Papilloma and Papillomatosis.