

Reactive vocal-fold nodules and polyps

Benign reactive lesions of the true vocal folds

Pathogenesis · morphology · clinicopathologic correlation

Dr Abu Suraih Sakhri

MBBS, MD (Pathology)

www.abusuraihsakhri.com

Learning outcomes

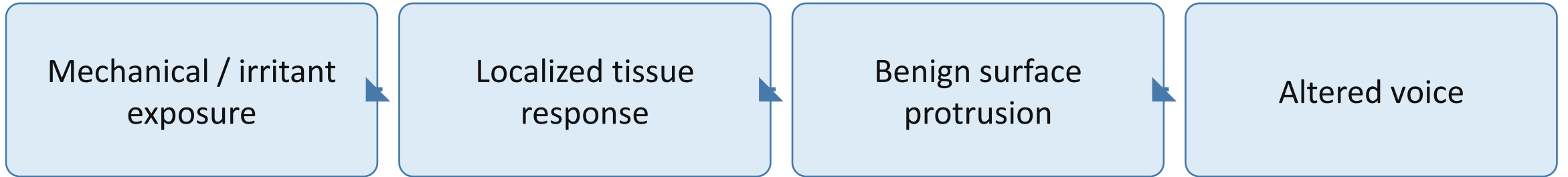
- Explain how repeated vocal-fold injury produces reactive lesions.
- Recognize gross and microscopic features of nodules and polyps.
- Connect lesion location with hoarseness and altered vibration.
- Distinguish common benign lesions from papilloma and suspected carcinoma.

Where reactive nodules fit in laryngeal pathology

Reactive lesion	Vocal-fold nodule / polyp
Benign neoplasm	Squamous papilloma
Malignant neoplasm	Laryngeal squamous carcinoma

Laryngeal disease includes inflammatory, reactive and neoplastic processes.

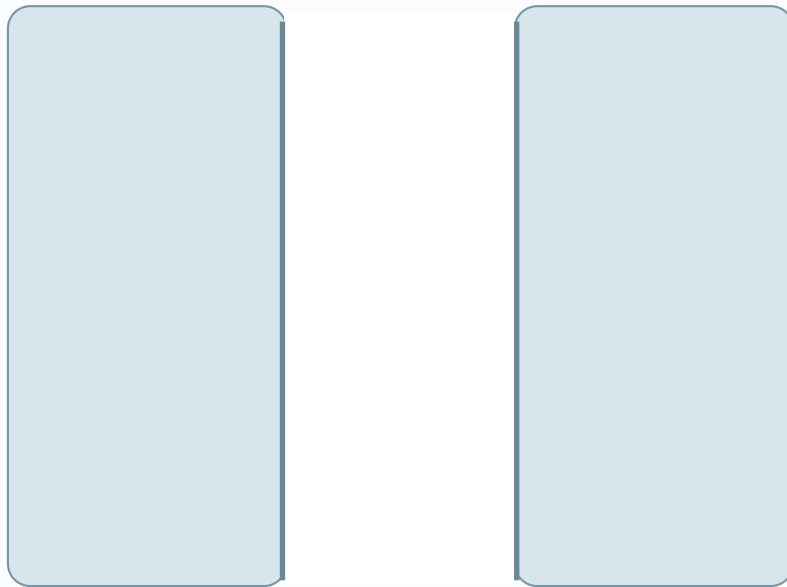
Reactive versus neoplastic: A necessary distinction



- “Reactive” denotes tissue response to injury rather than autonomous invasive growth.
- A vocal-fold mass can alter function even when it has negligible malignant potential.
- Clinical appearance must still be assessed: Hoarseness does not itself establish benignity.

True vocal folds: The vulnerable mucosal edge

Opposing true vocal-fold edges — schematic



Left fold

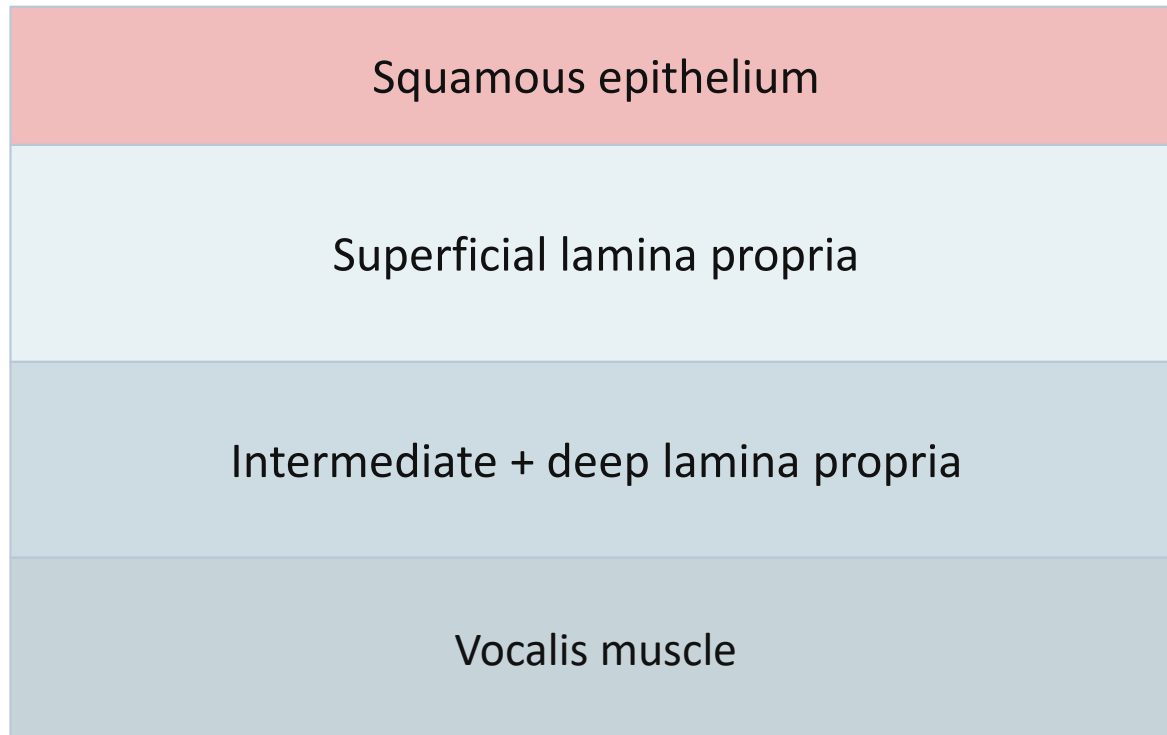
Glottic gap

Right fold

Schematic; Not an endoscopic photograph

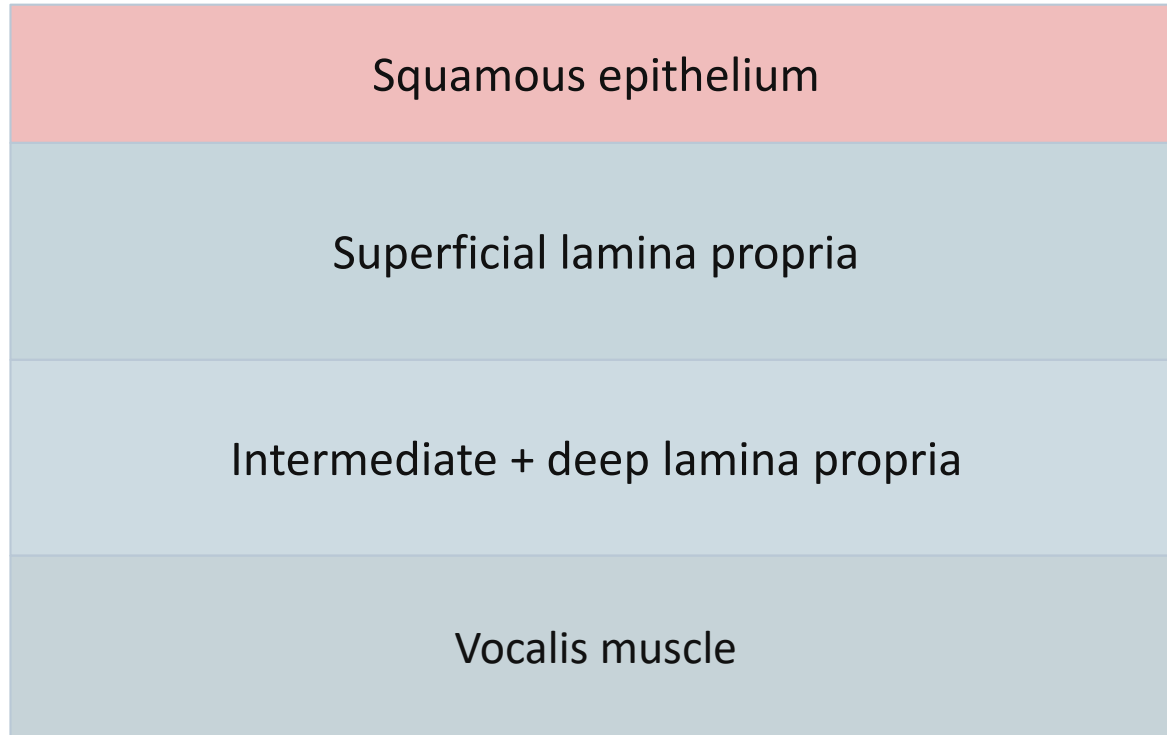
- Nodules and polyps generally involve the true, rather than false, vocal folds.
- Their free margins meet repeatedly during phonation.
- A small lesion at the vibrating edge can disproportionately affect vocal quality.

Vocal-fold mucosa: Epithelium over lamina propria



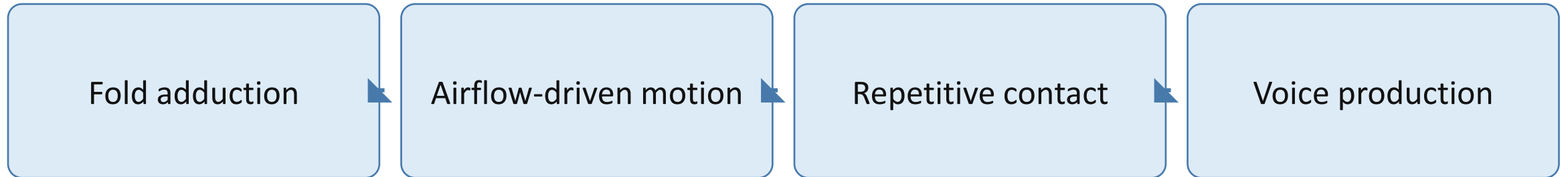
- The vibrating fold has a surface squamous epithelial cover.
- Beneath it, connective-tissue layers differ in mechanical compliance.
- The superficial lamina propria is important for the mucosal wave.

Why superficial tissue pliability matters



- Normal phonation requires periodic opening, closure and pliable surface vibration.
- Focal edema changes local mass; Fibrosis changes tissue stiffness.
- Either alteration may disrupt the regular vibratory pattern.

Phonation converts airflow into vibration



- Adducted folds interact with expiratory airflow during voiced speech.
- Repetitive approximation exposes the opposing mucosal surfaces to contact stress.
- Raised lesions perturb contact geometry and can introduce irregular vibration.

Principal causal setting: Vocal strain

- Robbins particularly associates these lesions with people who heavily strain their voices.
- Singers are a classic example; Prolonged loud speaking is another clinically relevant exposure.
- Exposure history supplies a mechanism; It is not a substitute for visual examination.

Occupational voice use increases the injury burden

- Teachers, coaches, public speakers and performers may have sustained vocal demands.
- Repeated vocal loading is clinically relevant when assessing benign phonotraumatic lesions.
- A detailed history should distinguish duration, intensity and abrupt voice change.

Smoking is an important associated exposure

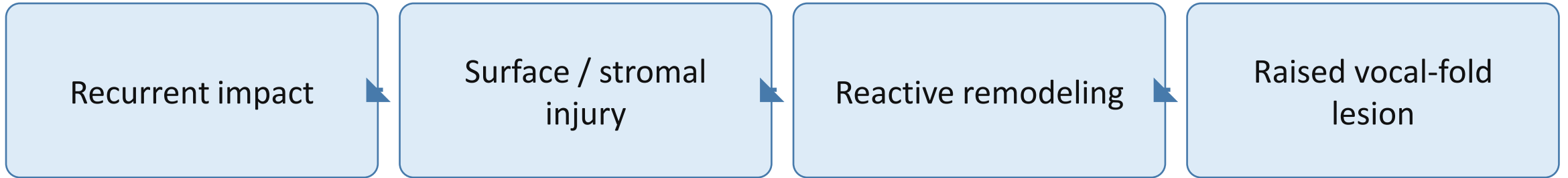
For nodules/polyps	Smoking is a relevant irritant / exposure
For laryngeal carcinoma	Tobacco is a major independent risk factor
Diagnostic implication	Examine persistent dysphonia in smokers

Heavy smoking as a common setting for nodules/polyps.

Vocal overuse is not the only clinical modifier

- Inflammatory upper-airway disease and reflux can coexist with a voice disorder.
- Irritants may aggravate vocal symptoms or alter laryngeal appearance.
- A causal attribution to reflux or allergy alone should not replace laryngeal assessment.

Mechanistic model: Repetitive phonotraumatic contact



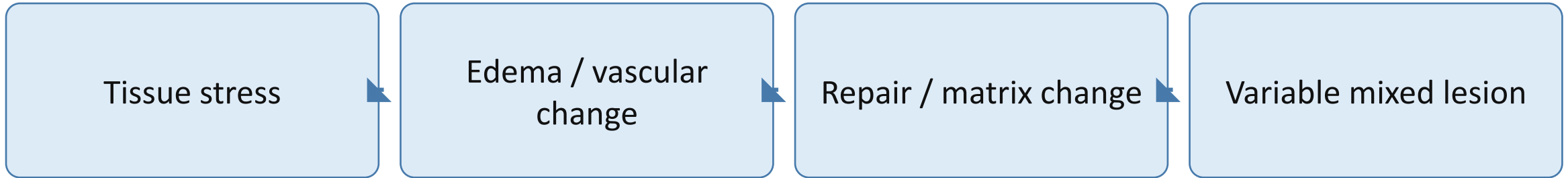
- Repeated contact produces local epithelial and stromal tissue stress.
- Edema, vascular remodeling and reparative connective-tissue changes may coexist.
- Accumulated surface change produces an enduring protrusion at the free margin.

Nodules and polyps overlap pathogenetically

Nodule tendency	Prolonged / repetitive phonotrauma
Polyp tendency	Repetitive or sometimes acute phonotrauma
Shared process	Reactive epithelial–stromal injury

Both are commonly associated with phonotrauma and can share microscopic features.

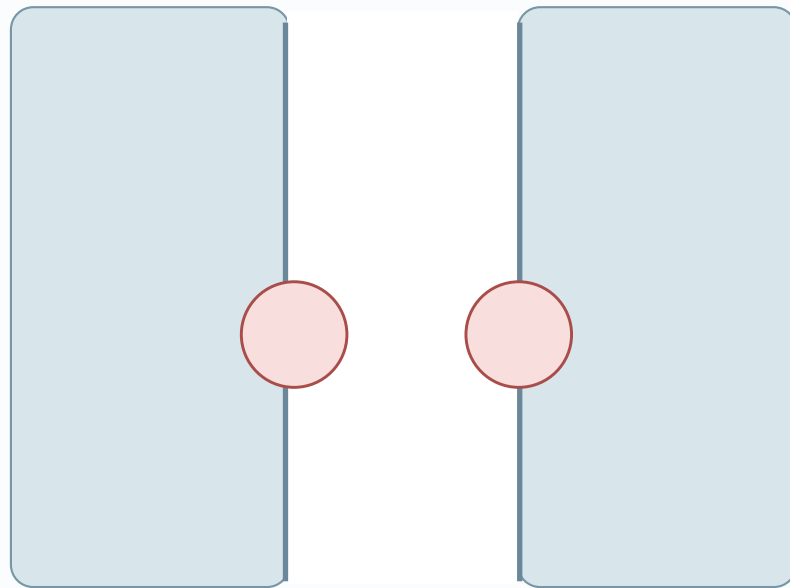
Acute change and chronic remodeling can coexist



- Early lesions may have more edema and vascularity.
- Reparative phases may contain more fibrosis or stromal hyalinization.
- Histologic composition depends on lesion history; A simple nodule–polyp binary is imperfect.

Location explains the functional prominence

Opposing true vocal-fold edges — schematic



Left fold

Glottic gap

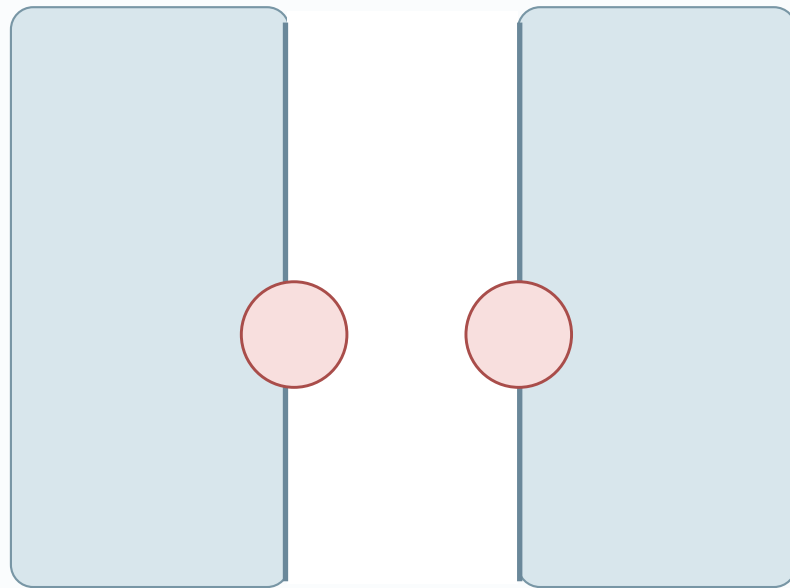
Right fold

Schematic; Not an endoscopic photograph

- the lesions usually on the true vocal folds.
- Opposing folds can contact the protrusions during phonation.
- Even small lesions can lead to significant disturbance of vocal quality.

By convention, nodules are bilateral

Opposing true vocal-fold edges — schematic



Left fold

Glottic gap

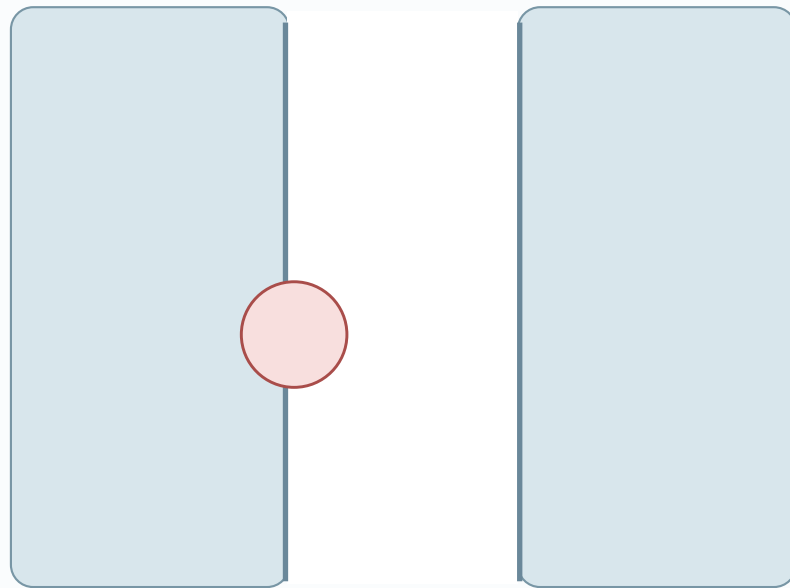
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Schematic; Not an endoscopic photograph

- The Robbins convention is bilateral nodule formation.
- Corresponding lesions may face one another along the free vocal-fold edges.
- This pairing provides a useful pattern-recognition clue, not a histologic definition.

By convention, polyps are unilateral

Opposing true vocal-fold edges — schematic



Left fold

Glottic gap

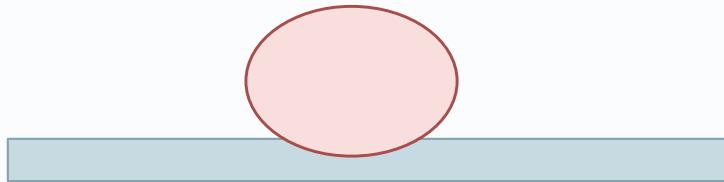
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Schematic; Not an endoscopic photograph

- Robbins conventionally uses “polyp” for a unilateral lesion.
- An isolated protrusion distorts one side of the glottal contact surface.
- Laterality guides terminology but does not eliminate the need for inspection.

Gross appearance: Smooth, rounded protrusions

Typical benign contour



Potentially suspicious contour

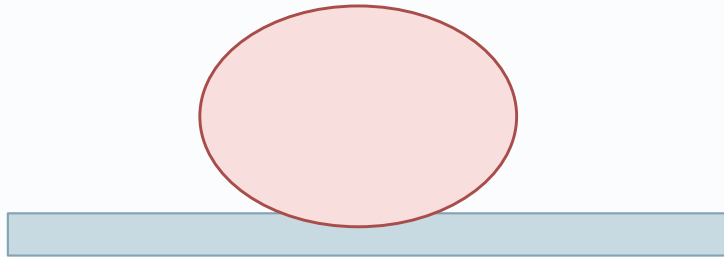


Original morphology schematic; Not a laryngoscopic image

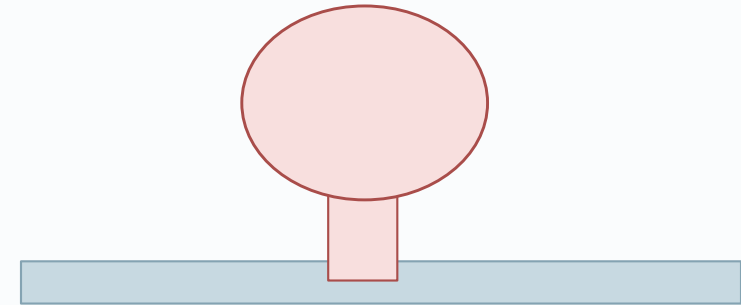
Typical nodules and polyps are discrete, smooth and rounded. | Their surfaces differ from the irregular ulcerative appearance that raises concern for carcinoma.

Attachment pattern: Sessile or pedunculated

Sessile attachment



Pedunculated attachment

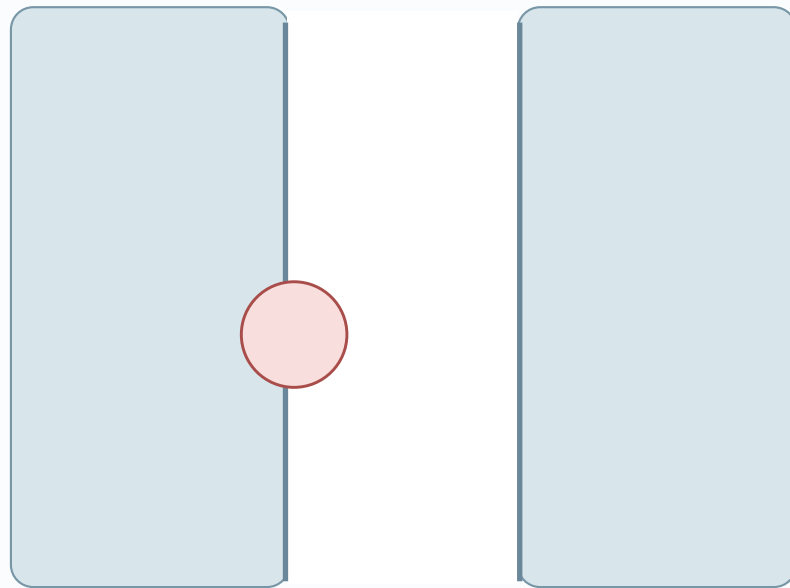


Original morphology schematic; Not a laryngoscopic image

A sessile lesion has a broad attachment to the mucosal surface. | A pedunculated lesion projects on a narrower stalk.

Size: Often only a few millimeters

Opposing true vocal-fold edges — schematic



Left fold

Glottic gap

Right fold

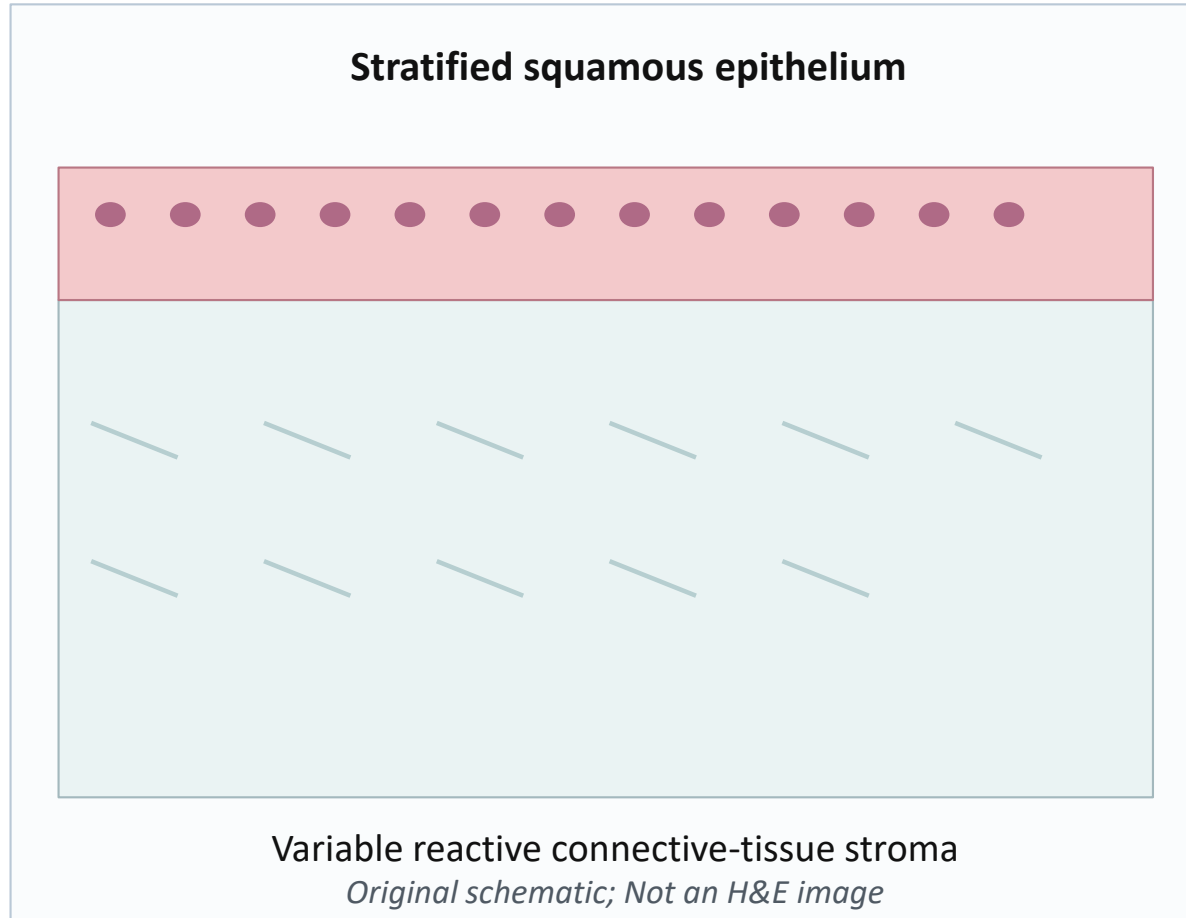
Schematic; Not an endoscopic photograph

- The typical reactive excrescence is small, commonly measured in millimeters.
- Size alone does not measure the degree of phonatory impairment.
- Anatomic position and changes in vibration also determine symptoms.

Patient population: Adults are commonly affected

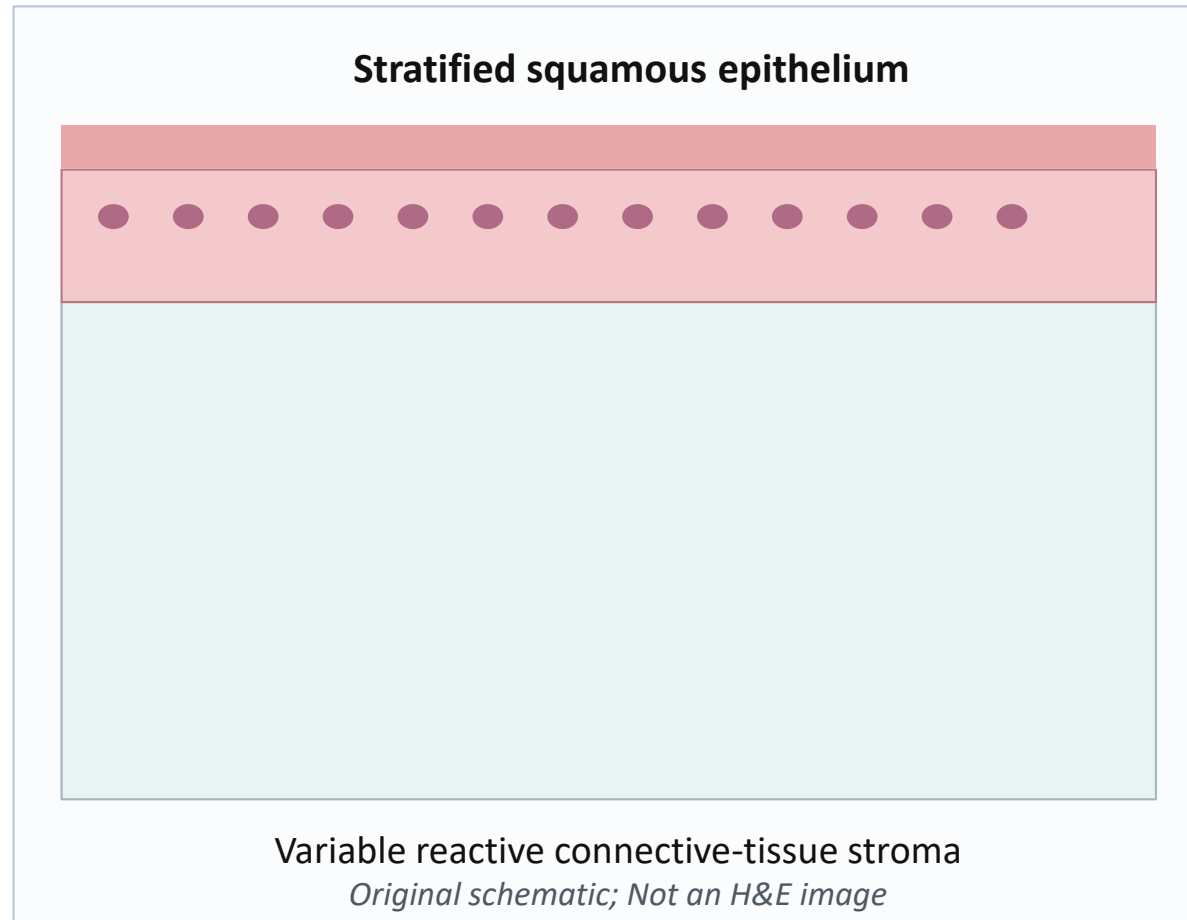
- adults are most often affected.
- A wider clinical literature also recognizes nodules in children with high vocal use.
- Neither patient age nor occupation is sufficient for a definitive diagnosis.

Squamous epithelium covers the lesion



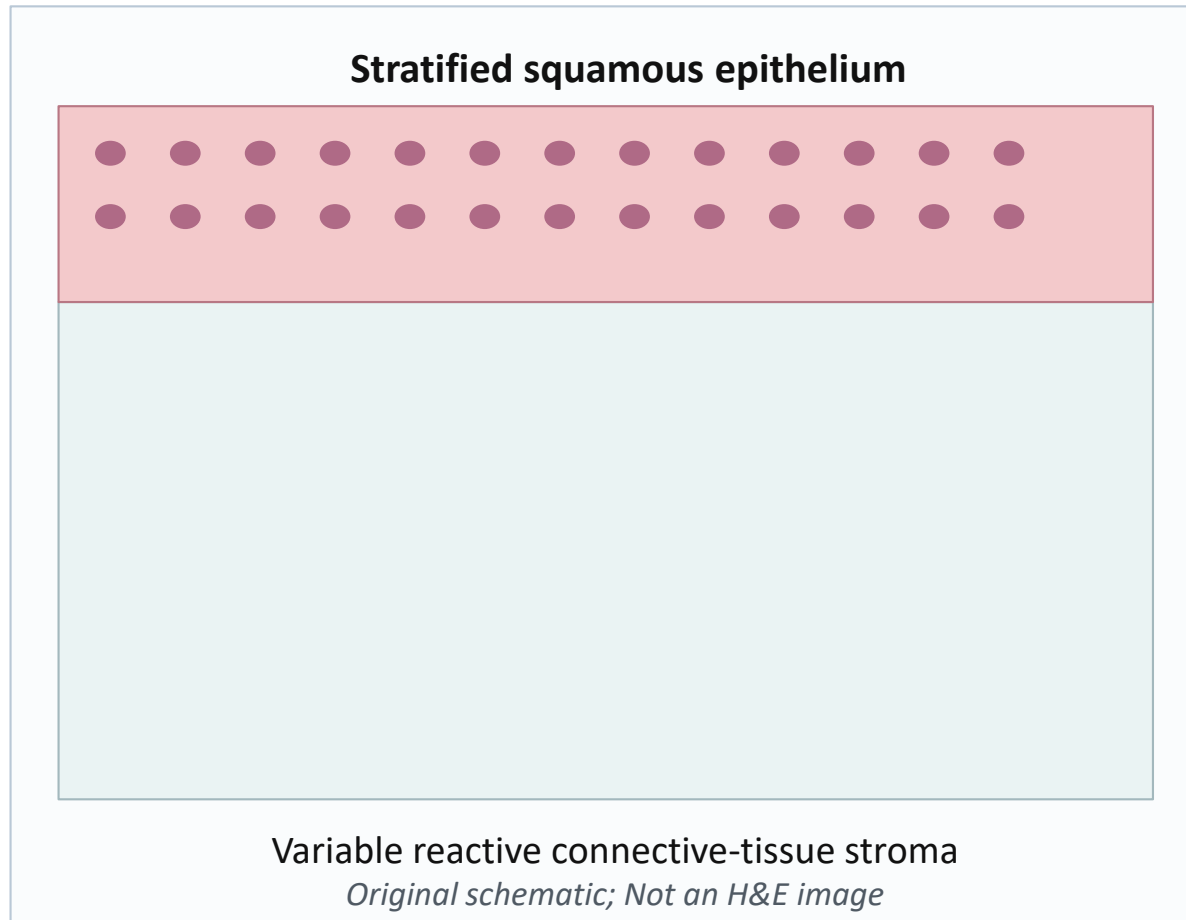
- Both lesions are lined by stratified squamous epithelium.
- Surface epithelium is responsive to chronic mechanical irritation.
- Interpret epithelial changes together with the underlying connective tissue.

Hyperkeratosis may accompany repeated injury



- Keratin production can increase over an irritated squamous surface.
- Gross whitening is not uniquely diagnostic of a nodule.
- Examine any concerning plaque in clinical context and assess dysplasia when sampled.

Reactive epithelial hyperplasia is frequent

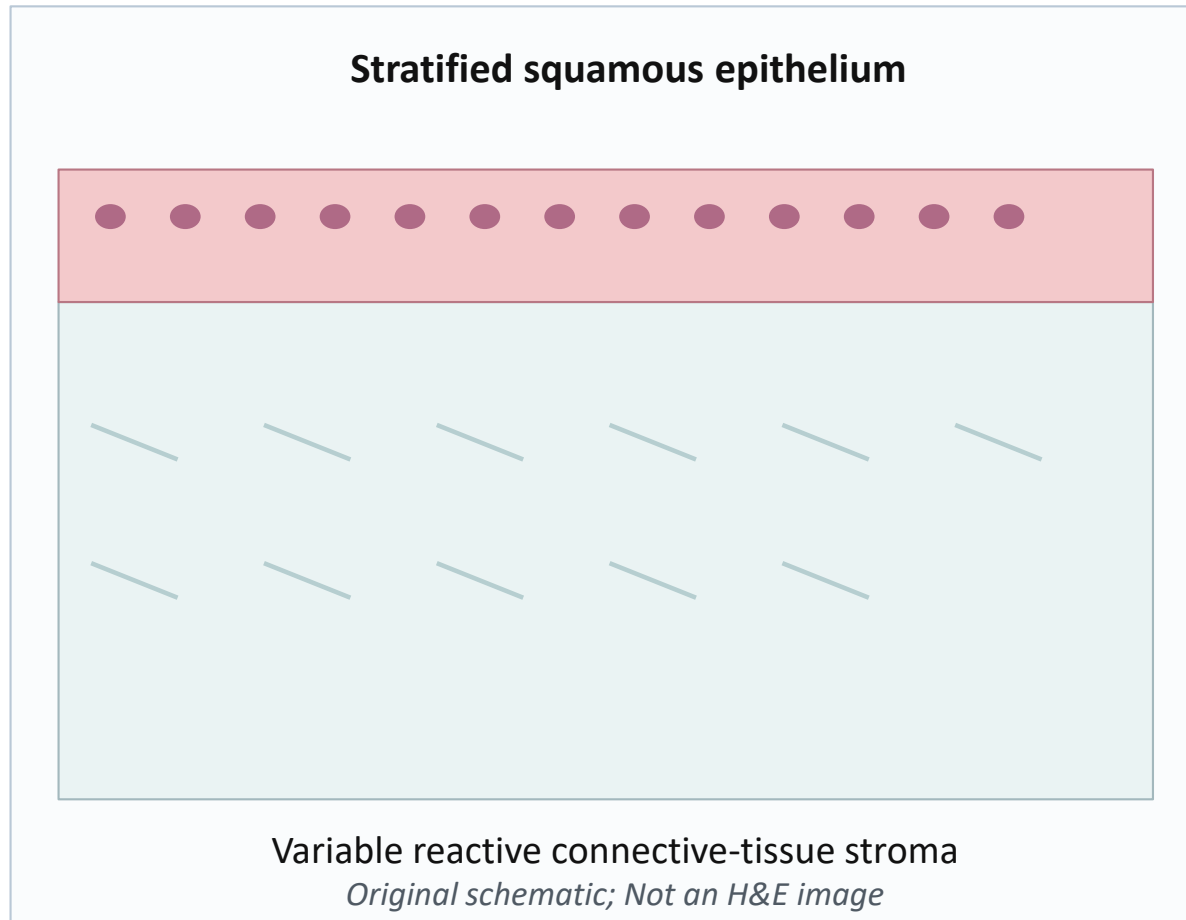


- squamous epithelial hyperplasia among possible findings.
- Increased epithelial thickness represents a proliferative response to irritation.
- Architecture, maturation and cytologic atypia must still be assessed separately.

Slight dysplasia is possible—but not obligatory

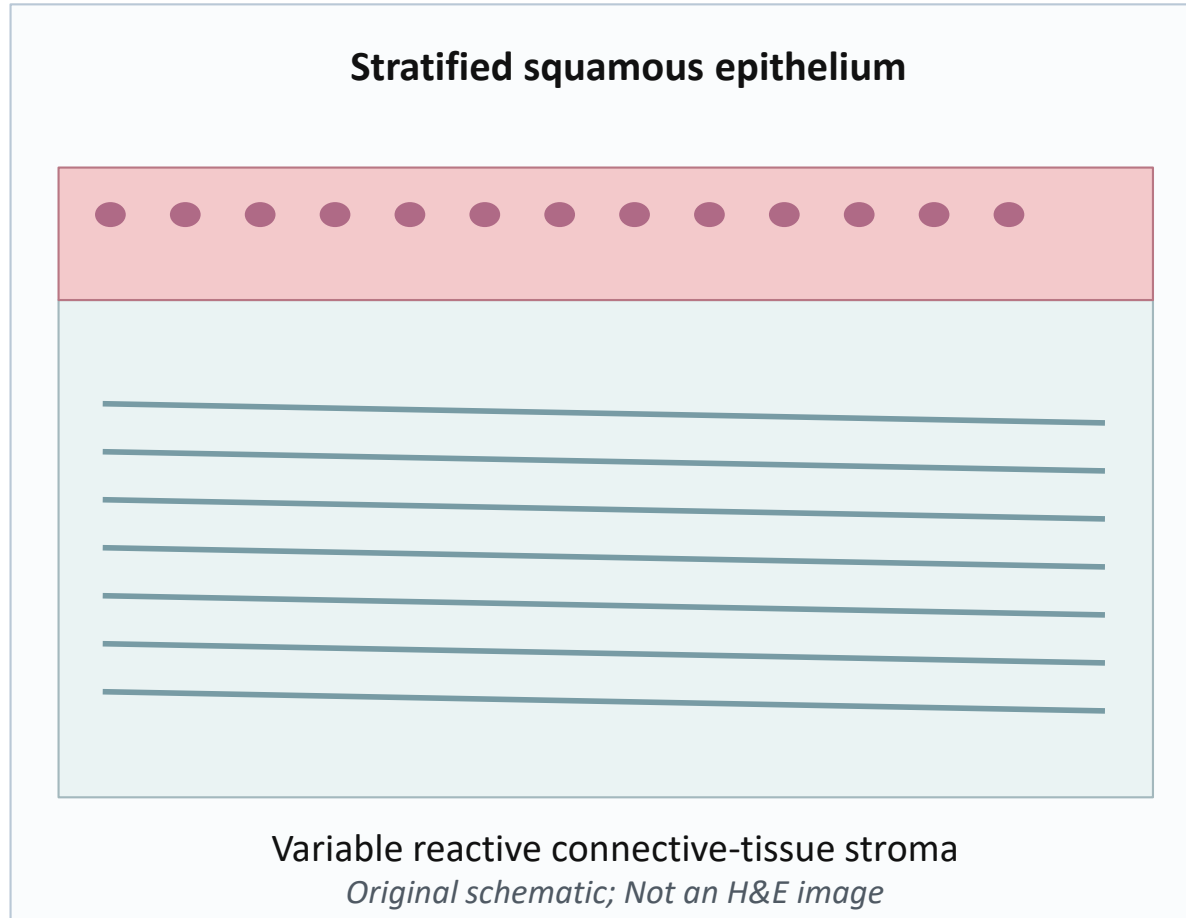
- the covering epithelium can be slightly dysplastic.
- A reactive growth is not thereby equivalent to an invasive squamous carcinoma.
- True dysplasia requires morphologic assessment; A label of “reactive” must not mask concerning features.

Loose myxoid stroma is a defining substrate



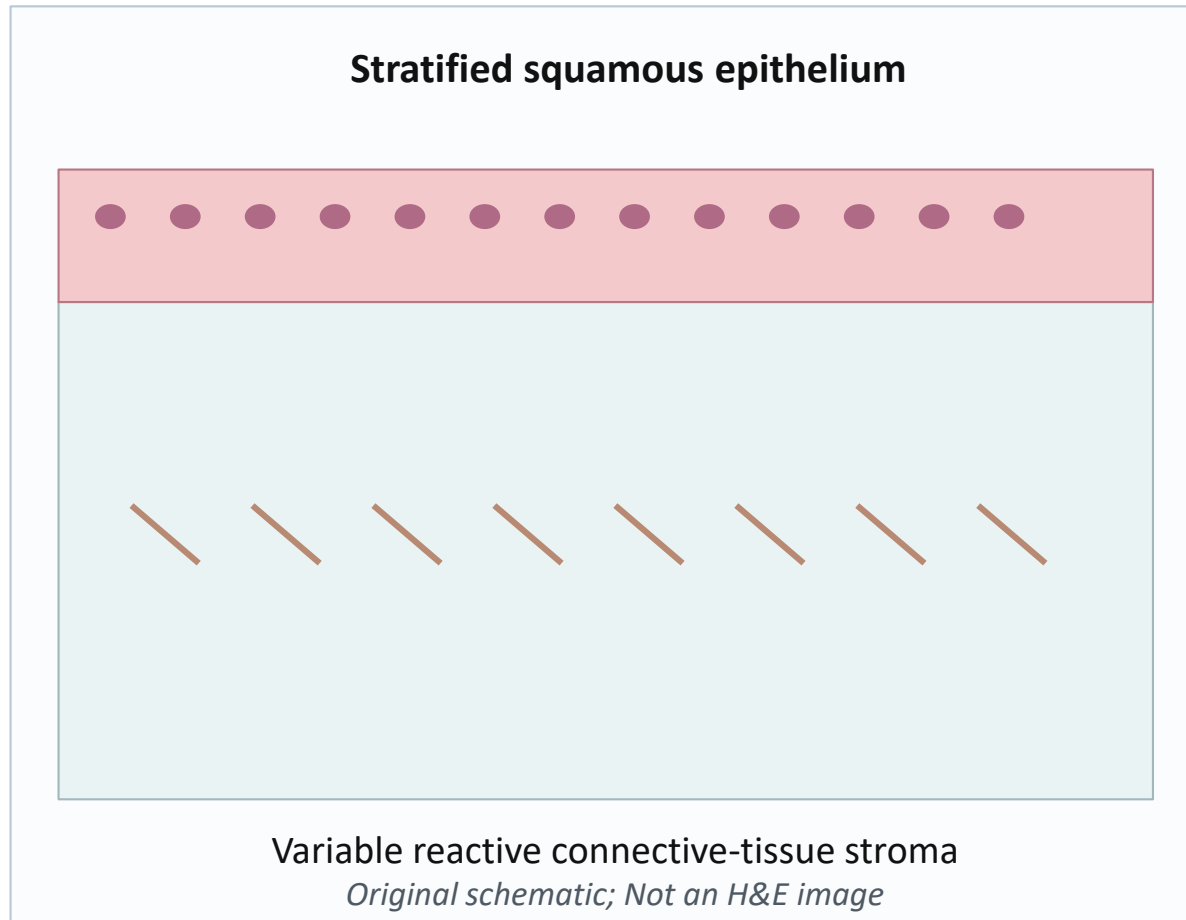
- Below the epithelium lies loose myxoid connective tissue.
- Myxoid stromal change contributes to the bulging architecture.
- The degree of stromal remodeling is variable across specimens.

Fibrosis reflects the reparative component



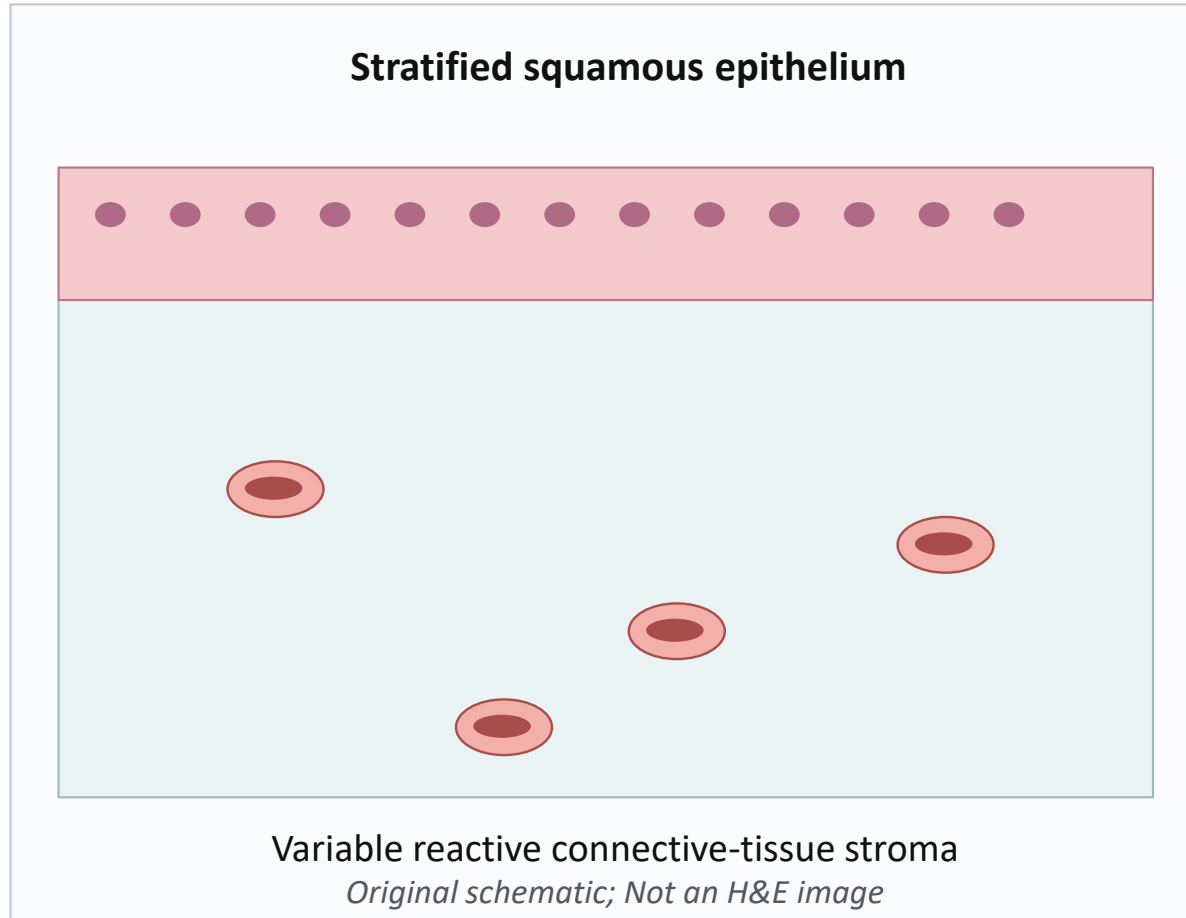
- The stromal tissue may be variably fibrotic.
- Fibrosis increases local stiffness relative to more pliable superficial tissue.
- Histology may therefore help explain persistent vibratory disturbance.

Fibrinous material can be present



- fibrinous change in the spectrum of stromal appearances.
- Fibrin may accompany local tissue and vascular injury.
- Fibrin is not independently specific for a vocal-fold nodule or polyp.

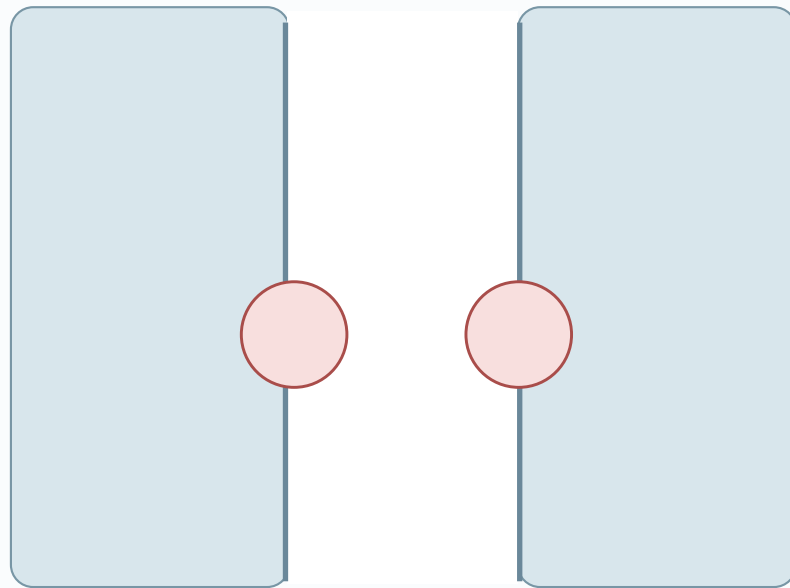
Vascularity may be conspicuous



- Some reactive lesions are highly vascularized.
- A vascular or hemorrhagic phenotype can contribute to a polyp-like appearance.
- Vascularity alone cannot assign the lesion type or prove malignancy.

Opposing nodules may ulcerate

Opposing true vocal-fold edges — schematic



Left fold

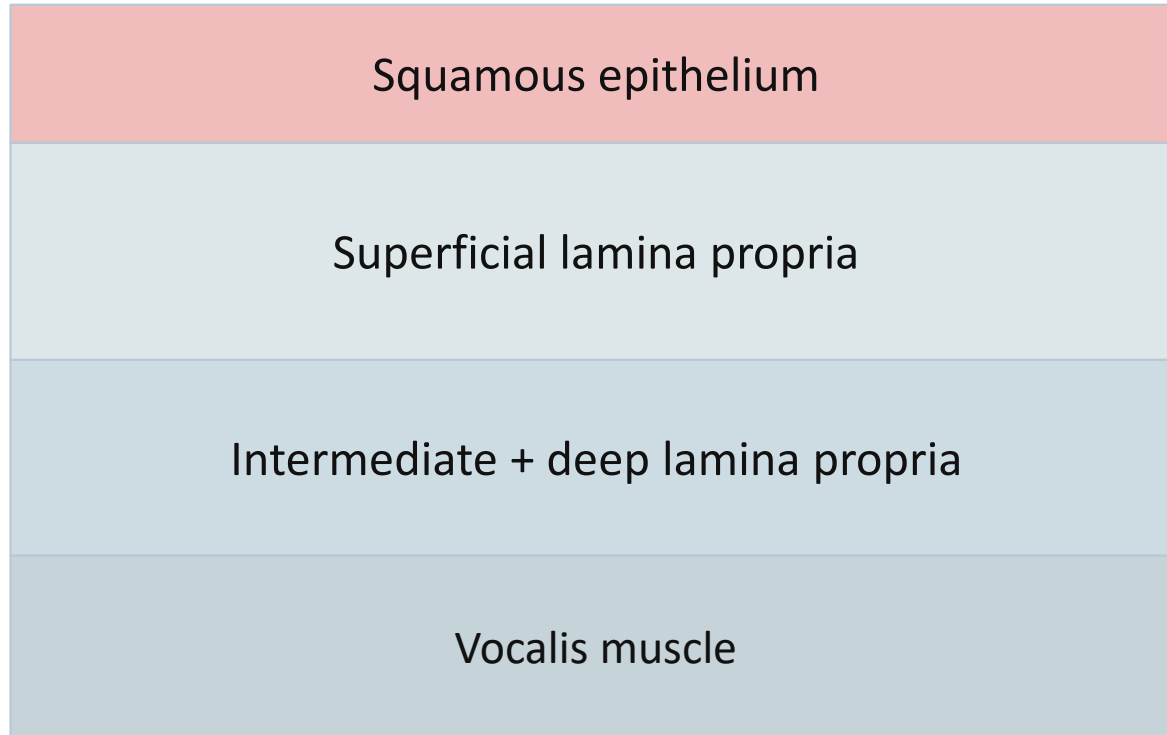
Glottic gap

Right fold

Schematic; Not an endoscopic photograph

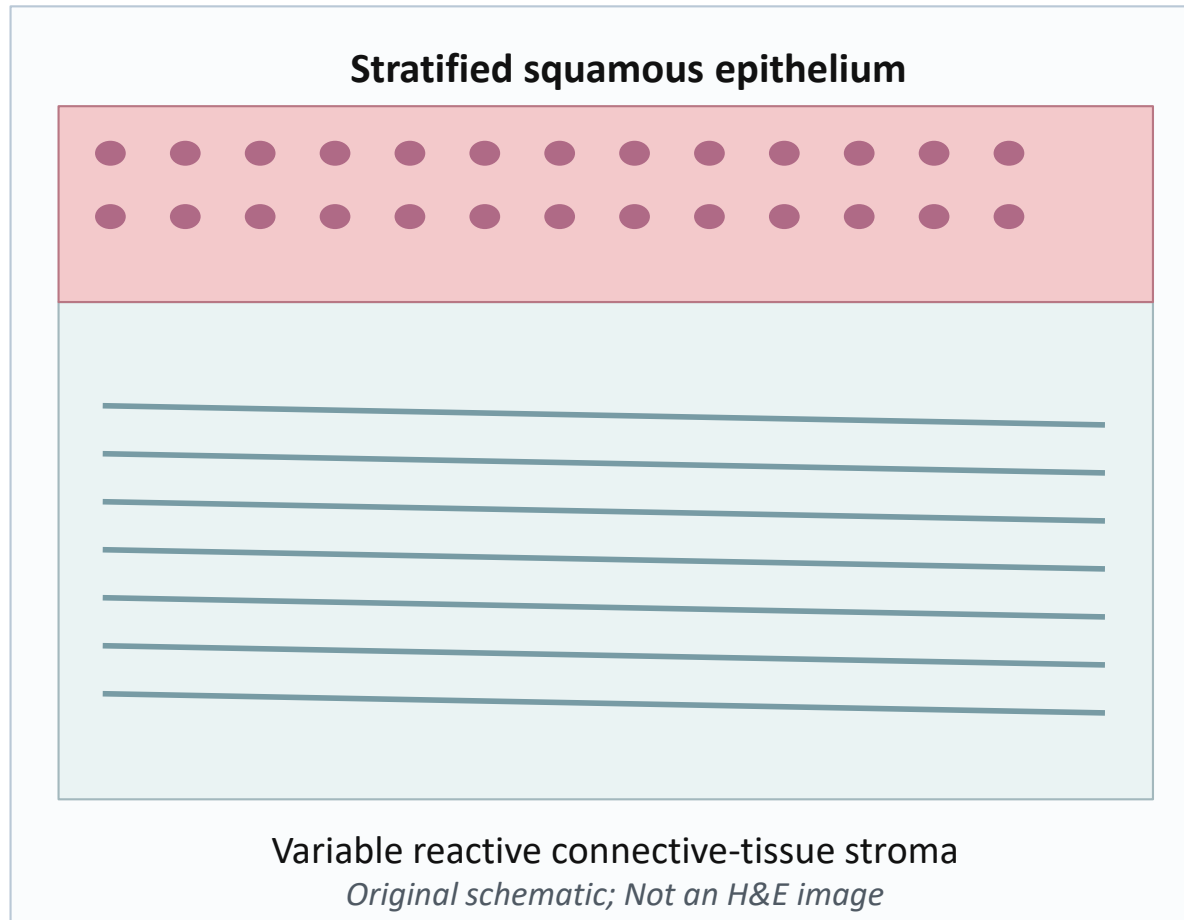
- Bilateral protrusions may strike each other during repetitive vocal-fold closure.
- Surface abrasion or ulceration can follow sustained mechanical contact.
- Clinical interpretation must distinguish this mechanism from suspicious destructive ulceration.

A coherent histologic reading is layered



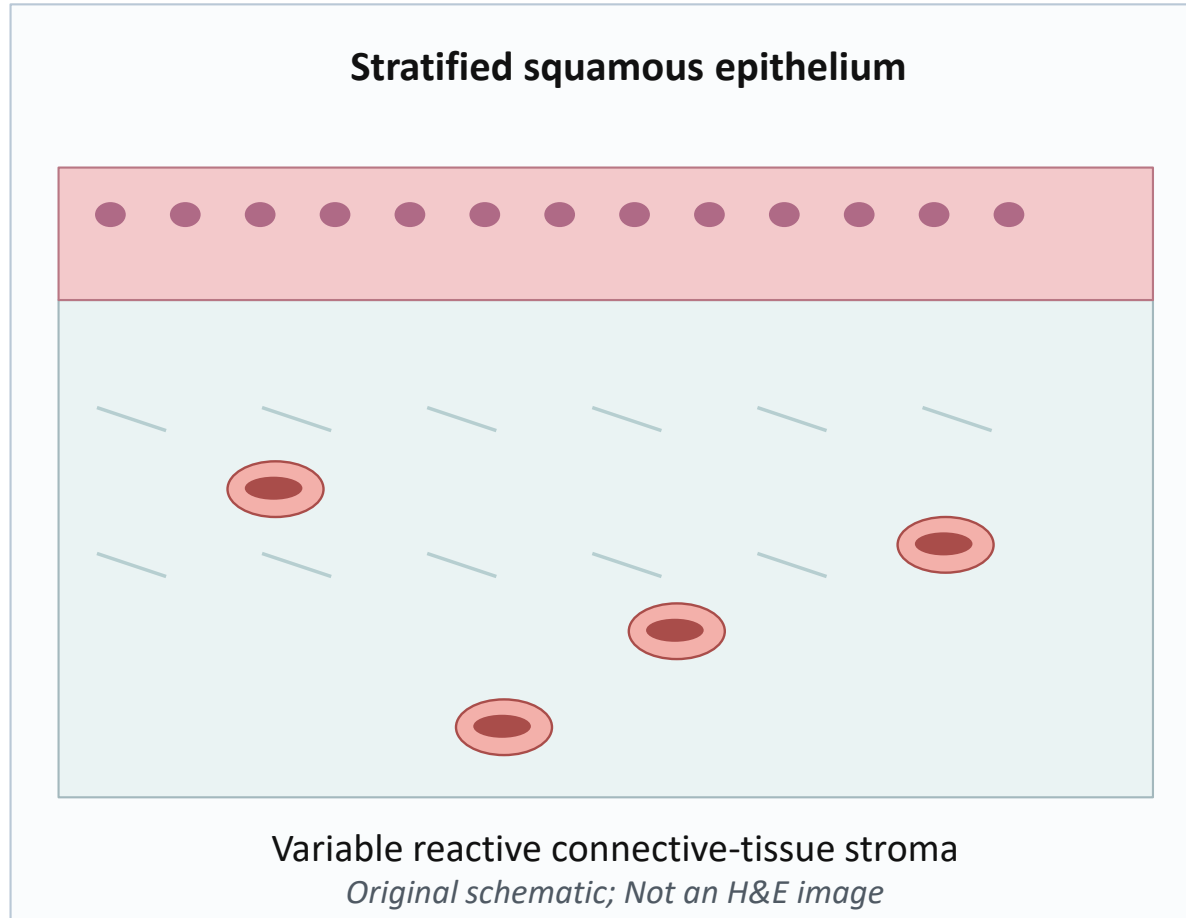
- First assess the epithelial surface:
Keratoses, hyperplasia and atypia.
- Then evaluate the lamina propria:
Edema/myxoid change, fibrosis and fibrin.
- Finally evaluate vascular changes and surface integrity.

Nodule: Schematic histologic profile



- Representative pattern: Squamous surface response with stromal fibrosis.
- Hyperplasia or keratinization can occur; Features vary with chronicity.
- The drawing is an explanatory tissue model, not an H&E photomicrograph.

Polyp: Schematic histologic profile



- Representative pattern: Loose stroma with conspicuous vascular / edematous change.
- Overlying squamous epithelium may show reactive alterations.
- The drawing is an explanatory tissue model, not an H&E photomicrograph.

Histology alone may not determine the name

Clinical data	Laterality, site, shape, phonatory history
Microscopy	Squamous cover + variable stromal phenotype
Synthesis	Reactive nodule / polyp in context

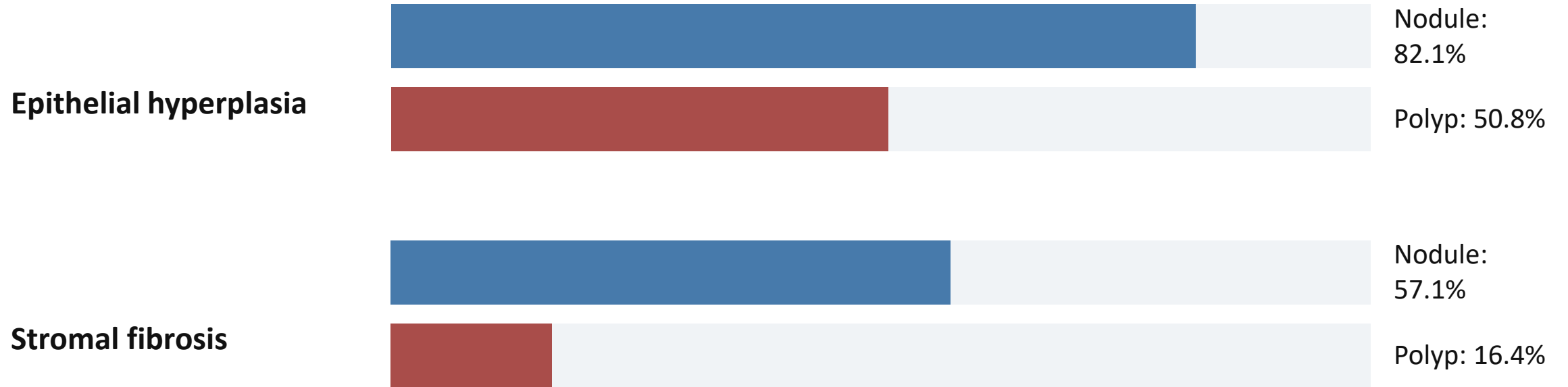
Similar histologic features in nodules and polyps.

What a surgical histology series examined

- Nunes et al. Retrospectively studied 132 lesions from 119 operated patients.
- The assessment included epithelial, basement-membrane, stromal and vascular features.
- Operated cases are a selected sample: Study proportions are not general-population prevalence.

Selected study results: Nodule-enriched findings

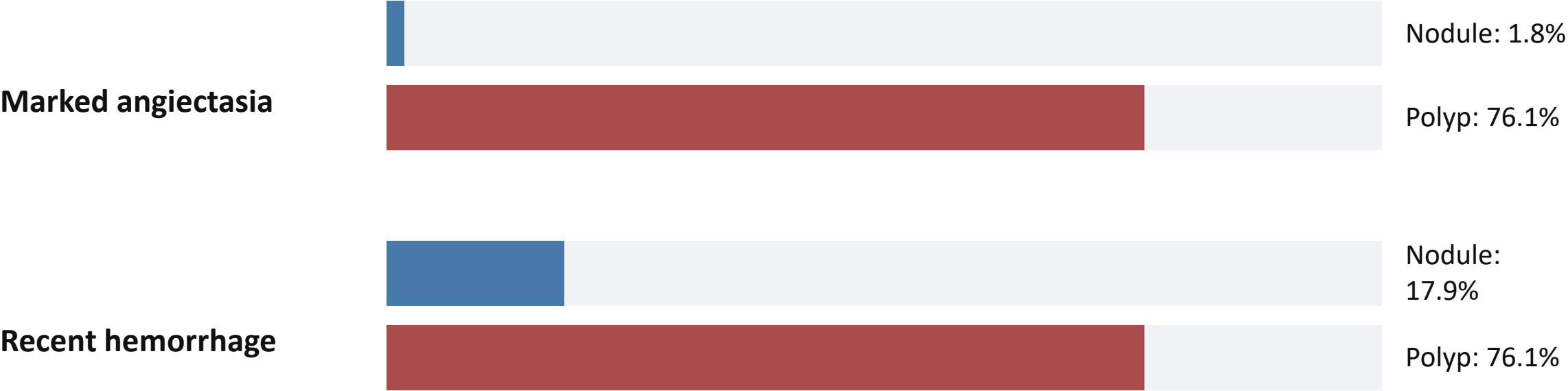
Selected operated specimens: Nodule versus polyp



Percentages from a selected retrospective surgical cohort; Not diagnostic thresholds.

Selected study results: Polyp-enriched findings

Selected operated specimens: Nodule versus polyp

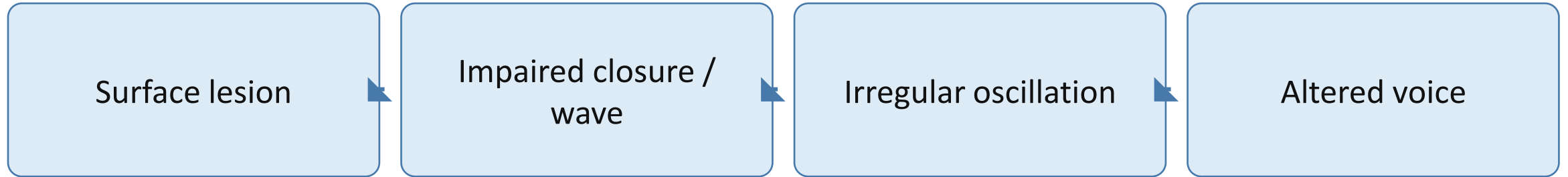


Percentages from a selected retrospective surgical cohort; Not diagnostic thresholds.

Why percentages are not diagnostic cutoffs

- The histologic observations arise from lesions selected for surgery.
- Clinical phenotype and microscopy overlap across disease labels.
- Do not use a single feature or study percentage as an absolute diagnostic rule.

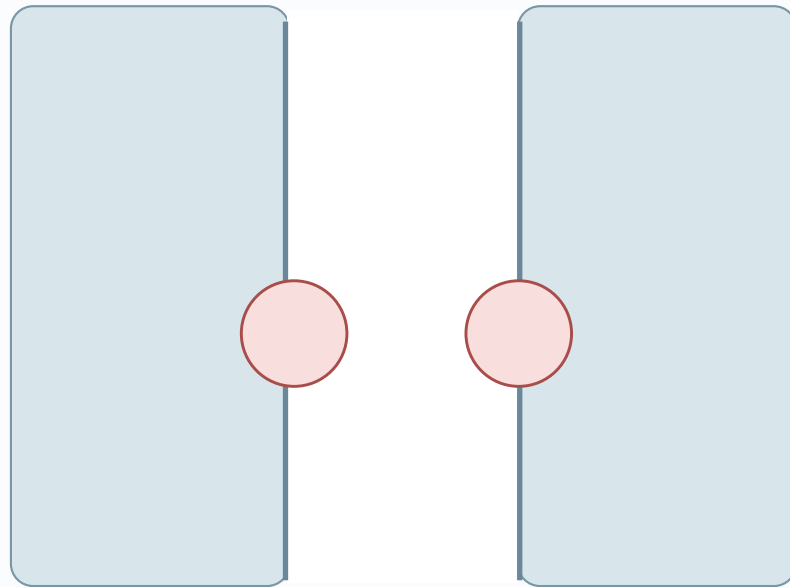
Why a small lesion makes the voice hoarse



- Lesions alter the geometry of apposition between the vocal folds.
- Local mass and stiffness can alter vibratory regularity.
- Turbulent leakage or uneven contact may produce rough, breathy or unstable sound.

Incomplete glottic closure can produce breathiness

Opposing true vocal-fold edges — schematic



Left fold

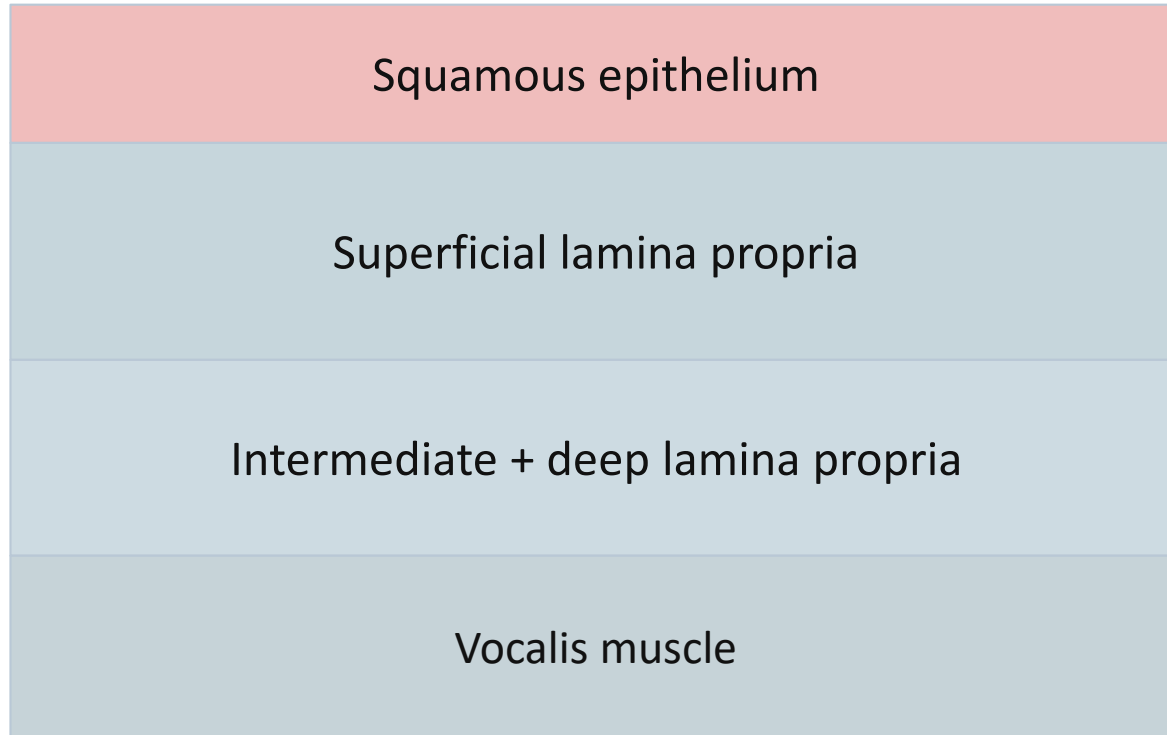
Glottic gap

Right fold

Schematic; Not an endoscopic photograph

- Opposing nodules can interfere with a continuous contact line.
- Air escape during attempted phonation may contribute to a breathy component.
- Perceptual voice assessment cannot establish lesion histology.

Stiffness may reduce vibratory pliability



- Fibrotic tissue is less pliable than a normal superficial lamina propria.
- The mucosal wave may become less regular where tissue properties change.
- Stroboscopy can help characterize the associated vibratory disturbance.

Progressive hoarseness is a typical complaint

- reactive nodules/polyps to a change in voice character.
- Hoarseness often develops progressively in this setting.
- Persistent hoarseness also occurs in other laryngeal disorders; Examine rather than assume.

Associated functional complaints add context

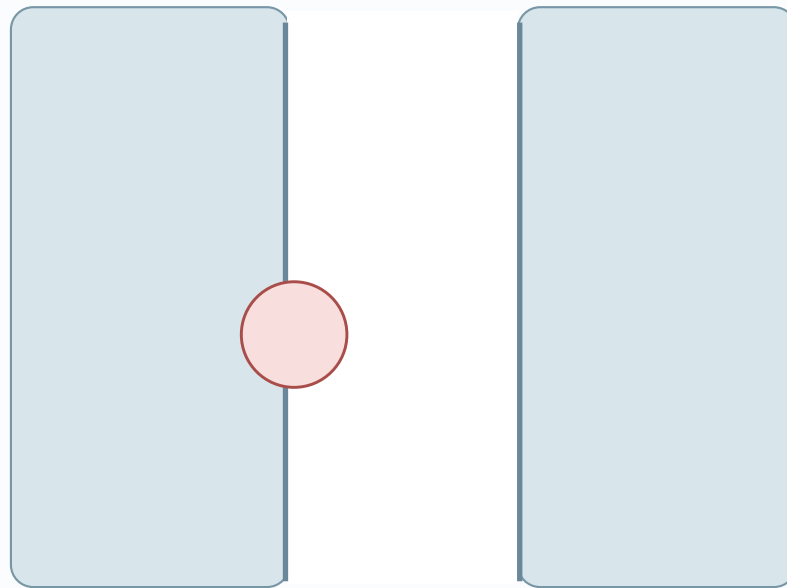
- Patients may report vocal fatigue, reduced singing range or breaks in the voice.
- Symptom burden depends on the lesion and vocal demand.
- Voice symptoms are nonspecific and should be integrated with visualization.

Clinical history: Investigate the pattern of loading

- Ask about speaking, singing, shouting, occupational use and onset of symptoms.
- Document tobacco exposure and associated irritant symptoms.
- Screen for rapid deterioration, airway complaints, prior intubation and a neck mass.

Laryngoscopy is central to structural assessment

Opposing true vocal-fold edges — schematic



Left fold

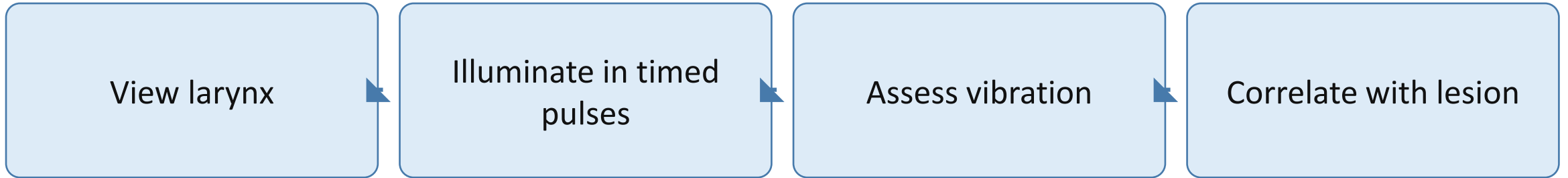
Glottic gap

Right fold

Schematic; Not an endoscopic photograph

- Direct visualization establishes whether a mucosal protrusion is present.
- Describe laterality, location, surface contour and cord mobility.
- Avoid substituting imaging or empiric reflux treatment for laryngeal visualization.

Stroboscopy assesses vibratory behavior



- Stroboscopic evaluation provides information about the vocal-fold mucosal wave.
- It complements lesion localization by assessing closure and oscillatory pattern.
- A vibratory abnormality is a functional observation, not a histologic diagnosis.

Practical comparison: Nodule and polyp

Feature	Vocal-fold nodule	Vocal-fold polyp
Typical laterality	Bilateral by convention	Unilateral by convention
Attachment	Usually localized broad-based	Sessile or pedunculated
Common morphology	Squamous cover; variable fibrosis	Squamous cover; edematous / vascular stroma
Key limitation	Overlaps with polyps	Overlaps with nodules

Papilloma is a distinct epithelial neoplasm

Reactive nodule / polyp	Smooth rounded mucosal excrescence
Squamous papilloma	Finger-like fibrovascular projections
Diagnostic implication	Exophytic morphology is not synonymous with “polyp”

Papillary fronds with central fibrovascular cores.

Carcinoma demands a separate pathway

Typical reactive lesion	Smooth, small, clinically phonotraumatic
Potential malignancy	Irregular or suspicious epithelial lesion
Action	Expedite visualization ± biopsy as indicated

Laryngeal SCC as a tobacco-associated epithelial malignancy.

Other benign lesions can mimic the presentation

- A vocal-fold cyst can present with persistent dysphonia but has a cystic internal structure.
- Reinke edema is a more diffuse polypoid process often linked to smoking.
- Direct visualization and tissue characteristics help distinguish these entities.

Cancer risk is negligible in reactive nodules

- an almost nonexistent risk of cancer arising in these lesions.
- This does not mean a patient with hoarseness cannot have an unrelated carcinoma.
- The correct formulation is benign lesion biology plus independent assessment of red flags.

Red flags that change the diagnostic urgency

- Stridor or respiratory distress requires urgent airway-oriented assessment.
- Tobacco use, neck mass or recent laryngeal instrumentation raises concern.
- Persistent or progressive unexplained dysphonia needs laryngeal visualization.

Guideline: Visualize unresolved dysphonia

- The 2018 AAO-HNS dysphonia guideline recommends laryngoscopy if symptoms do not resolve or improve within 4 weeks.
- Visualization is warranted earlier when a serious cause is suspected.
- Professional voice use and tobacco history affect the need for timely evaluation.

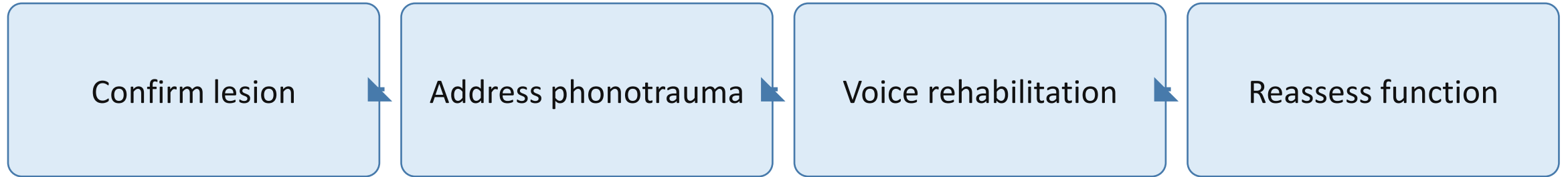
Do not image the larynx blindly for hoarseness

- The AAO-HNS guideline advises against routine CT or MRI before laryngeal visualization for a primary voice complaint.
- Endoscopic examination typically answers the initial structural question.
- Imaging can be pursued when specific findings justify it.

When tissue diagnosis is appropriate

- Suspicious appearance or concern for malignancy requires directed investigation and often biopsy.
- Symptomatic lesions failing conservative treatment may be considered for excision.
- An excised specimen should be described morphologically and interpreted with clinical findings.

First management step: Address causal voice behavior



- Reduce damaging vocal strain and improve vocal-use technique.
- Counsel on smoking cessation and avoidable irritants where relevant.
- Reassess symptom improvement alongside documented lesion findings.

Voice therapy has a defined role

- Laryngeal visualization should precede referral for voice therapy.
- Speech-language therapy targets harmful vocal-use patterns and efficient phonation.
- Nodules often respond to a conservative strategy; Persistent lesions need reassessment.

Surgery is selective, not the first answer to hoarseness

- The 2018 guideline reserves surgical consideration for appropriately selected conditions.
- Symptomatic benign lesions refractory to conservative measures may merit intervention.
- Preservation of functioning vibratory tissue remains a key clinical priority.

Illustrative case: A teacher with paired lesions

Case description

- A teacher develops months of progressively rough voice after intensive daily speaking.
- Laryngoscopy identifies smooth bilateral opposing protrusions on the true folds.
- What is the most fitting lesion label, and what is the causal mechanism?

Interpretation

Vocal-fold nodules;
Sustained phonotraumatic
contact. Assess voice use
and consider supervised
voice therapy.

Illustrative case: An acute unilateral protrusion

Case description

- After forceful shouting, an adult notices persistent dysphonia.
- Laryngoscopy reveals a smooth unilateral, stalked true-fold lesion.
- Which conventional diagnosis fits best, and which features are not established by the history alone?

Interpretation

Vocal-fold polyp is favored clinically. Histologic composition, atypia and the full differential cannot be deduced from history alone.

Illustrative case: Hoarseness in a smoker

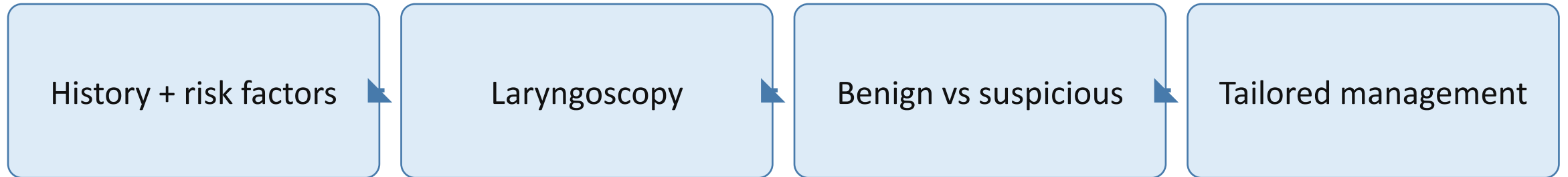
Case description

- A smoker reports progressive hoarseness and a unilateral irregular mucosal plaque.
- The history does not justify calling the plaque a reactive polyp.
- Which diagnostic concern should be prioritized?

Interpretation

Evaluate for epithelial dysplasia / laryngeal SCC with prompt laryngoscopy and biopsy when indicated.

An integrated diagnostic reasoning pathway



- Characterize the symptom and its risk modifiers.
- Visualize the larynx and describe the lesion.
- For typical benign morphology, address phonotrauma; For suspicious findings, escalate investigation.

Pathology reporting: What is actually seen

- Report squamous surface findings, including keratosis, hyperplasia or atypia.
- Describe stromal composition: Myxoid, fibrous, fibrinous and vascular changes.
- Give a clinicopathologic interpretation; Avoid unsupported certainty from one nonspecific feature.

Clinicopathologic synthesis

- Nodules and polyps are reactive lesions most closely linked to vocal strain and irritant exposure.
- Their smooth protrusions share a squamous cover and variable myxoid, fibrotic or vascular stroma.
- The key consequence is disturbed phonation—not malignant transformation.

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