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ORL 601

OTOLOGY

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Course code: ORL 601

Course title: Otology

Course credit load: 2 Units

Series 1: Otological Diagnosis and Differentials

- **Part 1.1: Clinical Assessment of the Ear**
  - Sub Part 1.1.1: History taking in otological disease
  - Sub Part 1.1.2: Otoscopic examination technique
  - Sub Part 1.1.3: Tuning fork tests and basic audiological assessment
- **Part 1.2: Diseases of the External Ear**
  - Sub Part 1.2.1: Otitis externa
  - Sub Part 1.2.2: Impacted cerumen and foreign bodies
  - Sub Part 1.2.3: Exostoses and other pinna and external canal conditions
- **Part 1.3: Diseases of the Middle Ear**
  - Sub Part 1.3.1: Acute otitis media
  - Sub Part 1.3.2: Chronic suppurative otitis media
  - Sub Part 1.3.3: Otitis media with effusion and other middle ear conditions
- **Part 1.4: Diseases of the Inner Ear and Differential Diagnosis of Hearing Loss**
  - Sub Part 1.4.1: Sensorineural hearing loss: causes and differential diagnosis
  - Sub Part 1.4.2: Meniere's disease and other vestibular disorders
  - Sub Part 1.4.3: Differentiating conductive from sensorineural hearing loss

Introduction

Welcome to **ORL 601: Otology**. Confident, competent otological practice begins with a systematic approach to history taking, examination, and differential diagnosis of ear disease, both the common conditions encountered daily in general practice and the less common presentations that demand a higher index of clinical suspicion. This opening Series establishes the clinical assessment skills and diagnostic framework required across the external, middle, and inner ear, forming the essential foundation for the emergency and surgical topics examined in the next Series of this course.

The aim of this Series is to equip you with a thorough understanding of the clinical assessment of the ear and the diagnosis and differential diagnosis of common and uncommon diseases affecting the external, middle, and inner ear.

This Series begins with the **clinical assessment of the ear**, before examining **diseases of the external ear**. We then turn to **diseases of the middle ear**, concluding with **diseases of the inner ear and differential diagnosis of hearing loss**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 1.1:** take a systematic history relevant to otological disease
- **SLO 1.2:** demonstrate correct otoscopic examination technique and basic audiological assessment using tuning fork tests
- **SLO 1.3:** recognise and describe the diagnosis of otitis externa
- **SLO 1.4:** recognise and describe the diagnosis of impacted cerumen, foreign bodies, and other external ear conditions
- **SLO 1.5:** recognise and describe the diagnosis of acute otitis media
- **SLO 1.6:** recognise and describe the diagnosis of chronic suppurative otitis media and otitis media with effusion
- **SLO 1.7:** describe the causes and differential diagnosis of sensorineural hearing loss and vestibular disorders, and
- **SLO 1.8:** differentiate conductive from sensorineural hearing loss using clinical and tuning fork assessment.

1.1 Clinical Assessment of the Ear

1.1.1 history taking in otological disease

Systematic enquiry directing subsequent examination

A systematic otological **history** should establish the specific nature, laterality, and time course of the presenting complaint, generally centred on one or more of a limited set of core symptoms, **otalgia** (ear pain), **otorrhoea** (ear discharge), **hearing loss**, **tinnitus**, and **vertigo**, each carrying distinct diagnostic implications.

Further essential history includes enquiry regarding preceding upper respiratory tract infection, discussed further later in this Series in relation to otitis media, prior ear surgery or trauma, occupational or recreational noise exposure, discussed in relation to sensorineural hearing loss later in this Series, and relevant family history, particularly for hearing loss presenting in childhood.

Fill in the blank: A systematic otological history should establish the presenting complaint among a limited set of core symptoms, including otalgia, otorrhoea, hearing loss, tinnitus, and _____.

1.1.2 otoscopic examination technique

Correct **otoscopic examination** requires gentle traction on the pinna, generally upward and backward in adults, to straighten the external auditory canal, discussed in relation to external ear anatomy later in this Series, before careful insertion of an appropriately sized speculum under direct visualisation.

Systematic assessment of the **tympanic membrane** should note its colour, translucency, position (normal, retracted, or bulging), and the presence or absence of the light reflex and visible landmarks, including the **handle of malleus** and **umbo**, with any perforation described according to its size and specific quadrant location.

Fill in the blank: Correct otoscopic examination requires gentle traction on the pinna, generally upward and backward in adults, to straighten the external auditory _____.

1.1.3 tuning fork tests and basic audiological assessment

The **Rinne test**, performed by comparing the loudness of a vibrating tuning fork, generally 512 Hz, held against the mastoid process, testing bone conduction, against the same fork held beside the ear canal, testing air conduction, is recorded as **Rinne positive** when air conduction is heard louder, the normal finding, or **Rinne negative** when bone conduction is heard louder, suggesting conductive hearing loss in that ear.

The **Weber test**, performed by placing a vibrating tuning fork in the midline of the forehead or vertex, assesses lateralisation, with the sound **lateralising** to the affected ear in conductive hearing loss, and to the unaffected ear in sensorineural hearing loss, providing an essential bedside complement to formal pure tone audiometry, discussed further later in this Series.

Fill in the blank: The Weber test assesses lateralisation, with sound lateralising to the affected ear in conductive hearing loss, and to the unaffected ear in _____ hearing loss.

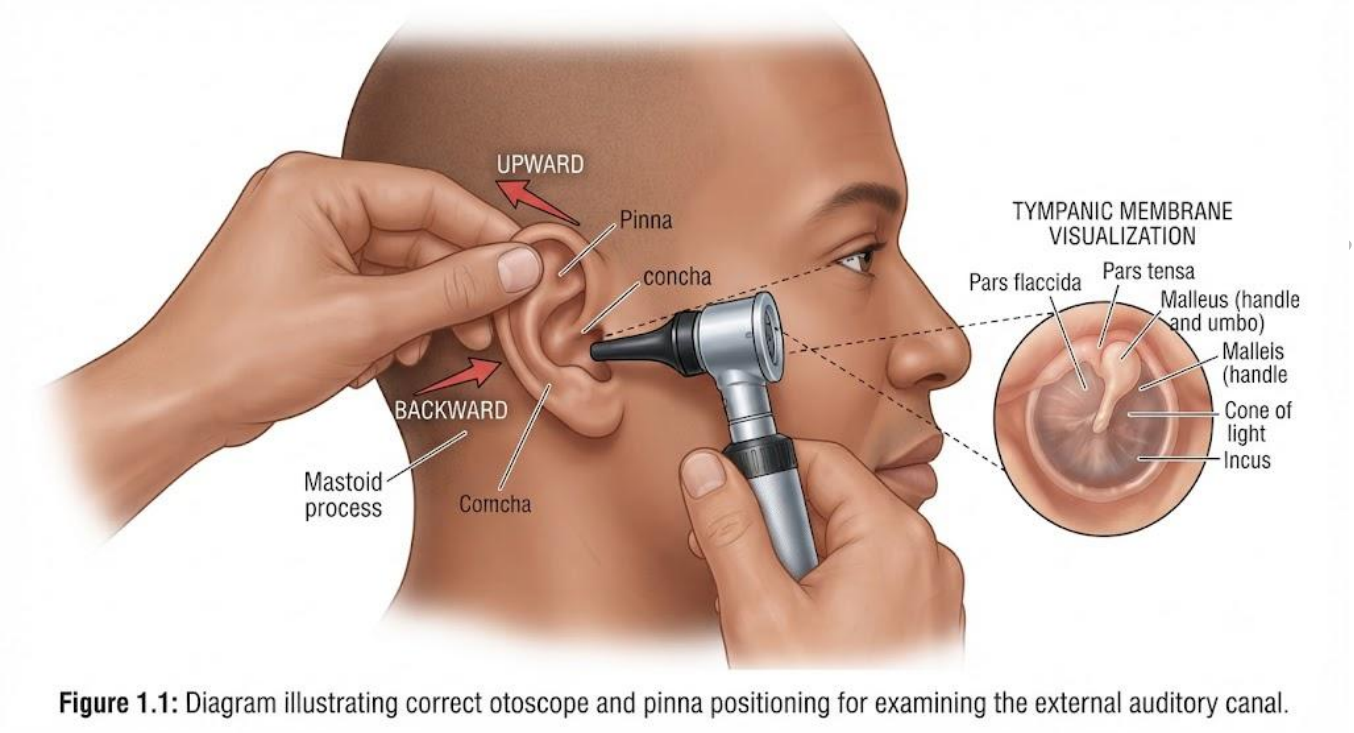

Figure 1.1: Diagram illustrating correct otoscope and pinna positioning for examining the external auditory canal.

Figure 1.1: Diagram illustrating correct otoscope and pinna positioning for examining the external auditory canal.

Pilot questions 1.1

1. List the five core symptoms that should be specifically enquired about in an otological history. (Linked to SLO 1.1)
2. Describe the correct technique for pinna traction during otoscopic examination in an adult. (Linked to SLO 1.2)
3. List the features that should be assessed on otoscopic examination of the tympanic membrane. (Linked to SLO 1.2)
4. Describe how the Rinne test is performed and interpreted. (Linked to SLO 1.2)
5. Describe how the Weber test is performed and interpreted. (Linked to SLO 1.2)

1.2 Diseases of the External Ear

1.2.1 otitis externa

Inflammation of the external auditory canal skin and soft tissue

Acute otitis externa is an infective or inflammatory condition of the external auditory canal skin, most commonly bacterial, particularly **Pseudomonas aeruginosa** and **Staphylococcus aureus**, presenting with otalgia characteristically worsened by pinna traction or jaw movement, canal oedema, and otorrhoea.

Malignant, or necrotising, otitis externa represents a rare but serious progression of infection into the surrounding bone, discussed further as an emergency in the next Series of this course, occurring almost exclusively in **diabetic** or otherwise immunocompromised patients, and requiring urgent recognition given its considerable potential morbidity if inadequately treated.

Fill in the blank: Malignant, or necrotising, otitis externa occurs almost exclusively in diabetic or otherwise _____ patients.

1.2.2 impacted cerumen and foreign bodies

Impacted cerumen, or ear wax, presents with conductive hearing loss, discussed earlier in this Series, a sensation of ear fullness, and, at times, tinnitus, generally managed with cerumenolytic drops or careful **syringing**, microsuction, or instrumental removal under direct vision where simple measures prove insufficient.

Foreign bodies within the external auditory canal, discussed particularly in relation to children, range from inert objects to, occasionally, live insects, requiring careful, atraumatic removal, generally by microsuction or fine instrumentation, with a low threshold for specialist referral where the foreign body is adherent to the canal wall or the **tympanic membrane** itself.

Fill in the blank: Impacted cerumen is generally managed with cerumenolytic drops or careful syringing, microsuction, or instrumental removal under direct _____.

1.2.3 exostoses and other pinna and external canal conditions

Exostoses are benign, bony outgrowths of the external auditory canal, strongly associated with repeated cold water exposure, discussed in relation to occupational and recreational history earlier in this Series, and generally producing progressive canal **narrowing**, occasionally requiring surgical removal if significantly obstructing or symptomatic.

Further recognised pinna and external canal conditions include **perichondritis**, infection of the cartilaginous framework of the pinna, often following minor trauma or piercing, and **relapsing polychondritis**, a rare autoimmune condition producing recurrent inflammation of cartilaginous structures including the pinna, each requiring prompt recognition to prevent permanent cartilage **destruction**.

Fill in the blank: Exostoses are benign, bony outgrowths of the external auditory canal strongly associated with repeated _____ water exposure.

Table 1.2: Comparing common conditions of the external ear.

Condition	Typical cause	Key clinical feature
Otitis externa	Bacterial infection (Pseudomonas, Staphylococcus)	Otalgia worsened by pinna traction
Impacted cerumen	Accumulated ear wax	Conductive hearing loss, ear fullness
Exostoses	Repeated cold water exposure	Progressive canal narrowing

Pilot questions 1.2

1. Describe the typical clinical presentation of acute otitis externa. (Linked to SLO 1.3)
2. Describe the specific patient group at risk of malignant otitis externa. (Linked to SLO 1.3)
3. Describe the clinical presentation and management of impacted cerumen. (Linked to SLO 1.4)
4. Describe the appropriate approach to removing a foreign body from the external auditory canal. (Linked to SLO 1.4)
5. Define exostoses and describe their characteristic risk factor. (Linked to SLO 1.4)

1.3 Diseases of the Middle Ear

1.3.1 acute otitis media

Acute middle ear infection, most common in early childhood

Acute otitis media is an acute infection of the middle ear cleft, most commonly occurring in young children following **Eustachian tube** dysfunction accompanying an upper respiratory tract infection, presenting with otalgia, fever, and, on otoscopy, a bulging, erythematous tympanic membrane, discussed earlier in this Series, with loss of the normal light reflex.

Common causative organisms include **Streptococcus pneumoniae**, **Haemophilus influenzae**, and **Moraxella catarrhalis**, with management generally including appropriate **analgesia**, and antibiotic therapy for confirmed or strongly suspected bacterial infection, particularly in younger children or where symptoms are severe or persistent.

Fill in the blank: Acute otitis media most commonly occurs in young children following Eustachian tube dysfunction accompanying an upper respiratory tract _____.

1.3.2 chronic suppurative otitis media

Chronic suppurative otitis media is characterised by persistent tympanic membrane **perforation** with recurrent or continuous otorrhoea, discussed earlier in this Series, generally classified as **tubotympanic** (safe) disease, involving the central portion of the tympanic membrane, or **atticoantral** (unsafe) disease, associated with **cholesteatoma** formation.

Cholesteatoma, an abnormal accumulation of keratinising squamous epithelium within the middle ear cleft, carries significant potential for progressive local bone erosion and serious complications, discussed further as an emergency topic in the next Series of this course, generally requiring surgical **mastoidectomy** for definitive management.

Fill in the blank: Atticoantral, or unsafe, chronic suppurative otitis media is associated with the formation of _____.

1.3.3 otitis media with effusion and other middle ear conditions

Otitis media with effusion, sometimes termed glue ear, presents with persistent middle ear fluid accumulation in the absence of acute infection, generally producing conductive hearing loss, discussed earlier in this Series, without significant otalgia, and is of particular importance in **children**, given its potential impact on speech and language development if prolonged.

Further middle ear conditions include **otosclerosis**, an inherited condition causing progressive fixation of the stapes footplate and consequent conductive, and eventually mixed, hearing loss, and **barotrauma**, middle ear injury resulting from rapid pressure change, such as during air travel or diving, discussed further in relation to prevention later in this Series.

Fill in the blank: Otosclerosis is an inherited condition causing progressive fixation of the stapes footplate and consequent conductive, and eventually mixed, hearing _____.

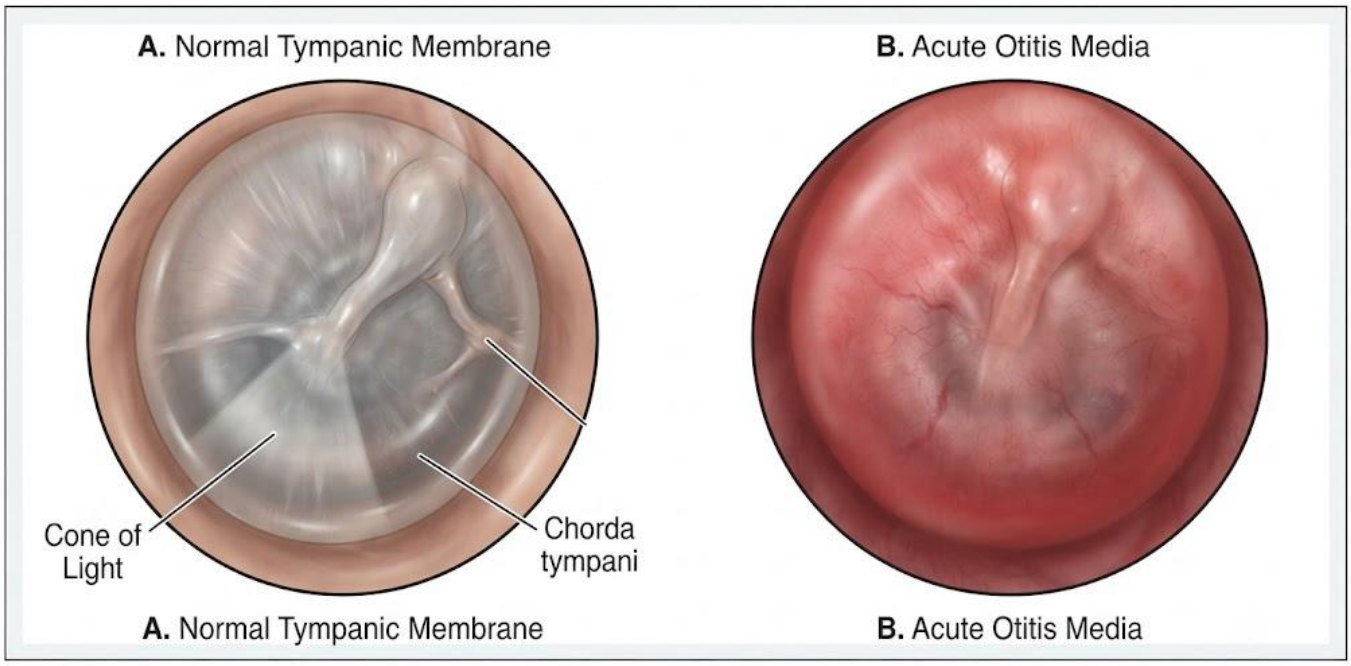

Figure 1.3: Otoscopic view diagram comparing a normal tympanic membrane with a bulging, erythemat- membrane of acute otitis media.

Figure 1.3: Otoscopic view diagram comparing a normal tympanic membrane with a bulging, erythematous membrane of acute otitis media.

Pilot questions 1.3

1. Describe the typical clinical and otoscopic presentation of acute otitis media. (Linked to SLO 1.5)
2. Name three common causative organisms of acute otitis media. (Linked to SLO 1.5)
3. Distinguish tubotympanic from atticoantral chronic suppurative otitis media. (Linked to SLO 1.6)
4. Define cholesteatoma and describe its clinical significance. (Linked to SLO 1.6)
5. Define otitis media with effusion and explain its particular importance in children. (Linked to SLO 1.6)

1.4 Diseases of the Inner Ear and Differential Diagnosis of Hearing Loss

1.4.1 sensorineural hearing loss: causes and differential diagnosis

Cochlear or retrocochlear dysfunction affecting sound perception

Sensorineural hearing loss results from dysfunction of the cochlea, the auditory nerve, or central auditory pathways, with recognised causes including **presbycusis**, age-related

progressive hearing loss, **noise-induced hearing loss**, discussed in relation to occupational history earlier in this Series, and **ototoxicity** from certain medications, including aminoglycoside antibiotics.

Further important causes requiring careful differential consideration include **sudden sensorineural hearing loss**, a genuine otological emergency discussed further in the next Series of this course, **vestibular schwannoma**, a benign tumour of the vestibulocochlear nerve typically presenting with asymmetric hearing loss, and congenital causes relevant to childhood **hearing screening**.

Fill in the blank: Sensorineural hearing loss results from dysfunction of the cochlea, the auditory nerve, or central auditory _____.

1.4.2 meniere's disease and other vestibular disorders

Meniere's disease classically presents with the characteristic tetrad of episodic **vertigo**, fluctuating sensorineural hearing loss, tinnitus, and a sensation of aural fullness, thought to result from excessive accumulation of endolymph within the inner ear, termed **endolymphatic hydrops**.

Further recognised vestibular disorders include **benign paroxysmal positional vertigo**, producing brief episodes of vertigo triggered by specific head movements, resulting from displaced otoconia within the semicircular canals, and **vestibular neuronitis**, producing a single prolonged episode of severe vertigo, generally following a viral **illness**, without accompanying hearing loss.

Fill in the blank: Meniere's disease is thought to result from excessive accumulation of endolymph within the inner ear, termed endolymphatic _____.

1.4.3 differentiating conductive from sensorineural hearing loss

Distinguishing **conductive** from **sensorineural** hearing loss relies substantially on the tuning fork tests discussed earlier in this Series, together with formal **pure tone audiometry**, which measures air and bone conduction thresholds separately across a range of frequencies, revealing a characteristic **air-bone gap** in conductive hearing loss that is absent in pure sensorineural hearing loss.

This distinction carries direct clinical significance, since conductive hearing loss generally reflects a mechanical problem within the external or middle ear, discussed throughout this Series, often amenable to medical or surgical correction, while sensorineural hearing loss, discussed

earlier in this Part, generally requires audiological rehabilitation, discussed further in the next Series of this course, rather than surgical correction of the underlying cause.

Fill in the blank: Pure tone audiometry reveals a characteristic air-bone gap in conductive hearing loss that is absent in pure _____ hearing loss.

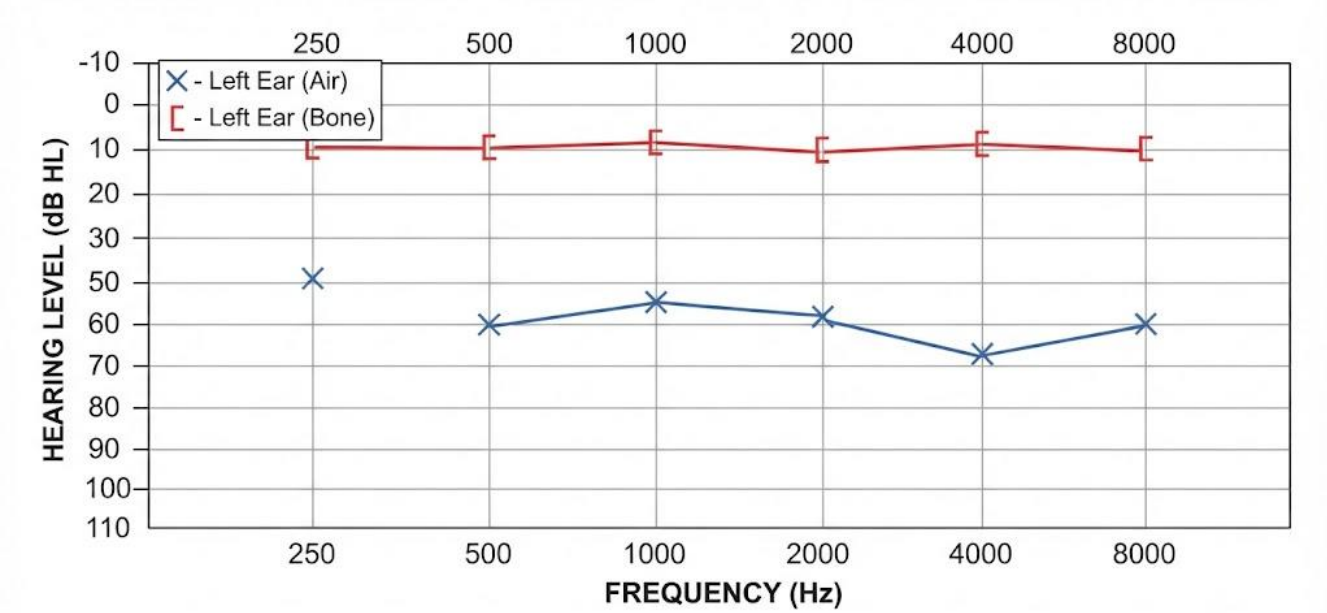

Figure 1.4: Diagram of a pure tone audiogram showing an air-bone gap characteristic of conductive hearing loss.

Figure 1.4: Diagram of a pure tone audiogram showing an air-bone gap characteristic of conductive hearing loss.

Pilot questions 1.4

1. List three recognised causes of sensorineural hearing loss. (Linked to SLO 1.7)
2. Define vestibular schwannoma and describe its typical presentation. (Linked to SLO 1.7)
3. State the classic clinical tetrad of Meniere's disease. (Linked to SLO 1.7)
4. Distinguish benign paroxysmal positional vertigo from vestibular neuronitis. (Linked to SLO 1.7)
5. Explain how pure tone audiometry distinguishes conductive from sensorineural hearing loss. (Linked to SLO 1.8)

Series Summary

This opening Series established the foundation of otological diagnosis, beginning with the **clinical assessment of the ear**, systematic history taking, otoscopic examination technique, and tuning fork testing, before examining **diseases of the external ear**, otitis externa, impacted cerumen and foreign bodies, and exostoses.

We then examined **diseases of the middle ear**, acute otitis media, chronic suppurative otitis media, and otitis media with effusion, concluding with **diseases of the inner ear and differential diagnosis of hearing loss**, sensorineural hearing loss, Meniere's disease and vestibular disorders, and the essential distinction between conductive and sensorineural hearing loss. Having worked through this Series, you should now possess the diagnostic foundation needed to understand otological emergencies and surgical management examined in the next Series of this course.

Glossary of Terms

- **Otalgia:** ear pain.
- **Otorrhoea:** ear discharge.
- **Rinne test:** a tuning fork test comparing air and bone conduction in a single ear.
- **Weber test:** a tuning fork test assessing lateralisation of sound perception.
- **Otitis externa:** inflammation or infection of the external auditory canal skin.
- **Cholesteatoma:** an abnormal accumulation of keratinising squamous epithelium within the middle ear.
- **Otitis media with effusion:** persistent middle ear fluid without acute infection, also termed glue ear.
- **Otosclerosis:** an inherited condition causing progressive fixation of the stapes footplate.
- **Presbycusis:** age-related, progressive sensorineural hearing loss.
- **Endolymphatic hydrops:** excessive accumulation of endolymph within the inner ear, implicated in Meniere's disease.
- **Pure tone audiometry:** a formal hearing test measuring air and bone conduction thresholds across frequencies.
- **Air-bone gap:** the difference between air and bone conduction thresholds, characteristic of conductive hearing loss.

Concept Check Questions [Series 1]

Objective questions

1. An otological history should establish the presenting complaint among core symptoms including otalgia, otorrhoea, hearing loss, tinnitus, and _____.
2. The Weber test lateralises to the affected ear in conductive hearing loss and to the unaffected ear in _____ hearing loss.
3. Malignant, or necrotising, otitis externa occurs almost exclusively in diabetic or otherwise _____ patients.
4. Atticoantral, or unsafe, chronic suppurative otitis media is associated with the formation of _____.
5. Meniere's disease is thought to result from excessive accumulation of endolymph within the inner ear, termed endolymphatic _____.

Short-answer questions

6. Describe how the Rinne test is performed and interpreted.
7. Describe the typical clinical presentation of acute otitis externa.
8. Distinguish tubotympanic from atticoantral chronic suppurative otitis media.
9. State the classic clinical tetrad of Meniere's disease.
10. Explain how pure tone audiometry distinguishes conductive from sensorineural hearing loss.

Long-answer questions

11. Discuss the systematic history taking, otoscopic examination, and tuning fork testing used in otological assessment. (Linked to SLO 1.1, SLO 1.2)
12. Discuss otitis externa, impacted cerumen, foreign bodies, and exostoses. (Linked to SLO 1.3, SLO 1.4)
13. Discuss acute otitis media, chronic suppurative otitis media, and otitis media with effusion. (Linked to SLO 1.5, SLO 1.6)
14. Discuss the causes and differential diagnosis of sensorineural hearing loss and vestibular disorders. (Linked to SLO 1.7)
15. Discuss the differentiation of conductive from sensorineural hearing loss. (Linked to SLO 1.8)

Answers to Concept Check Questions [Series 1]

Objective questions

1. Vertigo.
2. Sensorineural.
3. Immunocompromised.

4. Cholesteatoma.
5. Hydrops.

Short-answer questions

6. Compare loudness of a vibrating tuning fork at the mastoid (bone conduction) versus beside the ear canal (air conduction); Rinne positive is normal, Rinne negative suggests conductive loss.
7. Otalgia worsened by pinna traction or jaw movement, canal oedema, and otorrhoea.
8. Tubotympanic disease involves the central tympanic membrane and is considered safe; atticoantral disease is associated with cholesteatoma and considered unsafe.
9. Episodic vertigo, fluctuating sensorineural hearing loss, tinnitus, and aural fullness.
10. It measures air and bone conduction thresholds separately, revealing an air-bone gap present in conductive but not sensorineural hearing loss.

Long-answer questions

11. **Basic response:** A systematic otological history covers otalgia, otorrhoea, hearing loss, tinnitus, and vertigo, complemented by otoscopic examination assessing the tympanic membrane's colour, position, and landmarks.

Value-added response: Tuning fork tests, the Rinne and Weber tests, provide an essential bedside means of distinguishing conductive from sensorineural hearing loss ahead of formal audiometry.

12. **Basic response:** Otitis externa presents with otalgia worsened by pinna traction, while impacted cerumen and foreign bodies produce conductive hearing loss and require careful removal.

Value-added response: Exostoses, associated with cold water exposure, cause progressive canal narrowing, together illustrating the range of common external ear pathology.

13. **Basic response:** Acute otitis media presents with a bulging, erythematous tympanic membrane following upper respiratory infection, while chronic suppurative otitis media involves persistent perforation, classified as tubotympanic or atticoantral disease.

Value-added response: Otitis media with effusion produces conductive hearing loss without infection, of particular importance in children given its impact on speech and language development.

14. **Basic response:** Sensorineural hearing loss results from cochlear, nerve, or central pathway dysfunction, including presbycusis, noise-induced loss, and ototoxicity.

Value-added response: Meniere's disease and other vestibular disorders, including benign paroxysmal positional vertigo and vestibular neuronitis, require careful differentiation based on their specific symptom pattern and duration.

15. **Basic response:** Differentiating conductive from sensorineural hearing loss relies on tuning fork tests and formal pure tone audiometry revealing an air-bone gap in conductive loss.

Value-added response: This distinction carries direct clinical significance, since conductive loss is often surgically correctable while sensorineural loss generally requires audiological rehabilitation.

Answers to Pilot Questions [Series 1]

Part 1.1

1. Otalgia, otorrhoea, hearing loss, tinnitus, and vertigo.
2. Pulling the pinna upward and backward to straighten the external auditory canal.
3. Colour, translucency, position, presence of the light reflex, and visible landmarks such as the malleus and umbo.
4. Compare bone conduction at the mastoid with air conduction beside the ear canal; positive (air louder) is normal, negative (bone louder) suggests conductive loss.
5. Place a vibrating fork at the forehead or vertex; it lateralises to the affected ear in conductive loss and to the unaffected ear in sensorineural loss.

Part 1.2

1. Otalgia worsened by pinna traction or jaw movement, canal oedema, and otorrhoea.
2. Diabetic or otherwise immunocompromised patients.
3. Conductive hearing loss, ear fullness, and tinnitus; managed with cerumenolytic drops, syringing, microsuction, or instrumental removal.
4. Careful, atraumatic removal, generally by microsuction or fine instrumentation, with low threshold for specialist referral if adherent.
5. Benign bony outgrowths of the external auditory canal; strongly associated with repeated cold water exposure.

Part 1.3

1. Otalgia and fever, with a bulging, erythematous tympanic membrane and loss of the light reflex.
2. Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis.
3. Tubotympanic disease is central and safe; atticoantral disease is associated with cholesteatoma and unsafe.
4. An abnormal accumulation of keratinising squamous epithelium in the middle ear; it carries risk of local bone erosion and serious complications.
5. Persistent middle ear fluid without infection; important in children due to potential impact on speech and language development.

Part 1.4

1. Presbycusis, noise-induced hearing loss, and ototoxicity.
2. A benign tumour of the vestibulocochlear nerve; typically presents with asymmetric hearing loss.
3. Episodic vertigo, fluctuating sensorineural hearing loss, tinnitus, and aural fullness.
4. Benign paroxysmal positional vertigo produces brief episodes triggered by head movement; vestibular neuronitis produces a single prolonged episode following viral illness without hearing loss.
5. It measures air and bone conduction thresholds separately, revealing an air-bone gap present in conductive but absent in sensorineural hearing loss.

References and Attributions [Series 1]

- Gleeson, M. (Ed.). (2008). Scott-Brown's Otorhinolaryngology, Head and Neck Surgery (7th ed.). Hodder Arnold.
- Probst, R., Grevers, G., & Iro, H. (2018). Basic Otorhinolaryngology: A Step-by-Step Learning Guide (2nd ed.). Thieme.
- Dhillon, R. S., & East, C. A. (2013). Ear, Nose and Throat and Head and Neck Surgery: An Illustrated Colour Text (4th ed.). Churchill Livingstone.
- Ludman, H., & Bradley, P. J. (Eds.). (2007). ABC of Ear, Nose and Throat (6th ed.). BMJ Books.

Figures, Plates, Tables, and Boxes

- Figure 1.1: Diagram illustrating correct otoscope and pinna positioning for examining the external auditory canal. AI-generated using the prompt: "A single clean, clinically accurate instructional diagram showing a hand gently pulling the outer ear upward and backward while the other hand holds an otoscope correctly angled toward the ear canal, medical textbook instructional style, clear labelled arrows showing direction of traction, neutral background, no other panels."
- Table 1.2: Comparing common conditions of the external ear. AI-generated using the prompt: "Create a clean clinical reference table titled Comparing Common Conditions of the External Ear, listing condition, typical cause, and key clinical feature. Medical reference table style with outside border, no photographic elements."
- Figure 1.3: Otoscopic view diagram comparing a normal tympanic membrane with a bulging, erythematous membrane of acute otitis media. AI-generated using the prompt: "A single clean, accurate paired otoscopic view diagram showing a normal translucent tympanic membrane with visible light reflex and malleus on one side, and a red, bulging tympanic membrane without visible landmarks on the other side, medical textbook diagnostic reference style, clear labels, neutral background, no other panels."
- Figure 1.4: Diagram of a pure tone audiogram showing an air-bone gap characteristic of conductive hearing loss. AI-generated using the prompt: "A single clean, accurate audiogram chart diagram with frequency on the horizontal axis and hearing level in decibels on the vertical axis, showing an air conduction threshold line notably below a bone conduction threshold line to depict an air-bone gap, medical textbook diagnostic chart style, clearly labelled axes and symbols, neutral background, no other panels."

Course code: ORL 601

Course title: Otology

Course credit load: 2 Units

Series 2: Otological Emergencies and Management

- **Part 2.1: Otological Emergencies I**
  - Sub Part 2.1.1: Acute mastoiditis and its complications
  - Sub Part 2.1.2: Malignant (necrotising) otitis externa
  - Sub Part 2.1.3: Facial nerve palsy in otological disease
- **Part 2.2: Otological Emergencies II**
  - Sub Part 2.2.1: Sudden sensorineural hearing loss
  - Sub Part 2.2.2: Temporal bone trauma
  - Sub Part 2.2.3: Intracranial complications of ear disease
- **Part 2.3: Basic Surgical Principles and Postoperative Complications**
  - Sub Part 2.3.1: Principles of common otological surgical procedures
  - Sub Part 2.3.2: Postoperative care and complications
  - Sub Part 2.3.3: Indications for referral to secondary and tertiary otological care
- **Part 2.4: Rehabilitation, Follow-Up, and Prevention**
  - Sub Part 2.4.1: Hearing rehabilitation: hearing aids and cochlear implants
  - Sub Part 2.4.2: Follow-up criteria after otological treatment
  - Sub Part 2.4.3: Preventive measures for otological disease

Introduction

In the last Series, we established the clinical assessment and differential diagnosis of otological disease. We now turn to **otological emergencies**, conditions demanding urgent recognition and prompt referral to prevent serious morbidity, together with the **basic surgical principles**, **postoperative complications**, **rehabilitation process**, and **preventive measures** relevant to comprehensive otological management. Recognising these emergencies promptly, and

understanding the surgical and rehabilitative pathway that follows definitive diagnosis, is essential to safe otological practice.

The aim of this Series is to equip you with a thorough understanding of otological emergencies, their initial treatment and indications for referral, the basic surgical principles of management and postoperative complications, the rehabilitation process and follow-up criteria, and preventive measures for otological disease.

This Series begins with **otological emergencies I**, before turning to **otological emergencies II**. We then examine **basic surgical principles and postoperative complications**, concluding with **rehabilitation, follow-up, and prevention**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 2.1:** recognise acute mastoiditis and its complications, and malignant otitis externa, and describe their initial treatment and referral
- **SLO 2.2:** recognise facial nerve palsy in otological disease and describe its initial management
- **SLO 2.3:** recognise sudden sensorineural hearing loss and temporal bone trauma as otological emergencies
- **SLO 2.4:** describe the intracranial complications of ear disease and their indications for urgent referral
- **SLO 2.5:** describe the basic principles of common otological surgical procedures
- **SLO 2.6:** describe postoperative care and complications following otological surgery
- **SLO 2.7:** describe hearing rehabilitation options and follow-up criteria after otological treatment, and
- **SLO 2.8:** describe preventive measures relevant to common otological disease.

2.1 Otological Emergencies I

2.1.1 acute mastoiditis and its complications

Extension of middle ear infection into the mastoid air cell system

Acute mastoiditis represents extension of acute otitis media, discussed in the previous Series of this course, into the **mastoid air cell system**, presenting with postauricular swelling, tenderness, and characteristic **protrusion** of the pinna, together with persistent fever and otalgia despite initial antibiotic treatment of the underlying otitis media.

Initial management requires **intravenous antibiotics** and urgent otolaryngology referral, since untreated or inadequately treated mastoiditis carries risk of serious complications, including **subperiosteal abscess** formation and intracranial extension, discussed further later in this Series, with surgical **mastoidectomy** required where medical treatment alone proves insufficient.

Fill in the blank: Acute mastoiditis presents with postauricular swelling, tenderness, and characteristic _____ of the pinna.

2.1.2 malignant (necrotising) otitis externa

Malignant otitis externa, discussed in the previous Series of this course, represents progressive **Pseudomonas aeruginosa** infection extending from the external auditory canal into adjacent bone, presenting with severe, persistent otalgia disproportionate to examination findings, and, characteristically, **granulation tissue** visible at the bony-cartilaginous junction of the canal floor.

Management requires urgent otolaryngology referral for prolonged, high-dose **intravenous antibiotic** therapy, generally over several weeks, together with imaging to assess the extent of bony involvement, since delayed recognition carries risk of progressive skull base **osteomyelitis** and cranial nerve palsies.

Fill in the blank: Malignant otitis externa characteristically presents with granulation tissue visible at the bony-cartilaginous junction of the canal _____.

2.1.3 facial nerve palsy in otological disease

Facial nerve palsy arising in the context of otological disease may complicate acute or chronic otitis media, discussed in the previous Series of this course, cholesteatoma, or malignant otitis externa, discussed earlier in this Part, reflecting the nerve's close anatomical relationship to the middle ear and mastoid as it traverses the **facial canal**.

Sudden-onset facial palsy in the setting of active ear disease represents an **emergency** requiring urgent otolaryngology referral for imaging and, where indicated, urgent surgical **decompression**, since prompt intervention offers the best opportunity to prevent permanent facial nerve **dysfunction**.

Fill in the blank: Facial nerve palsy arising from otological disease reflects the nerve's close anatomical relationship to the middle ear and mastoid as it traverses the facial _____.

Figure 2.1: Clinical illustration of acute mastoiditis showing postauricular swelling and forward protrusion of the pinna.

Figure 2.1: Clinical illustration of acute mastoiditis showing postauricular swelling and forward protrusion of the pinna.

Pilot questions 2.1

- Describe the clinical presentation of acute mastoiditis. (Linked to SLO 2.1)
- Describe the initial management of acute mastoiditis. (Linked to SLO 2.1)
- Describe the characteristic clinical finding of malignant otitis externa on examination. (Linked to SLO 2.1)
- Describe the initial management of malignant otitis externa. (Linked to SLO 2.1)
- Explain why sudden-onset facial nerve palsy in active ear disease requires urgent referral. (Linked to SLO 2.2)

2.2 Otological Emergencies II

2.2.1 sudden sensorineural hearing loss

A rapid, unexplained loss demanding urgent evaluation

Sudden sensorineural hearing loss is defined as a hearing loss of at least 30 decibels across three consecutive frequencies occurring within a period of 72 hours or less, discussed in relation to audiometric assessment in the previous Series of this course, generally of unknown cause though occasionally associated with viral infection or vascular events.

This condition constitutes a genuine otological **emergency**, since prompt initiation of **systemic corticosteroid** therapy within the first one to two weeks offers the best opportunity for meaningful hearing recovery, meaning any patient presenting with rapid, unexplained hearing loss warrants urgent audiological assessment and specialist referral without delay.

Fill in the blank: Sudden sensorineural hearing loss is defined as a hearing loss of at least 30 decibels across three consecutive frequencies occurring within _____ hours or less.

2.2.2 temporal bone trauma

Temporal bone fractures, generally resulting from significant head trauma, are broadly classified as **longitudinal**, more common and typically producing conductive hearing loss and haemotympanum, and **transverse**, less common but carrying higher risk of sensorineural hearing loss and facial nerve injury, given the fracture line's closer relationship to the inner ear and facial canal.

Clinical evaluation should assess for **cerebrospinal fluid otorrhoea**, indicating a potential communication between the middle ear and intracranial space, and facial nerve function, discussed earlier in this Series, with urgent imaging and otolaryngology or neurosurgical referral indicated where either finding is present.

Fill in the blank: Longitudinal temporal bone fractures typically produce conductive hearing loss and _____.

2.2.3 intracranial complications of ear disease

Intracranial complications of ear disease, generally arising from untreated or inadequately treated acute or chronic otitis media and mastoiditis, discussed earlier in this Series, include **meningitis**, **extradural** and **subdural abscess**, and **lateral sinus thrombosis**, each representing a genuine life-threatening emergency.

Clinical features raising suspicion for intracranial extension include persistent headache, fever despite antibiotic treatment, altered consciousness, and focal neurological signs, with urgent

cross-sectional imaging and combined otolaryngological and neurosurgical management required for any patient with active ear disease and these accompanying warning **features**.

Fill in the blank: Intracranial complications of ear disease include meningitis, extradural and subdural abscess, and lateral sinus _____.

Table 2.2: Comparing key otological emergencies.

Emergency	Key warning sign	Immediate priority
Acute mastoiditis	Postauricular swelling with pinna protrusion	Intravenous antibiotics and urgent referral
Malignant otitis externa	Granulation tissue at the canal bony-cartilaginous junction	Prolonged intravenous antibiotics and imaging
Sudden sensorineural hearing loss	Rapid unexplained hearing loss within 72 hours	Urgent corticosteroid therapy and audiological assessment

Pilot questions 2.2

1. Define sudden sensorineural hearing loss. (Linked to SLO 2.3)
2. Explain why sudden sensorineural hearing loss requires urgent treatment. (Linked to SLO 2.3)
3. Distinguish longitudinal from transverse temporal bone fractures. (Linked to SLO 2.3)
4. List three intracranial complications of ear disease. (Linked to SLO 2.4)
5. Describe the clinical features that should raise suspicion for intracranial extension of ear disease. (Linked to SLO 2.4)

2.3 Basic Surgical Principles and Postoperative Complications

2.3.1 principles of common otological surgical procedures

Restoring hearing and eradicating disease through targeted surgery

Myringotomy, with or without **grommet** (ventilation tube) insertion, is generally performed for otitis media with effusion, discussed in the previous Series of this course, creating a small incision in the tympanic membrane to drain fluid and, where a grommet is inserted, maintain middle ear **ventilation** over subsequent months.

Mastoidectomy, indicated for cholesteatoma or complicated mastoiditis, discussed earlier in this Series, aims to eradicate disease from the mastoid air cell system, while **tympanoplasty** aims to repair a tympanic membrane perforation and, where indicated, reconstruct the ossicular chain to restore sound **conduction**.

Fill in the blank: Myringotomy with grommet insertion aims to maintain middle ear ventilation over subsequent _____.

2.3.2 postoperative care and complications

Postoperative care following otological surgery generally includes appropriate wound care, avoidance of water entry into the operated ear during the initial healing period, and clear patient instruction regarding expected recovery **course** and warning signs warranting earlier review.

Recognised postoperative complications include wound infection, **facial nerve** injury, discussed earlier in this Series, given its anatomical proximity to several otological surgical fields, **taste disturbance** from chorda tympani injury, and, less commonly, further hearing deterioration, each requiring appropriate counselling before surgery and prompt recognition **afterward**.

Fill in the blank: Recognised postoperative complications include facial nerve injury and taste disturbance from _____ injury.

2.3.3 indications for referral to secondary and tertiary otological care

Indications for referral from primary or general practice to specialist otological care include persistent or recurrent otological symptoms despite initial treatment, discussed throughout this course, suspected cholesteatoma or other unsafe chronic ear disease, discussed in the previous Series of this course, and any of the emergency presentations discussed earlier in this Series.

Further indications include progressive or asymmetric hearing loss warranting evaluation for **vestibular schwannoma**, discussed in the previous Series of this course, and any patient in whom the diagnosis remains genuinely uncertain despite appropriate initial assessment, since timely referral represents an essential safeguard against delayed diagnosis of significant otological **pathology**.

Fill in the blank: Indications for otological referral include progressive or asymmetric hearing loss warranting evaluation for vestibular _____.

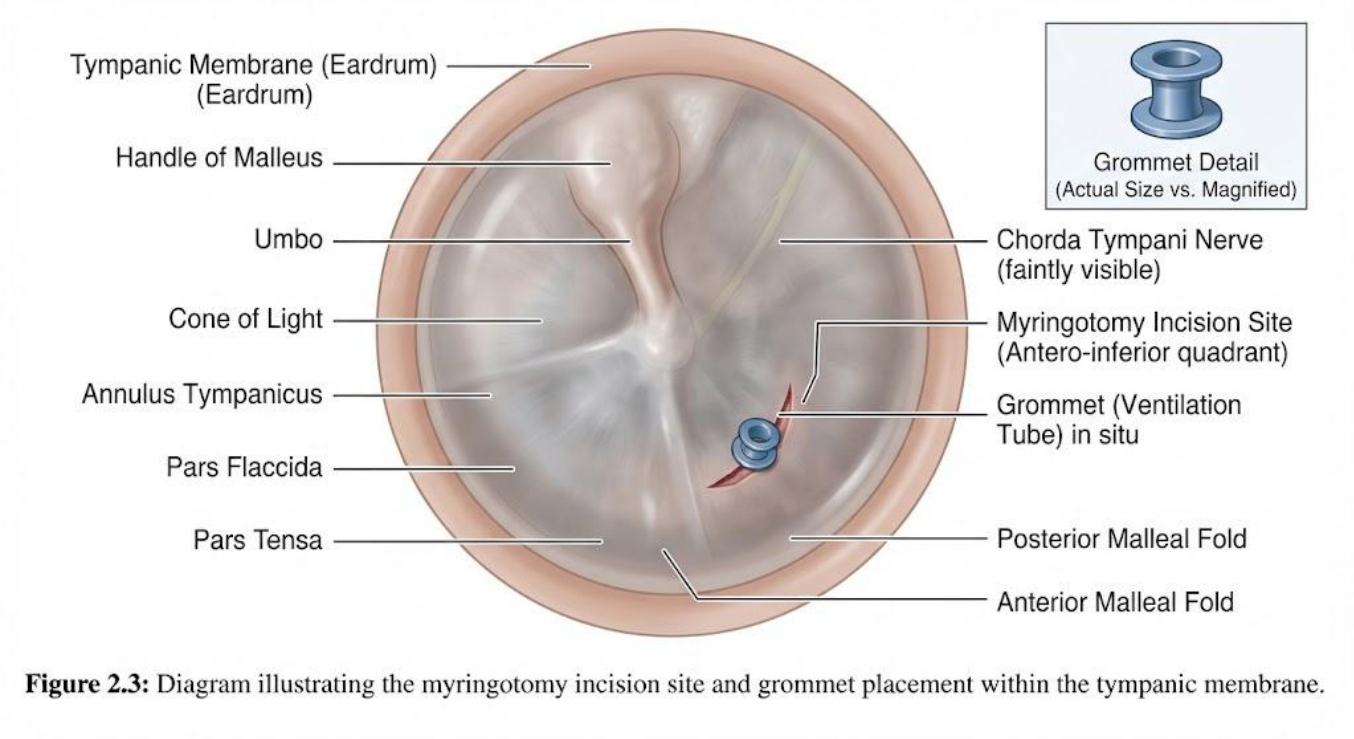

Figure 2.3: Diagram illustrating the myringotomy incision site and grommet placement within the tympanic membrane.

Figure 2.3: Diagram illustrating the myringotomy incision site and grommet placement within the tympanic membrane.

Pilot questions 2.3

1. Describe the purpose of myringotomy with grommet insertion. (Linked to SLO 2.5)
2. Distinguish mastoidectomy from tympanoplasty in terms of surgical aim. (Linked to SLO 2.5)
3. Describe two important elements of postoperative care following otological surgery. (Linked to SLO 2.6)
4. List two recognised complications of otological surgery. (Linked to SLO 2.6)
5. List three indications for referral to specialist otological care. (Linked to SLO 2.6)

2.4 Rehabilitation, Follow-Up, and Prevention

2.4.1 hearing rehabilitation: hearing aids and cochlear implants

Restoring functional hearing following irreversible loss

Hearing aids amplify sound and represent the primary rehabilitative option for most patients with mild to severe sensorineural hearing loss, discussed in the previous Series of this course,

with device selection and fitting guided by formal audiometric assessment and the specific pattern of hearing loss identified.

Cochlear implants, surgically implanted devices that directly electrically stimulate the auditory nerve, are indicated for patients with severe to profound sensorineural hearing loss deriving insufficient benefit from conventional hearing aids, offering considerably improved sound and speech perception, particularly when implanted early in cases of congenital **deafness**.

Fill in the blank: Cochlear implants are surgically implanted devices that directly electrically stimulate the auditory _____.

2.4.2 follow-up criteria after otological treatment

Appropriate follow-up after otological treatment generally includes clinical and, where relevant, audiometric reassessment at intervals guided by the specific condition treated, with patients following mastoidectomy or cholesteatoma surgery, discussed earlier in this Series, generally requiring longer-term surveillance given the recognised risk of disease **recurrence**.

Children treated for otitis media with effusion, discussed in the previous Series of this course, require follow-up attentive to speech and language development, discussed in relation to childhood hearing screening in the previous Series of this course, while patients with confirmed sudden sensorineural hearing loss, discussed earlier in this Series, require follow-up audiometry to document treatment **response**.

Fill in the blank: Patients following mastoidectomy or cholesteatoma surgery generally require longer-term surveillance given the recognised risk of disease _____.

2.4.3 preventive measures for otological disease

Preventive measures relevant to common otological disease include appropriate ear protection during occupational or recreational noise exposure, discussed in the previous Series of this course, to reduce risk of noise-induced hearing loss, and avoidance of unnecessary cotton bud or other object insertion into the ear canal, reducing risk of trauma or impacted cerumen.

Further preventive measures include appropriate, timely treatment of upper respiratory tract infections in children to reduce progression to acute otitis media, discussed in the previous Series of this course, use of ear protection or avoidance of water entry during swimming for patients prone to recurrent otitis externa, and appropriate childhood **vaccination** reducing incidence of relevant bacterial pathogens.

Fill in the blank: Further preventive measures include appropriate childhood _____ reducing incidence of relevant bacterial pathogens causing otitis media.

Figure 2.4: A hearing rehabilitation specialist fitting and adjusting a behind-the-ear hearing aid for a patient.

Figure 2.4: A hearing rehabilitation specialist fitting and adjusting a behind-the-ear hearing aid for a patient.

Pilot questions 2.4

1. Describe the role of hearing aids in hearing rehabilitation. (Linked to SLO 2.7)
2. Describe the indications for a cochlear implant. (Linked to SLO 2.7)
3. Describe the follow-up requirements after mastoidectomy or cholesteatoma surgery. (Linked to SLO 2.7)
4. Describe the follow-up requirements for a child treated for otitis media with effusion. (Linked to SLO 2.7)
5. List three preventive measures relevant to common otological disease. (Linked to SLO 2.8)

Series Summary

This Series examined **otological emergencies and management**, beginning with **otological emergencies I**, acute mastoiditis, malignant otitis externa, and facial nerve palsy, before turning to **otological emergencies II**, sudden sensorineural hearing loss, temporal bone trauma, and intracranial complications of ear disease.

We then examined **basic surgical principles and postoperative complications**, common otological procedures, postoperative care and complications, and referral indications, concluding with **rehabilitation, follow-up, and prevention**, hearing rehabilitation, appropriate follow-up criteria, and preventive measures for otological disease. Having worked through this Series, you should now be equipped to understand rhinological diagnosis and management examined in the next Series of this course.

Glossary of Terms

1. **Acute mastoiditis:** extension of acute otitis media into the mastoid air cell system.
2. **Malignant otitis externa:** progressive Pseudomonas aeruginosa infection extending from the ear canal into adjacent bone.
3. **Sudden sensorineural hearing loss:** a rapid, significant hearing loss occurring within 72 hours or less.
4. **Temporal bone fracture:** a skull fracture involving the temporal bone, classified as longitudinal or transverse.
5. **Lateral sinus thrombosis:** clot formation within the lateral venous sinus, an intracranial complication of ear disease.
6. **Myringotomy:** a small surgical incision in the tympanic membrane, often combined with grommet insertion.
7. **Mastoidectomy:** surgery to eradicate disease from the mastoid air cell system.
8. **Tympanoplasty:** surgery to repair a tympanic membrane perforation and reconstruct the ossicular chain.
9. **Chorda tympani:** a nerve branch carrying taste sensation, at risk during middle ear surgery.
10. **Cochlear implant:** a surgically implanted device that electrically stimulates the auditory nerve.
11. **Grommet:** a small ventilation tube inserted into the tympanic membrane to maintain middle ear aeration.
12. **Noise-induced hearing loss:** sensorineural hearing loss resulting from excessive occupational or recreational noise exposure.

Concept Check Questions [Series 2]

Objective questions

- Acute mastoiditis presents with postauricular swelling, tenderness, and characteristic _____ of the pinna.
- Malignant otitis externa characteristically presents with granulation tissue at the bony-cartilaginous junction of the canal _____.
- Sudden sensorineural hearing loss is defined as a significant hearing loss occurring within _____ hours or less.
- Cochlear implants are surgically implanted devices that directly electrically stimulate the auditory _____.
- Patients following mastoidectomy or cholesteatoma surgery require longer-term surveillance given the risk of disease _____.

Short-answer questions

1. Describe the initial management of acute mastoiditis.
2. Distinguish longitudinal from transverse temporal bone fractures.
3. List three intracranial complications of ear disease.
4. Distinguish mastoidectomy from tympanoplasty in terms of surgical aim.
5. Describe the indications for a cochlear implant.

Long-answer questions

6. Discuss acute mastoiditis, malignant otitis externa, and facial nerve palsy as otological emergencies. (Linked to SLO 2.1, SLO 2.2)
7. Discuss sudden sensorineural hearing loss, temporal bone trauma, and intracranial complications of ear disease. (Linked to SLO 2.3, SLO 2.4)
8. Discuss the basic principles of common otological surgical procedures and postoperative complications. (Linked to SLO 2.5, SLO 2.6)
9. Discuss the indications for referral to secondary and tertiary otological care. (Linked to SLO 2.6)
10. Discuss hearing rehabilitation, follow-up criteria, and preventive measures for otological disease. (Linked to SLO 2.7, SLO 2.8)

Answers to Concept Check Questions [Series 2]

Objective questions

11. Protrusion.
12. Floor.
13. 72.
14. Nerve.
15. Recurrence.

Short-answer questions

16. Intravenous antibiotics and urgent otolaryngology referral, with surgical mastoidectomy if medical treatment alone is insufficient.
17. Longitudinal fractures are more common and produce conductive hearing loss and haemotympanum; transverse fractures carry higher risk of sensorineural loss and facial nerve injury.
18. Meningitis, extradural/subdural abscess, and lateral sinus thrombosis.
19. Mastoidectomy eradicates disease from the mastoid air cell system; tympanoplasty repairs the perforation and reconstructs the ossicular chain.
20. Severe to profound sensorineural hearing loss with insufficient benefit from conventional hearing aids.

Long-answer questions

21. **Basic response:** Acute mastoiditis presents with postauricular swelling and pinna protrusion, requiring intravenous antibiotics and urgent referral, while malignant otitis externa shows canal floor granulation tissue requiring prolonged antibiotics.

Value-added response: Facial nerve palsy in active ear disease is a further emergency, requiring urgent imaging and, where indicated, surgical decompression to prevent permanent dysfunction.

22. **Basic response:** Sudden sensorineural hearing loss requires urgent corticosteroid treatment within one to two weeks, while temporal bone fractures are classified as longitudinal or transverse based on fracture line and associated risk.

Value-added response: Intracranial complications, including meningitis and abscess formation, represent life-threatening emergencies requiring urgent imaging and combined specialist management.

23. **Basic response:** Common otological procedures include myringotomy with grommet insertion, mastoidectomy, and tympanoplasty, each targeting a specific pathological process.

Value-added response: Postoperative care requires attention to wound healing and water avoidance, with recognised complications including facial nerve injury and taste disturbance requiring careful counselling.

24. **Basic response:** Referral indications include persistent symptoms despite treatment, suspected unsafe chronic ear disease, and any emergency presentation discussed throughout this Series.

Value-added response: Progressive or asymmetric hearing loss and genuine diagnostic uncertainty represent further important indications, safeguarding against delayed diagnosis of significant pathology.

25. **Basic response:** Hearing aids and cochlear implants provide rehabilitation for sensorineural hearing loss depending on severity, with follow-up criteria tailored to the specific condition treated.

Value-added response: Preventive measures, including noise protection, avoidance of ear canal trauma, prompt treatment of respiratory infection, and vaccination, help reduce the incidence of common otological disease.

Answers to Pilot Questions [Series 2]

Part 2.1

1. Postauricular swelling, tenderness, and protrusion of the pinna, with persistent fever and otalgia.
2. Intravenous antibiotics and urgent otolaryngology referral, with mastoidectomy if needed.
3. Granulation tissue at the bony-cartilaginous junction of the canal floor.
4. Prolonged, high-dose intravenous antibiotics and imaging to assess bony involvement.
5. Because prompt intervention offers the best opportunity to prevent permanent facial nerve dysfunction.

Part 2.2

6. A hearing loss of at least 30 decibels across three consecutive frequencies within 72 hours or less.
7. Because prompt corticosteroid treatment offers the best opportunity for meaningful hearing recovery.
8. Longitudinal fractures are more common with conductive hearing loss and haemotympanum; transverse fractures carry higher risk of sensorineural loss and facial nerve injury.
9. Meningitis, extradural abscess, subdural abscess, and lateral sinus thrombosis.
10. Persistent headache, fever despite antibiotics, altered consciousness, and focal neurological signs.

Part 2.3

11. To drain middle ear fluid and maintain ventilation over subsequent months.
12. Mastoidectomy eradicates disease from the mastoid; tympanoplasty repairs perforation and reconstructs the ossicular chain.
13. Appropriate wound care and avoidance of water entry into the operated ear.
14. Facial nerve injury and taste disturbance from chorda tympani injury.
15. Persistent symptoms despite treatment, suspected cholesteatoma, and any emergency presentation.

Part 2.4

1. They amplify sound and are the primary option for mild to severe sensorineural hearing loss.
2. Severe to profound sensorineural hearing loss with insufficient benefit from conventional hearing aids.
3. Longer-term surveillance given the recognised risk of disease recurrence.
4. Follow-up attentive to speech and language development.
5. Ear protection during noise exposure, avoidance of cotton bud insertion, and prompt treatment of upper respiratory infection.

References and Attributions [Series 2]

1. Gleeson, M. (Ed.). (2008). Scott-Brown's Otorhinolaryngology, Head and Neck Surgery (7th ed.). Hodder Arnold.

2. Probst, R., Grevers, G., & Iro, H. (2018). Basic Otorhinolaryngology: A Step-by-Step Learning Guide (2nd ed.). Thieme.
3. American Academy of Otolaryngology-Head and Neck Surgery (2019). Clinical practice guideline: sudden hearing loss (update).
4. Ludman, H., & Bradley, P. J. (Eds.). (2007). ABC of Ear, Nose and Throat (6th ed.). BMJ Books.

Figures, Plates, Tables, and Boxes

1. Figure 2.1: Clinical illustration of acute mastoiditis showing postauricular swelling and forward protrusion of the pinna. AI-generated using the prompt: "A single clean, clinically accurate medical illustration of the side of the head showing postauricular swelling and erythema behind the ear with the outer ear pushed forward and downward, textbook clinical reference style, moderate skin tone, neutral lighting, no other panels, no identifying facial features."
2. Table 2.2: Comparing key otological emergencies. AI-generated using the prompt: "Create a clean clinical reference table titled Comparing Key Otological Emergencies, listing emergency, key warning sign, and immediate priority. Medical reference table style with outside border, no photographic elements."
3. Figure 2.3: Diagram illustrating the myringotomy incision site and grommet placement within the tympanic membrane. AI-generated using the prompt: "A single clean, accurate medical diagram showing a frontal view of the tympanic membrane with a small incision line and a grommet ventilation tube correctly seated within it, textbook surgical illustration style, clearly labelled parts, neutral background, no other panels."
4. Figure 2.4: A hearing rehabilitation specialist fitting and adjusting a behind-the-ear hearing aid for a patient. AI-generated using the prompt: "A single clean, clinically accurate illustration of a specialist adjusting a small behind-the-ear hearing aid device on a seated patient in a consultation room, calm professional setting, natural lighting, no text overlays, no other panels, no identifying facial features, respectful depiction."

Course code: ORL 601

Course title: Otology

Course credit load: 2 Units

Series 3: Rhinological Diagnosis and Management

- **Part 3.1: Clinical Assessment and Common Rhinological Diseases**
  - Sub Part 3.1.1: History and examination of the nose and paranasal sinuses
  - Sub Part 3.1.2: Allergic and non-allergic rhinitis
  - Sub Part 3.1.3: Acute and chronic rhinosinusitis
- **Part 3.2: Nasal Polyps, Septal Disorders, and Epistaxis**
  - Sub Part 3.2.1: Nasal polyps
  - Sub Part 3.2.2: Septal deviation and septal perforation
  - Sub Part 3.2.3: Epistaxis: causes and differential diagnosis
- **Part 3.3: Rhinological Emergencies and Surgical Principles**
  - Sub Part 3.3.1: Management of severe or uncontrolled epistaxis
  - Sub Part 3.3.2: Orbital and intracranial complications of sinusitis
  - Sub Part 3.3.3: Basic surgical principles and postoperative complications
- **Part 3.4: Rehabilitation, Community Risk Factors, and Prevention**
  - Sub Part 3.4.1: Follow-up criteria after rhinological treatment
  - Sub Part 3.4.2: Community risk factors for rhinological disease
  - Sub Part 3.4.3: Preventive measures for rhinological disease

Introduction

In the last Series, we examined otological emergencies and management. We now turn to **rhinology**, the diagnosis and differential diagnosis of common nasal and paranasal sinus disease, rhinological **emergencies** and the basic surgical principles governing their management, and the practical **rehabilitation, community risk factors, and preventive measures** relevant to comprehensive rhinological practice, all addressed together across this single, integrated Series.

The aim of this Series is to equip you with a thorough understanding of the diagnosis and differential diagnosis of common rhinological disease, rhinological emergencies, their initial treatment and indications for referral, the basic surgical principles of management and postoperative complications, the rehabilitation process, follow-up criteria, community risk factors, and preventive measures for rhinological disease.

This Series begins with the **clinical assessment and common rhinological diseases**, before turning to **nasal polyps, septal disorders, and epistaxis**. We then examine **rhinological emergencies and surgical principles**, concluding with **rehabilitation, community risk factors, and prevention**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 3.1:** take a systematic history and perform basic examination of the nose and paranasal sinuses
- **SLO 3.2:** recognise and describe the management of allergic and non-allergic rhinitis, and acute and chronic rhinosinusitis
- **SLO 3.3:** recognise and describe the management of nasal polyps and septal disorders
- **SLO 3.4:** describe the causes and differential diagnosis of epistaxis
- **SLO 3.5:** describe the management of severe or uncontrolled epistaxis and the orbital and intracranial complications of sinusitis
- **SLO 3.6:** describe the basic principles of common rhinological surgical procedures and their postoperative complications
- **SLO 3.7:** describe follow-up criteria and community risk factors relevant to rhinological disease, and
- **SLO 3.8:** describe preventive measures for rhinological disease.

3.1 Clinical Assessment and Common Rhinological Diseases

3.1.1 history and examination of the nose and paranasal sinuses

Systematic enquiry and structured anterior rhinoscopy

A systematic rhinological **history** should establish the nature and time course of the presenting complaint, generally centred on a limited set of core symptoms, **nasal obstruction**,

rhinorrhoea, **epistaxis**, discussed further later in this Series, **facial pain**, and **anosmia** or **hyposmia**, together with relevant allergic, occupational, and family history.

Examination generally begins with external inspection of the nasal pyramid, followed by **anterior rhinoscopy** using a nasal speculum and headlight, assessing the septum, inferior and middle turbinates, and any visible discharge or mass, with **nasal endoscopy** providing more detailed visualisation of the middle meatus and posterior nasal cavity where available.

Fill in the blank: A systematic rhinological history should establish core symptoms including nasal obstruction, rhinorrhoea, epistaxis, facial pain, and _____ or hyposmia.

3.1.2 allergic and non-allergic rhinitis

Allergic rhinitis results from an **immunoglobulin E**-mediated hypersensitivity reaction to specific inhaled allergens, presenting with sneezing, watery rhinorrhoea, nasal obstruction, and itching, generally accompanied by pale, oedematous inferior turbinates on examination, and often coexisting allergic conjunctivitis.

Non-allergic rhinitis produces a broadly similar symptom pattern without an identifiable allergic trigger, including **vasomotor rhinitis**, triggered by non-specific stimuli such as temperature change or strong odours, and **rhinitis medicamentosa**, rebound nasal congestion resulting from prolonged overuse of topical decongestant **sprays**.

Fill in the blank: Rhinitis medicamentosa is rebound nasal congestion resulting from prolonged overuse of topical decongestant _____.

3.1.3 acute and chronic rhinosinusitis

Acute rhinosinusitis presents with nasal obstruction, purulent rhinorrhoea, facial pain or pressure, and reduced sense of smell, generally lasting less than 12 weeks, most commonly following a viral upper respiratory tract infection, with secondary bacterial infection occasionally supervening, particularly if symptoms worsen after initial improvement.

Chronic rhinosinusitis is defined by persistence of similar symptoms for **12 weeks or longer**, generally subclassified according to the presence or absence of nasal polyps, discussed further in the next Part of this Series, with management for both acute and chronic disease including saline irrigation, intranasal corticosteroids, and, for chronic disease refractory to medical treatment, surgical intervention.

Fill in the blank: Chronic rhinosinusitis is defined by persistence of similar symptoms for _____ weeks or longer.

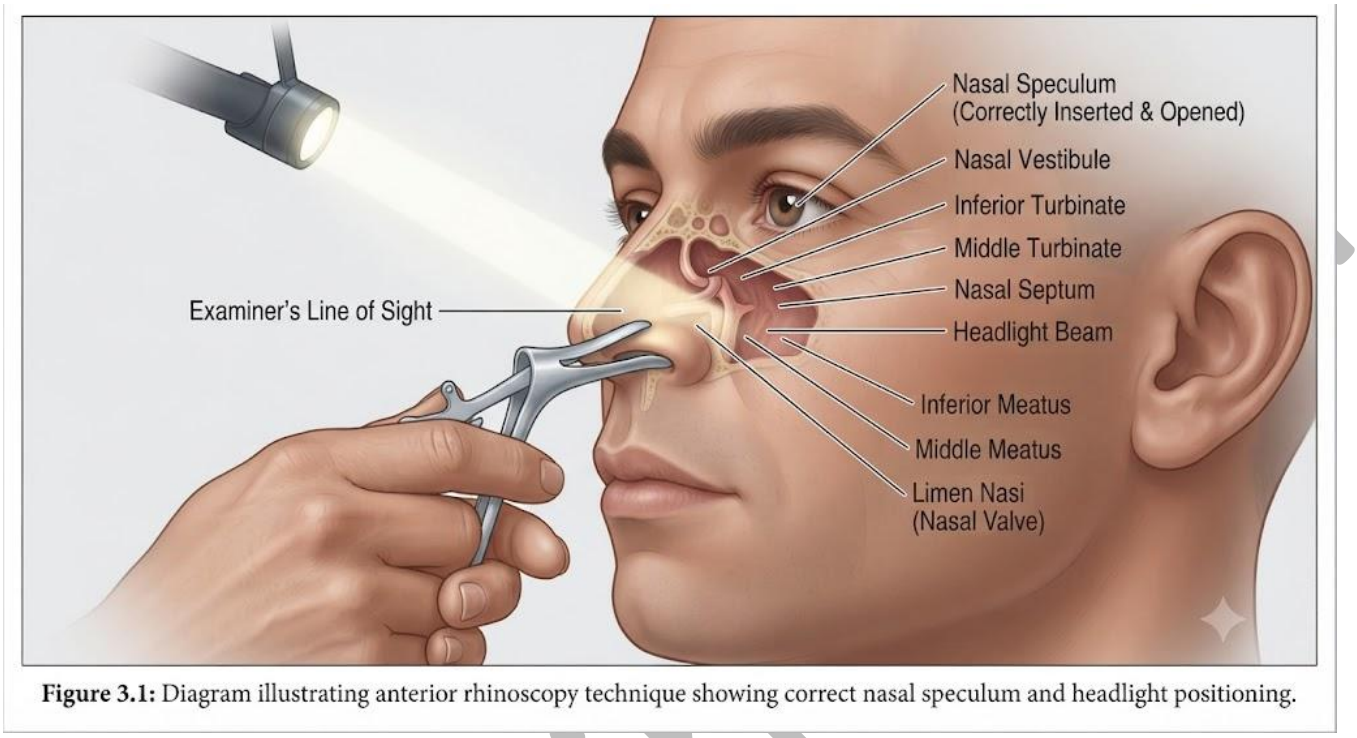

Figure 3.1: Diagram illustrating anterior rhinoscopy technique showing correct nasal speculum and headlight positioning.

Figure 3.1: Diagram illustrating anterior rhinoscopy technique showing correct nasal speculum and headlight positioning.

Pilot questions 3.1

- List the core symptoms that should be specifically enquired about in a rhinological history. (Linked to SLO 3.1)
- Describe the technique of anterior rhinoscopy. (Linked to SLO 3.1)
- Describe the typical clinical presentation of allergic rhinitis. (Linked to SLO 3.2)
- Define rhinitis medicamentosa. (Linked to SLO 3.2)
- Distinguish acute from chronic rhinosinusitis in terms of duration. (Linked to SLO 3.2)

3.2 Nasal Polyps, Septal Disorders, and Epistaxis

3.2.1 nasal polyps

Benign, oedematous mucosal outgrowths obstructing the nasal airway

Nasal polyps are benign, oedematous outgrowths of the sinonasal mucosa, generally arising from the middle meatus, discussed earlier in this Series, presenting with progressive nasal obstruction, reduced sense of smell, and, on examination, pale, mobile, insensitive masses

distinguishable from the surrounding turbinates by their characteristic **grey**, glistening appearance.

Nasal polyps are frequently associated with chronic rhinosinusitis, discussed earlier in this Series, and, in a subset of patients, form part of **Samter's triad**, together with asthma and aspirin sensitivity, with management including topical or, for more extensive disease, oral **corticosteroids**, and surgical polypectomy for disease refractory to medical treatment.

Fill in the blank: Nasal polyps are distinguishable from the surrounding turbinates by their characteristic grey, glistening _____.

3.2.2 septal deviation and septal perforation

Septal deviation, resulting from developmental variation or previous trauma, may produce unilateral or bilateral nasal obstruction, generally corrected surgically by **septoplasty**, discussed further later in this Series, where symptoms are significant and refractory to conservative measures.

Septal perforation may result from previous nasal surgery, trauma, chronic nose picking, or, less commonly, granulomatous or infective conditions, presenting with crusting, epistaxis, discussed further in the next sub-Part, and, with larger perforations, an audible **whistling** sound during nasal breathing.

Fill in the blank: Septal perforation may present with crusting, epistaxis, and, with larger perforations, an audible _____ sound during nasal breathing.

3.2.3 epistaxis: causes and differential diagnosis

Epistaxis, or nose bleeding, most commonly arises from the **Little's area**, a vascular plexus on the anterior nasal septum, discussed in relation to septal anatomy earlier in this Series, generally termed **anterior epistaxis**, and less commonly from posterior nasal structures, termed **posterior epistaxis**, which tends to be more severe and difficult to control.

Recognised causes include local trauma, including nose picking, dry mucosa, discussed in relation to environmental factors later in this Series, hypertension, and coagulopathy, whether inherited or resulting from anticoagulant medication, with careful history and examination generally distinguishing a benign local cause from a systemic underlying **contributor**.

Fill in the blank: Epistaxis most commonly arises from Little's area, a vascular plexus on the anterior nasal _____.

Table 3.2: Comparing anterior and posterior epistaxis.

Feature	Anterior epistaxis	Posterior epistaxis
Typical source	Little's area on the anterior septum	Posterior nasal or nasopharyngeal vessels
Typical severity	Usually mild to moderate	Often more severe
Ease of control	Generally easier with local pressure or cautery	Often requires packing or specialist intervention

Pilot questions 3.2

1. Describe the typical clinical appearance of nasal polyps on examination. (Linked to SLO 3.3)
2. Define Samter's triad. (Linked to SLO 3.3)
3. Describe septal deviation and its surgical correction. (Linked to SLO 3.3)
4. Describe the causes and clinical presentation of septal perforation. (Linked to SLO 3.3)
5. Distinguish anterior from posterior epistaxis in terms of source and typical severity. (Linked to SLO 3.4)

3.3 Rhinological Emergencies and Surgical Principles

3.3.1 management of severe or uncontrolled epistaxis

A structured, stepwise approach to achieving haemostasis

Initial management of epistaxis, discussed in the previous Part of this Series, involves firm, sustained **direct pressure** over the anterior soft cartilaginous part of the nose for at least ten to fifteen minutes, with the patient leaning forward, together with correction of any identified coagulopathy or discontinuation of contributing anticoagulant medication where clinically appropriate.

Where simple measures fail, escalating management includes chemical or electrical **cautery** of a visible bleeding point, **anterior nasal packing**, and, for posterior or refractory bleeding, **posterior packing** or, occasionally, surgical or radiological arterial **ligation** or embolisation,

with any severe or haemodynamically significant epistaxis warranting urgent otolaryngology referral.

Fill in the blank: Initial management of epistaxis involves firm, sustained direct pressure over the anterior soft cartilaginous part of the nose for at least ten to fifteen _____.

3.3.2 orbital and intracranial complications of sinusitis

Orbital complications of sinusitis, particularly ethmoid sinusitis given its close anatomical relationship to the orbit, range from **preseptal cellulitis**, confined to the eyelid soft tissue, through **orbital cellulitis**, involving the orbital contents themselves, to **orbital abscess**, each representing progressively more serious disease requiring urgent recognition.

Intracranial complications of sinusitis, analogous to those of ear disease discussed in the previous Series of this course, include meningitis, intracranial abscess, and cavernous sinus thrombosis, with warning features including severe headache, visual disturbance, proptosis, and altered consciousness warranting urgent imaging and combined specialist **management**.

Fill in the blank: Orbital complications of sinusitis range from preseptal cellulitis through orbital cellulitis to orbital _____.

3.3.3 basic surgical principles and postoperative complications

Septoplasty, discussed in the previous Part of this Series, aims to correct significant septal deviation by removing or repositioning deviated cartilage and bone, while **functional endoscopic sinus surgery**, or **FESS**, aims to restore normal sinus drainage and ventilation in patients with chronic rhinosinusitis, discussed earlier in this Series, refractory to medical treatment.

Recognised postoperative complications of nasal and sinus surgery include bleeding, infection, **cerebrospinal fluid leak**, given the close anatomical proximity of the sinuses to the anterior skull base, and, rarely, orbital injury, discussed earlier in this Part, each requiring appropriate preoperative counselling and prompt postoperative **recognition**.

Fill in the blank: Recognised postoperative complications of nasal and sinus surgery include cerebrospinal fluid leak, given the close anatomical proximity of the sinuses to the anterior skull _____.

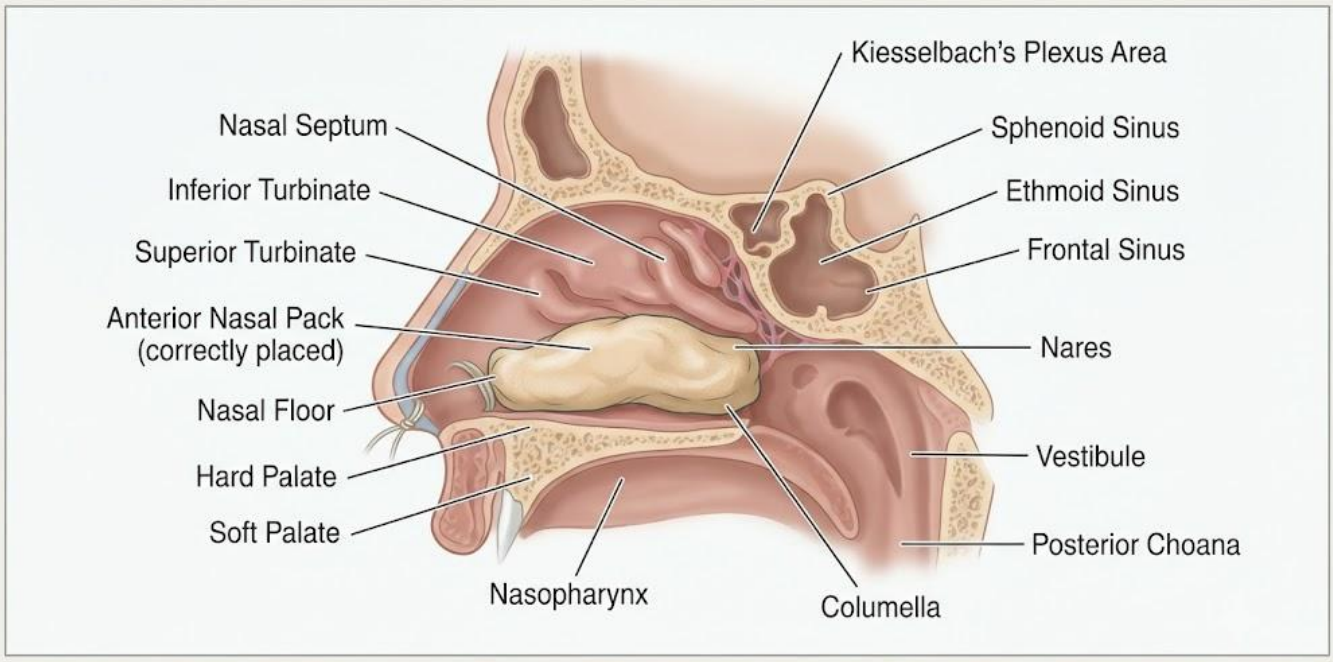

Figure 3.3: Diagram illustrating anterior nasal packing placement for management of epistaxis.

Figure 3.3: Diagram illustrating anterior nasal packing placement for management of epistaxis.

Pilot questions 3.3

1. Describe the correct initial first-aid management of epistaxis. (Linked to SLO 3.5)
2. Describe the escalating steps of epistaxis management when initial measures fail. (Linked to SLO 3.5)
3. Distinguish preseptal from orbital cellulitis as complications of sinusitis. (Linked to SLO 3.5)
4. Describe the aims of septoplasty and functional endoscopic sinus surgery. (Linked to SLO 3.6)
5. Describe a recognised complication of nasal and sinus surgery and explain why it occurs. (Linked to SLO 3.6)

3.4 Rehabilitation, Community Risk Factors, and Prevention

3.4.1 follow-up criteria after rhinological treatment

Structured review supporting recovery and early complication detection

Follow-up after nasal and sinus surgery, discussed earlier in this Series, generally includes early postoperative review to remove any nasal packing and assess healing, together with longer-term review to confirm resolution of the presenting symptoms and detect any early disease **recurrence**, particularly relevant for chronic rhinosinusitis with polyps.

Patients treated for recurrent epistaxis, discussed earlier in this Series, generally warrant follow-up attentive to underlying contributing factors, such as hypertension control or anticoagulant management, while patients with allergic rhinitis, discussed earlier in this Series, benefit from periodic review of symptom control and treatment **adherence**.

Fill in the blank: Follow-up after nasal and sinus surgery includes longer-term review to confirm symptom resolution and detect any early disease _____.

3.4.2 community risk factors for rhinological disease

Community risk factors relevant to rhinological disease include environmental **allergen** exposure, discussed in relation to allergic rhinitis earlier in this Series, indoor and outdoor air **pollution**, discussed in relation to environmental health in an earlier related course, and occupational exposure to irritant dusts or chemicals relevant to certain industries.

Further recognised community risk factors include indoor biomass cooking fuel exposure, discussed in relation to indoor air pollution in an earlier related course, particularly relevant to chronic rhinosinusitis and nasal symptoms in many Nigerian households, and tobacco smoke exposure, whether active or **passive**, contributing to chronic nasal mucosal inflammation.

Fill in the blank: Community risk factors for rhinological disease include indoor biomass cooking fuel exposure and tobacco smoke exposure, whether active or _____.

3.4.3 preventive measures for rhinological disease

Preventive measures relevant to rhinological disease include identification and avoidance of specific allergens where practical, discussed earlier in this Series, appropriate use of protective equipment in occupations involving irritant dust or chemical exposure, and improved household ventilation to reduce indoor air pollution, discussed earlier in this Part.

Further preventive measures include prompt, appropriate treatment of upper respiratory tract infections to reduce progression to bacterial rhinosinusitis, discussed earlier in this Series, avoidance of prolonged topical decongestant use to prevent rhinitis medicamentosa, discussed

earlier in this Series, and general tobacco smoke avoidance to reduce chronic nasal mucosal **irritation**.

Fill in the blank: Preventive measures include avoidance of prolonged topical decongestant use to prevent rhinitis _____.

Figure 3.4: A patient and clinician reviewing an environmental allergen avoidance checklist during a follow-up consultation.

Figure 3.4: A patient and clinician reviewing an environmental allergen avoidance checklist during a follow-up consultation.

Pilot questions 3.4

1. Describe the follow-up requirements after nasal and sinus surgery. (Linked to SLO 3.7)
2. Describe the follow-up requirements for a patient treated for recurrent epistaxis. (Linked to SLO 3.7)
3. List three community risk factors for rhinological disease relevant to the Nigerian environment. (Linked to SLO 3.7)
4. Describe two preventive measures relevant to reducing rhinosinusitis risk. (Linked to SLO 3.8)
5. Explain why avoidance of prolonged topical decongestant use is an important preventive measure. (Linked to SLO 3.8)

Series Summary

This Series examined **rhinological diagnosis and management**, beginning with **clinical assessment and common rhinological diseases**, systematic history and examination, allergic and non-allergic rhinitis, and acute and chronic rhinosinusitis, before turning to **nasal polyps, septal disorders, and epistaxis**, their clinical features and differential diagnosis.

We then examined **rhinological emergencies and surgical principles**, the stepwise management of epistaxis, orbital and intracranial complications of sinusitis, and basic surgical principles including septoplasty and FESS, concluding with **rehabilitation, community risk factors, and prevention**, follow-up criteria, community risk factors relevant to Nigeria, and preventive measures for rhinological disease. Having worked through this Series, you should now be equipped to understand laryngological and head and neck diagnosis examined in the next Series of this course.

Glossary of Terms

1. **Anterior rhinoscopy:** examination of the nasal cavity using a nasal speculum and headlight.
2. **Allergic rhinitis:** an IgE-mediated hypersensitivity reaction to inhaled allergens affecting the nasal mucosa.
3. **Rhinitis medicamentosa:** rebound nasal congestion from prolonged overuse of topical decongestants.
4. **Chronic rhinosinusitis:** sinonasal inflammation persisting for 12 weeks or longer.
5. **Nasal polyp:** a benign, oedematous outgrowth of sinonasal mucosa, often arising from the middle meatus.
6. **Samter's triad:** the combination of nasal polyps, asthma, and aspirin sensitivity.
7. **Little's area:** the vascular plexus on the anterior nasal septum, the most common source of epistaxis.
8. **Anterior epistaxis:** nose bleeding arising from the anterior nasal septum, usually mild to moderate.
9. **Posterior epistaxis:** nose bleeding arising from posterior nasal structures, often more severe.
10. **Septoplasty:** surgery to correct a significantly deviated nasal septum.
11. **Functional endoscopic sinus surgery (FESS):** endoscopic surgery restoring normal sinus drainage and ventilation.

12. **Orbital cellulitis:** infection involving the orbital contents, a serious complication of sinusitis.

Concept Check Questions [Series 3]

Objective questions

- A rhinological history should establish core symptoms including nasal obstruction, rhinorrhoea, epistaxis, facial pain, and _____ or hyposmia.
- Chronic rhinosinusitis is defined by persistence of symptoms for _____ weeks or longer.
- Epistaxis most commonly arises from Little's area, a vascular plexus on the anterior nasal _____.
- Initial management of epistaxis involves firm, sustained direct pressure over the anterior soft cartilaginous part of the nose for at least ten to fifteen _____.
- Preventive measures include avoidance of prolonged topical decongestant use to prevent rhinitis _____.

Short-answer questions

1. Describe the typical clinical presentation of allergic rhinitis.
2. Define Samter's triad.
3. Distinguish anterior from posterior epistaxis in terms of source and typical severity.
4. Distinguish preseptal from orbital cellulitis as complications of sinusitis.
5. List three community risk factors for rhinological disease relevant to the Nigerian environment.

Long-answer questions

6. Discuss the history, examination, and management of allergic and non-allergic rhinitis and rhinosinusitis. (Linked to SLO 3.1, SLO 3.2)
7. Discuss nasal polyps, septal disorders, and the causes and differential diagnosis of epistaxis. (Linked to SLO 3.3, SLO 3.4)
8. Discuss the management of severe epistaxis and the orbital and intracranial complications of sinusitis. (Linked to SLO 3.5)
9. Discuss the basic principles of septoplasty and functional endoscopic sinus surgery and their postoperative complications. (Linked to SLO 3.6)
10. Discuss follow-up criteria, community risk factors, and preventive measures for rhinological disease. (Linked to SLO 3.7, SLO 3.8)

Answers to Concept Check Questions [Series 3]

Objective questions

11. Anosmia.
12. 12.
13. Septum.
14. Minutes.
15. Medicamentosa.

Short-answer questions

16. Sneezing, watery rhinorrhoea, nasal obstruction, and itching, with pale, oedematous inferior turbinates and often allergic conjunctivitis.
17. The combination of nasal polyps, asthma, and aspirin sensitivity.
18. Anterior epistaxis arises from Little's area and is usually mild to moderate; posterior epistaxis arises from posterior structures and is often more severe.
19. Preseptal cellulitis is confined to eyelid soft tissue; orbital cellulitis involves the orbital contents themselves.
20. Indoor biomass cooking fuel exposure, air pollution, and tobacco smoke exposure.

Long-answer questions

21. **Basic response:** Allergic rhinitis presents with sneezing, watery rhinorrhoea, and pale turbinates, while non-allergic forms include vasomotor rhinitis and rhinitis medicamentosa.

Value-added response: Acute rhinosinusitis lasts under 12 weeks, generally following viral infection, while chronic rhinosinusitis persists for 12 weeks or longer, subclassified by presence or absence of nasal polyps.

22. **Basic response:** Nasal polyps present as pale, grey, glistening masses, often associated with chronic rhinosinusitis and, in some patients, Samter's triad, while septal deviation and perforation each produce distinct symptom patterns.

Value-added response: Epistaxis most commonly arises from Little's area anteriorly, with posterior bleeding tending to be more severe, requiring careful history to distinguish local from systemic causes.

23. **Basic response:** Severe epistaxis management escalates from direct pressure through cautery and nasal packing to surgical or radiological intervention for refractory bleeding.

Value-added response: Orbital and intracranial complications of sinusitis, ranging from preseptal cellulitis to abscess and intracranial extension, require urgent recognition and combined specialist management.

24. **Basic response:** Septoplasty corrects significant septal deviation, while functional endoscopic sinus surgery restores sinus drainage in refractory chronic rhinosinusitis.

Value-added response: Both carry recognised complications, including bleeding, infection, and cerebrospinal fluid leak given proximity to the anterior skull base, requiring careful preoperative counselling.

25. **Basic response:** Follow-up after rhinological treatment addresses healing, symptom resolution, and recurrence risk, tailored to the specific condition treated.

Value-added response: Community risk factors, including allergen exposure, air pollution, and tobacco smoke, inform preventive measures such as allergen avoidance, improved ventilation, and prompt infection treatment.

Answers to Pilot Questions [Series 3]

Part 3.1

1. Nasal obstruction, rhinorrhoea, epistaxis, facial pain, and anosmia or hyposmia.
2. Using a nasal speculum and headlight to inspect the septum, turbinates, and any discharge or mass.
3. Sneezing, watery rhinorrhoea, nasal obstruction, and itching, with pale, oedematous turbinates.
4. Rebound nasal congestion from prolonged overuse of topical decongestant sprays.
5. Acute rhinosinusitis lasts less than 12 weeks; chronic rhinosinusitis persists for 12 weeks or longer.

Part 3.2

6. Pale, mobile, insensitive, grey, glistening masses distinguishable from the surrounding turbinates.
7. The combination of nasal polyps, asthma, and aspirin sensitivity.
8. Deviation of the nasal septum causing obstruction, corrected surgically by septoplasty if refractory to conservative measures.
9. Trauma, nose picking, or infective/granulomatous causes; presents with crusting, epistaxis, and possible whistling.
10. Anterior epistaxis arises from Little's area and is usually mild to moderate; posterior epistaxis is often more severe.

Part 3.3

11. Firm, sustained direct pressure over the soft cartilaginous nose for ten to fifteen minutes, leaning forward.
12. Cautery of a visible bleeding point, anterior packing, and, if needed, posterior packing or arterial ligation/embolisation.
13. Preseptal cellulitis is confined to eyelid soft tissue; orbital cellulitis involves the orbital contents.
14. Septoplasty corrects septal deviation; FESS restores sinus drainage and ventilation.
15. Cerebrospinal fluid leak, occurring due to the close proximity of the sinuses to the anterior skull base.

Part 3.4

1. Early review to remove packing and assess healing, and longer-term review to confirm resolution and detect recurrence.
2. Follow-up attentive to underlying contributing factors, such as hypertension control or anticoagulant management.
3. Indoor biomass cooking fuel exposure, air pollution, and tobacco smoke exposure.
4. Allergen avoidance and improved household ventilation.
5. Because prolonged use can lead to rebound nasal congestion, known as rhinitis medicamentosa.

References and Attributions [Series 3]

1. Gleeson, M. (Ed.). (2008). Scott-Brown's Otorhinolaryngology, Head and Neck Surgery (7th ed.). Hodder Arnold.
2. Probst, R., Grevers, G., & Iro, H. (2018). Basic Otorhinolaryngology: A Step-by-Step Learning Guide (2nd ed.). Thieme.
3. Fokkens, W. J., et al. (2020). European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS 2020).
4. Ludman, H., & Bradley, P. J. (Eds.). (2007). ABC of Ear, Nose and Throat (6th ed.). BMJ Books.

Figures, Plates, Tables, and Boxes

1. Figure 3.1: Diagram illustrating anterior rhinoscopy technique showing correct nasal speculum and headlight positioning. AI-generated using the prompt: "A single clean, clinically accurate instructional diagram showing a hand holding a nasal speculum correctly inserted just inside the nostril with a headlight beam directed into the nasal cavity, medical textbook instructional style, clear labelled positioning, neutral background, no other panels."
2. Table 3.2: Comparing anterior and posterior epistaxis. AI-generated using the prompt: "Create a clean clinical reference table titled Comparing Anterior and Posterior Epistaxis, listing feature, anterior epistaxis, and posterior epistaxis. Medical reference table style with outside border, no photographic elements."
3. Figure 3.3: Diagram illustrating anterior nasal packing placement for management of epistaxis. AI-generated using the prompt: "A single clean, accurate cross-sectional medical diagram of the nasal cavity showing correctly positioned packing material along the nasal floor and against the septum, textbook surgical illustration style, clearly labelled anatomical structures, neutral background, no other panels."
4. Figure 3.4: A patient and clinician reviewing an environmental allergen avoidance checklist during a follow-up consultation. AI-generated using the prompt: "A single clean, realistic illustration of a clinician and seated patient reviewing a printed checklist together at a consultation desk, calm professional setting, natural lighting, no legible text detail, no other panels, respectful depiction, no identifying facial features."

Course code: ORL 601

Course title: Otology

Course credit load: 2 Units

Series 4: Laryngological and Head and Neck Diagnosis

- **Part 4.1: Clinical Assessment of the Larynx and Head and Neck**
  - Sub Part 4.1.1: History taking in laryngological and head and neck disease
  - Sub Part 4.1.2: Indirect and flexible laryngoscopy technique
  - Sub Part 4.1.3: Examination of the neck
- **Part 4.2: Common Laryngeal Diseases**
  - Sub Part 4.2.1: Acute laryngitis
  - Sub Part 4.2.2: Vocal cord nodules and polyps
  - Sub Part 4.2.3: Vocal cord palsy
- **Part 4.3: Laryngeal and Hypopharyngeal Malignancy**
  - Sub Part 4.3.1: Risk factors and clinical presentation of laryngeal carcinoma
  - Sub Part 4.3.2: Differential diagnosis of hoarseness
  - Sub Part 4.3.3: Hypopharyngeal carcinoma
- **Part 4.4: Head and Neck Masses and Salivary Gland Disease**
  - Sub Part 4.4.1: Differential diagnosis of a neck mass
  - Sub Part 4.4.2: Cervical lymphadenopathy
  - Sub Part 4.4.3: Salivary gland disease

Introduction

In the last Series, we examined rhinological diagnosis and management. We now turn to **laryngology and head and neck disease**, establishing the systematic clinical assessment, together with the diagnosis and differential diagnosis, of both common and uncommon conditions affecting the larynx, the hypopharynx, and the wider head and neck region, an area of particular clinical importance given the critical diagnostic distinction between benign and malignant disease that persistent hoarseness or a neck mass may represent.

The aim of this Series is to equip you with a thorough understanding of the clinical assessment of the larynx and head and neck, and the diagnosis and differential diagnosis of common and uncommon laryngological, hypopharyngeal, and head and neck disease.

This Series begins with the **clinical assessment of the larynx and head and neck**, before examining **common laryngeal diseases**. We then turn to **laryngeal and hypopharyngeal malignancy**, concluding with **head and neck masses and salivary gland disease**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 4.1:** take a systematic history and perform indirect or flexible laryngoscopy in laryngological disease
- **SLO 4.2:** perform a systematic examination of the neck
- **SLO 4.3:** recognise and describe the diagnosis of acute laryngitis
- **SLO 4.4:** recognise and describe the diagnosis of vocal cord nodules, polyps, and vocal cord palsy
- **SLO 4.5:** describe the risk factors and clinical presentation of laryngeal carcinoma
- **SLO 4.6:** describe the differential diagnosis of hoarseness and hypopharyngeal carcinoma
- **SLO 4.7:** describe the differential diagnosis of a neck mass and cervical lymphadenopathy, and
- **SLO 4.8:** recognise and describe the diagnosis of common salivary gland disease.

4.1 Clinical Assessment of the Larynx and Head and Neck

4.1.1 history taking in laryngological and head and neck disease

Systematic enquiry directed at voice, swallowing, and airway symptoms

A systematic laryngological history should establish the nature and time course of the presenting complaint, generally centred on **dysphonia** (voice change), **dysphagia** or **odynophagia** (swallowing difficulty or pain), **stridor**, and **haemoptysis**, together with relevant smoking and alcohol history, given their strong association with malignancy discussed further later in this Series.

Any persistent hoarseness lasting longer than **three weeks**, particularly in a patient with significant smoking history, warrants specific consideration of malignancy, discussed further later in this Series, meaning the duration and progression of voice change carries direct diagnostic **significance** beyond its immediate symptomatic impact.

Fill in the blank: A systematic laryngological history should establish dysphonia, dysphagia or odynophagia, stridor, and _____.

4.1.2 indirect and flexible laryngoscopy technique

Indirect laryngoscopy, using a small angled mirror placed against the soft palate while the patient's tongue is gently held forward, provides a traditional means of visualising the larynx and vocal cords, though it has been substantially superseded in modern practice by **flexible nasendoscopy**, passing a thin, flexible fibre-optic scope through the nose to directly visualise the larynx and hypopharynx.

Systematic laryngoscopic assessment should note vocal cord **mobility**, symmetry, and any visible mucosal lesion, mass, or asymmetry, with the vocal cords assessed both at rest and during **phonation**, the act of producing voiced sound, to identify any impairment of normal cord movement or apposition.

Fill in the blank: Flexible nasendoscopy passes a thin, flexible fibre-optic scope through the nose to directly visualise the larynx and _____.

4.1.3 examination of the neck

Systematic neck examination generally proceeds by **anatomical region**, discussed further in relation to cervical lymph node levels later in this Series, palpating methodically from the submental and submandibular region, along the anterior and posterior triangles, to the supraclavicular fossa, noting the size, consistency, mobility, and tenderness of any palpable mass.

Examination additionally includes assessment of the **thyroid gland**, asking the patient to swallow while palpating, since a thyroid mass characteristically moves upward on swallowing, and the **salivary glands**, discussed further later in this Series, together with bimanual palpation where an intraoral or floor of mouth mass is suspected.

Fill in the blank: A thyroid mass characteristically moves upward on _____, a useful bedside distinguishing feature during neck examination.

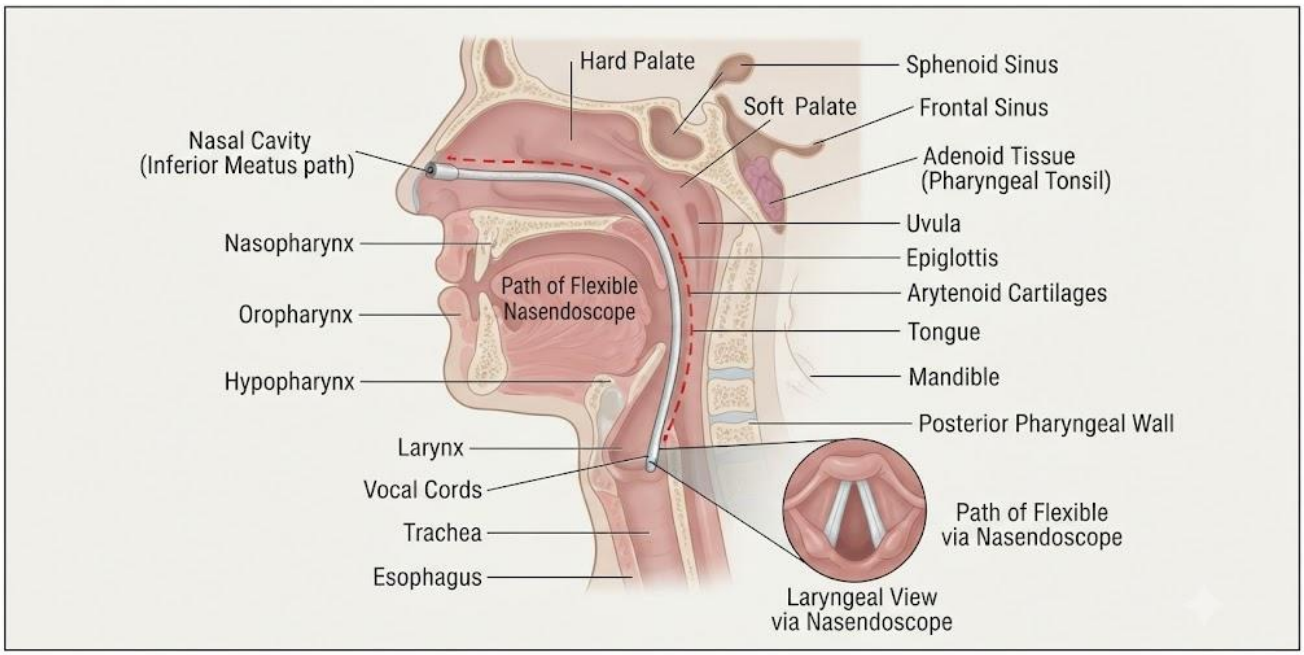

Figure 4.1: Diagram illustrating flexible nasendoscopy passage through the nasal cavity to visualise the larynx.

Figure 4.1: Diagram illustrating flexible nasendoscopy passage through the nasal cavity to visualise the larynx.

Pilot questions 4.1

- List the core symptoms that should be specifically enquired about in a laryngological history. (Linked to SLO 4.1)
- Explain why persistent hoarseness lasting longer than three weeks warrants specific clinical attention. (Linked to SLO 4.1)
- Distinguish indirect laryngoscopy from flexible nasendoscopy. (Linked to SLO 4.1)
- Describe what should be assessed during laryngoscopic examination of the vocal cords. (Linked to SLO 4.1)
- Describe the systematic approach to examining the neck, including the thyroid gland. (Linked to SLO 4.2)

4.2 Common Laryngeal Diseases

4.2.1 acute laryngitis

Self-limiting inflammation producing acute voice change

Acute laryngitis is generally caused by viral upper respiratory tract infection, presenting with acute-onset hoarseness, discussed earlier in this Series, and, at times, mild odynophagia and cough, with laryngoscopy typically demonstrating erythematous, oedematous vocal cords without a discrete mass lesion.

Management is generally **supportive**, including voice rest, adequate hydration, and avoidance of further vocal cord irritants such as smoking, with the condition generally resolving spontaneously within one to two weeks, meaning persistence beyond this timeframe warrants reconsideration of the underlying diagnosis and further laryngoscopic assessment.

Fill in the blank: Acute laryngitis generally resolves spontaneously within one to two weeks, meaning persistence beyond this timeframe warrants reconsideration of the underlying _____.

4.2.2 vocal cord nodules and polyps

Vocal cord nodules are bilateral, symmetrical, benign mucosal thickenings typically occurring at the junction of the anterior and middle thirds of the vocal cord, generally resulting from chronic **vocal abuse** or misuse, and particularly common in occupations involving prolonged or forceful voice use.

Vocal cord polyps, by contrast, are generally unilateral, single, benign mucosal lesions, occasionally following a single episode of vocal trauma or haemorrhage, with management for both conditions typically beginning with **voice therapy** and modification of contributing vocal behaviour, reserving surgical excision for lesions persisting despite conservative management.

Fill in the blank: Vocal cord nodules are bilateral, symmetrical lesions generally resulting from chronic vocal _____ or misuse.

4.2.3 vocal cord palsy

Vocal cord palsy results from impaired function of the **recurrent laryngeal nerve**, presenting with a weak, breathy voice and, at times, aspiration with swallowing, given the affected cord's resulting inability to fully close against its opposite counterpart during phonation and airway protection.

Recognised causes include thyroid or other neck surgery, discussed further later in this Series, malignancy directly involving or compressing the nerve, discussed further later in this Series, and viral neuritis, with any newly identified vocal cord palsy warranting careful investigation to

identify the underlying **cause**, given the potentially serious implications of a compressive malignant aetiology.

Fill in the blank: Vocal cord palsy results from impaired function of the recurrent laryngeal _____.

Table 4.2: Comparing vocal cord nodules and vocal cord polyps.

Feature	Vocal cord nodules	Vocal cord polyps
Laterality	Bilateral, symmetrical	Generally unilateral, single
Typical cause	Chronic vocal abuse or misuse	Often a single episode of vocal trauma
Initial management	Voice therapy and behaviour modification	Voice therapy, with surgery if persistent

Pilot questions 4.2

1. Describe the typical clinical and laryngoscopic presentation of acute laryngitis. (Linked to SLO 4.3)
2. Describe the management of acute laryngitis. (Linked to SLO 4.3)
3. Distinguish vocal cord nodules from vocal cord polyps in terms of laterality and typical cause. (Linked to SLO 4.4)
4. Define vocal cord palsy and describe its typical clinical presentation. (Linked to SLO 4.4)
5. List two recognised causes of vocal cord palsy. (Linked to SLO 4.4)

4.3 Laryngeal and Hypopharyngeal Malignancy

4.3.1 risk factors and clinical presentation of laryngeal carcinoma

A smoking- and alcohol-related malignancy presenting with persistent hoarseness

Laryngeal carcinoma, most commonly **squamous cell carcinoma**, is strongly associated with **tobacco smoking** and, to a lesser extent, alcohol consumption, with the combination of both substantially increasing overall risk, discussed in relation to modifiable risk factors in an earlier related course.

Clinical presentation depends substantially on the specific anatomical **subsite** involved, with **glottic** tumours, involving the vocal cords themselves, generally presenting relatively early with persistent hoarseness, discussed earlier in this Series, while **supraglottic** and **subglottic** tumours

may present later, with symptoms such as dysphagia, referred otalgia, or stridor, given their location away from the immediate voice-producing structures.

Fill in the blank: Laryngeal carcinoma is most commonly squamous cell carcinoma, strongly associated with tobacco _____.

4.3.2 differential diagnosis of hoarseness

The differential diagnosis of persistent hoarseness, discussed earlier in this Series, includes benign causes such as acute or chronic laryngitis, vocal cord nodules or polyps, discussed earlier in this Series, and vocal cord palsy, alongside the essential consideration of laryngeal carcinoma, discussed in the previous sub-Part, particularly in patients with relevant risk factors.

Any patient presenting with hoarseness persisting beyond **three weeks**, discussed earlier in this Series, particularly with significant smoking history or accompanying red flag symptoms such as haemoptysis or a neck mass, discussed further later in this Series, warrants prompt laryngoscopic assessment to exclude underlying **malignancy**.

Fill in the blank: Any patient presenting with hoarseness persisting beyond three weeks, particularly with significant smoking history, warrants prompt laryngoscopic assessment to exclude underlying _____.

4.3.3 hypopharyngeal carcinoma

Hypopharyngeal carcinoma, arising within the region of the throat below the level of the hyoid bone and above the oesophagus, shares similar risk factors to laryngeal carcinoma discussed earlier in this Part, but frequently presents at a more **advanced** stage, given the relative absence of early warning symptoms comparable to the hoarseness characteristic of glottic laryngeal tumours.

Presenting symptoms may include progressive dysphagia, referred otalgia, discussed in relation to referred pain pathways in an earlier related course, and a neck mass reflecting metastatic **cervical lymphadenopathy**, discussed further later in this Series, meaning a high index of clinical suspicion is required given this tendency toward later, more advanced presentation.

Fill in the blank: Hypopharyngeal carcinoma frequently presents at a more advanced stage, given the relative absence of early warning symptoms comparable to the _____ characteristic of glottic laryngeal tumours.

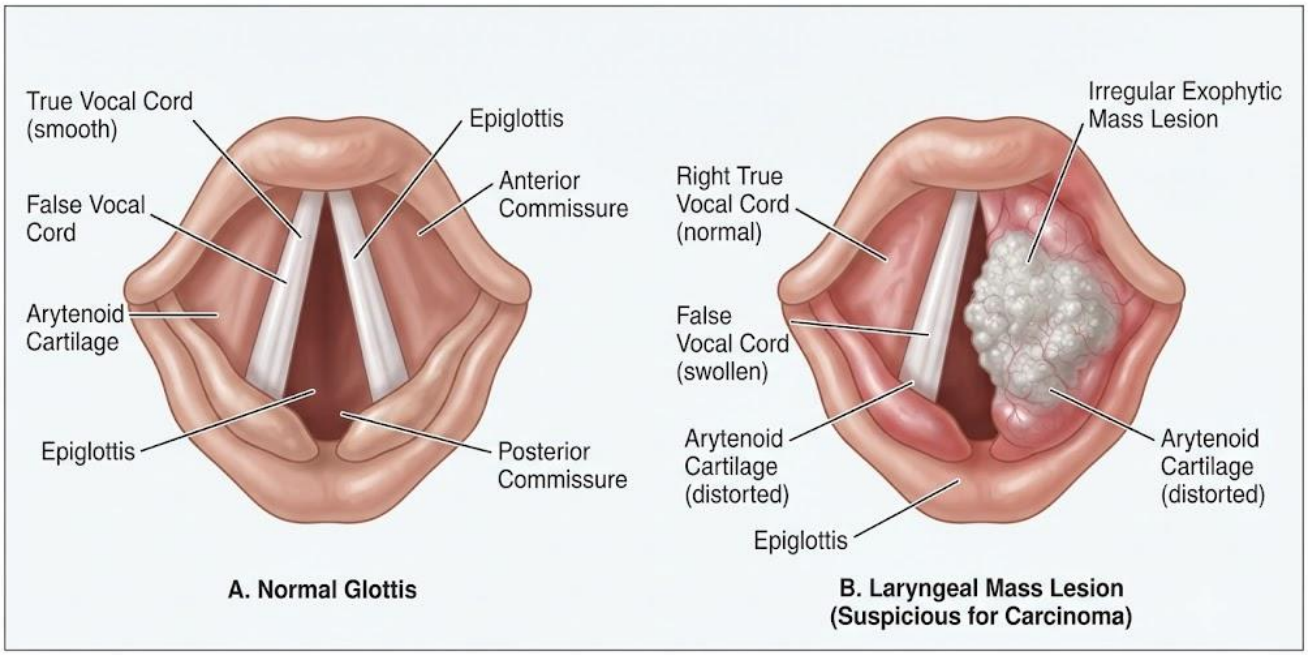

Figure 4.3: Laryngoscopic view diagram comparing a normal glottis with an irregular mass lesion on the vocal cord.

Figure 4.3: Laryngoscopic view diagram comparing a normal glottis with an irregular mass lesion on the vocal cord.

Pilot questions 4.3

1. List the principal risk factors for laryngeal carcinoma. (Linked to SLO 4.5)
2. Explain why glottic tumours tend to present earlier than supraglottic or subglottic tumours. (Linked to SLO 4.5)
3. List the differential diagnosis of persistent hoarseness. (Linked to SLO 4.6)
4. State the duration of hoarseness that should prompt laryngoscopic assessment to exclude malignancy. (Linked to SLO 4.6)
5. Explain why hypopharyngeal carcinoma frequently presents at an advanced stage. (Linked to SLO 4.6)

4.4 Head and Neck Masses and Salivary Gland Disease

4.4.1 differential diagnosis of a neck mass

A systematic approach guided by age, location, and characteristics

The differential diagnosis of a neck mass is usefully approached according to its anatomical **location** and the patient's **age**, with congenital lesions such as **branchial cysts** and **thyroglossal duct cysts** more typical in younger patients, and malignant causes, discussed further in this Part, requiring particular consideration in older patients or those with relevant risk factors.

A widely applied clinical rule of thumb, sometimes summarised as the **rule of 80**, notes that approximately 80 percent of persistent adult neck masses are neoplastic, of which approximately 80 percent are malignant, and of which approximately 80 percent represent metastatic disease from a primary tumour elsewhere in the head and neck, underscoring the importance of thorough primary site **examination** in any adult presenting with a persistent neck mass.

Fill in the blank: A widely applied clinical rule of thumb notes that approximately 80 percent of persistent adult neck masses are _____.

4.4.2 cervical lymphadenopathy

Cervical lymphadenopathy may reflect reactive enlargement secondary to local or systemic infection, discussed in relation to specific infectious causes in earlier related courses, or, of particular clinical concern, **metastatic** spread from a head and neck primary malignancy, discussed earlier in this Series, or systemic lymphoma.

Features raising suspicion for malignant lymphadenopathy include a firm or hard, generally painless, progressively enlarging node, discussed in relation to persistent masses earlier in this Part, particularly when persisting beyond several weeks, warranting further investigation including **fine-needle aspiration cytology** to guide subsequent management.

Fill in the blank: Fine-needle aspiration cytology is generally used to further investigate a persistent, firm, or hard cervical lymph node of suspected malignant _____.

4.4.3 salivary gland disease

Salivary gland disease includes **sialadenitis**, infective or inflammatory salivary gland enlargement, often associated with duct obstruction by a **sialolith**, or salivary stone, presenting with painful glandular swelling, characteristically worsened by eating given the associated increase in salivary flow demand.

Salivary gland tumours, most commonly affecting the **parotid gland**, are generally benign when occurring within this gland, most frequently **pleomorphic adenoma**, though malignant

salivary tumours do occur and should be suspected where a mass is associated with rapid growth, pain, or facial nerve **weakness**, given the nerve's anatomical course through the parotid gland.

Fill in the blank: Malignant salivary tumours should be suspected where a mass is associated with rapid growth, pain, or facial nerve _____.

Table 4.4: Comparing sialadenitis and salivary gland tumour.

Feature	**Sialadenitis**	**Salivary gland tumour**
Typical onset	Acute, often related to eating	Gradual, painless enlargement
Associated pain	Common, worsened by eating	Usually absent unless malignant
Concerning features	Recurrent obstruction or abscess	Rapid growth, pain, or facial weakness

Pilot questions 4.4

1. Describe how the differential diagnosis of a neck mass is approached according to age and location. (Linked to SLO 4.7)
2. State the rule of 80 as it applies to persistent adult neck masses. (Linked to SLO 4.7)
3. List two features raising suspicion for malignant cervical lymphadenopathy. (Linked to SLO 4.7)
4. Describe the clinical presentation of sialadenitis. (Linked to SLO 4.8)
5. Describe the features that should raise suspicion of a malignant salivary gland tumour. (Linked to SLO 4.8)

Series Summary

This Series examined **laryngological and head and neck diagnosis**, beginning with the **clinical assessment of the larynx and head and neck**, systematic history taking, laryngoscopic examination, and neck examination, before turning to **common laryngeal diseases**, acute laryngitis, vocal cord nodules and polyps, and vocal cord palsy.

We then examined **laryngeal and hypopharyngeal malignancy**, risk factors, clinical presentation, and the differential diagnosis of hoarseness, concluding with **head and neck masses and salivary gland disease**, the differential diagnosis of a neck mass, cervical

lymphadenopathy, and salivary gland disease. Having worked through this Series, you should now be equipped to understand laryngological and head and neck emergencies and management examined in the final Series of this course.

Glossary of Terms

1. **Dysphonia:** voice change, most commonly hoarseness.
2. **Flexible nasendoscopy:** endoscopic examination of the larynx via a flexible scope passed through the nose.
3. **Vocal cord nodule:** a bilateral, symmetrical benign vocal cord lesion caused by chronic vocal abuse.
4. **Vocal cord polyp:** a generally unilateral benign vocal cord lesion, often following vocal trauma.
5. **Vocal cord palsy:** impaired vocal cord movement resulting from recurrent laryngeal nerve dysfunction.
6. **Glottic tumour:** a laryngeal tumour involving the vocal cords, generally presenting early with hoarseness.
7. **Hypopharyngeal carcinoma:** malignancy of the throat below the hyoid bone, often presenting at an advanced stage.
8. **Branchial cyst:** a congenital neck mass arising from remnants of the branchial apparatus.
9. **Thyroglossal duct cyst:** a congenital midline neck mass arising from thyroid gland developmental remnants.
10. **Sialadenitis:** infective or inflammatory salivary gland enlargement, often related to duct obstruction.
11. **Pleomorphic adenoma:** the most common benign tumour of the parotid gland.
12. **Fine-needle aspiration cytology:** a diagnostic test sampling cells from a mass for cytological examination.

Concept Check Questions [Series 4]

Objective questions

- A systematic laryngological history should establish dysphonia, dysphagia or odynophagia, stridor, and _____.
- A thyroid mass characteristically moves upward on _____ during neck examination.
- Vocal cord nodules are bilateral, symmetrical lesions generally resulting from chronic vocal _____.

- Laryngeal carcinoma is most commonly squamous cell carcinoma, strongly associated with tobacco _____.
- A widely applied clinical rule of thumb notes that approximately 80 percent of persistent adult neck masses are _____.

Short-answer questions

1. Distinguish indirect laryngoscopy from flexible nasendoscopy.
2. Distinguish vocal cord nodules from vocal cord polyps in terms of laterality and typical cause.
3. Explain why glottic tumours tend to present earlier than supraglottic or subglottic tumours.
4. State the duration of hoarseness that should prompt laryngoscopic assessment to exclude malignancy.
5. Describe the features that should raise suspicion of a malignant salivary gland tumour.

Long-answer questions

6. Discuss the systematic history taking, laryngoscopic examination, and neck examination used in laryngological and head and neck assessment. (Linked to SLO 4.1, SLO 4.2)
7. Discuss acute laryngitis, vocal cord nodules and polyps, and vocal cord palsy. (Linked to SLO 4.3, SLO 4.4)
8. Discuss the risk factors, clinical presentation, and differential diagnosis of laryngeal and hypopharyngeal malignancy. (Linked to SLO 4.5, SLO 4.6)
9. Discuss the differential diagnosis of a neck mass and cervical lymphadenopathy. (Linked to SLO 4.7)
10. Discuss salivary gland disease. (Linked to SLO 4.8)

Answers to Concept Check Questions [Series 4]

Objective questions

11. Haemoptysis.
12. Swallowing.
13. Abuse.
14. Smoking.
15. Neoplastic.

Short-answer questions

16. Indirect laryngoscopy uses a mirror against the soft palate; flexible nasendoscopy uses a fibre-optic scope passed through the nose.
17. Nodules are bilateral and caused by chronic vocal abuse; polyps are generally unilateral, often following a single episode of trauma.
18. Because glottic tumours affect the vocal cords directly, producing early hoarseness, unlike tumours located away from these structures.
19. Hoarseness persisting beyond three weeks.
20. Rapid growth, pain, or facial nerve weakness, given the nerve's course through the parotid gland.

Long-answer questions

21. **Basic response:** A systematic laryngological history covers dysphonia, dysphagia, stridor, and haemoptysis, complemented by laryngoscopic assessment of vocal cord mobility and mucosal appearance.

Value-added response: Systematic neck examination proceeds by anatomical region, including thyroid assessment on swallowing, providing a comprehensive foundation for head and neck diagnosis.

22. **Basic response:** Acute laryngitis produces erythematous, oedematous cords managed supportively, while vocal cord nodules and polyps are distinguished by laterality and cause, and vocal cord palsy reflects recurrent laryngeal nerve dysfunction.

Value-added response: Each condition requires appropriate voice assessment and, where indicated, further investigation to exclude a more serious underlying cause.

23. **Basic response:** Laryngeal carcinoma is strongly associated with smoking and alcohol, with glottic tumours presenting earlier with hoarseness than supraglottic or subglottic tumours.

Value-added response: The differential diagnosis of persistent hoarseness must always consider malignancy, particularly beyond three weeks' duration, while hypopharyngeal carcinoma often presents at an advanced stage given fewer early warning symptoms.

24. **Basic response:** Neck mass differential diagnosis is approached by age and location, with the rule of 80 highlighting the importance of considering metastatic malignancy in persistent adult neck masses.

Value-added response: Cervical lymphadenopathy may be reactive or malignant, with firm, persistent, enlarging nodes warranting further investigation including fine-needle aspiration cytology.

25. **Basic response:** Sialadenitis presents with painful glandular swelling worsened by eating, often related to ductal obstruction, while salivary gland tumours, most commonly benign pleomorphic adenoma in the parotid, present as painless enlargement.

Value-added response: Malignant salivary tumours should be suspected with rapid growth, pain, or facial nerve weakness, given the nerve's anatomical relationship to the parotid gland.

Answers to Pilot Questions [Series 4]

Part 4.1

1. Dysphonia, dysphagia or odynophagia, stridor, and haemoptysis.
2. Because it raises specific consideration of malignancy, particularly with significant smoking history.
3. Indirect laryngoscopy uses a mirror against the soft palate; flexible nasendoscopy uses a fibre-optic scope through the nose.
4. Vocal cord mobility, symmetry, and any visible mucosal lesion, mass, or asymmetry, assessed at rest and during phonation.
5. Palpating methodically by anatomical region from submental to supraclavicular fossa, and assessing thyroid movement on swallowing.

Part 4.2

6. Acute-onset hoarseness with erythematous, oedematous vocal cords without a discrete mass on laryngoscopy.
7. Voice rest, hydration, and avoidance of vocal cord irritants, with spontaneous resolution generally within one to two weeks.
8. Nodules are bilateral and caused by chronic vocal abuse; polyps are generally unilateral, often from a single traumatic episode.
9. Impaired vocal cord movement from recurrent laryngeal nerve dysfunction; presents with a weak, breathy voice and possible aspiration.
10. Thyroid or neck surgery, and malignancy compressing or involving the nerve.

Part 4.3

11. Tobacco smoking and alcohol consumption.
12. Because glottic tumours affect the vocal cords directly, producing early hoarseness, unlike tumours located away from these structures.
13. Laryngitis, vocal cord nodules or polyps, vocal cord palsy, and laryngeal carcinoma.
14. Beyond three weeks.
15. Because it lacks early warning symptoms comparable to the hoarseness seen with glottic laryngeal tumours.

Part 4.4

1. Congenital lesions are more typical in younger patients; malignant causes require particular consideration in older patients or those with risk factors.
2. Approximately 80 percent of persistent adult neck masses are neoplastic, of which 80 percent are malignant, of which 80 percent are metastatic from a head and neck primary.
3. A firm or hard, painless, progressively enlarging node persisting beyond several weeks.
4. Painful glandular swelling, characteristically worsened by eating.
5. Rapid growth, pain, or facial nerve weakness.

References and Attributions [Series 4]

1. Gleeson, M. (Ed.). (2008). Scott-Brown's Otorhinolaryngology, Head and Neck Surgery (7th ed.). Hodder Arnold.
2. Probst, R., Grevers, G., & Iro, H. (2018). Basic Otorhinolaryngology: A Step-by-Step Learning Guide (2nd ed.). Thieme.
3. Dhillon, R. S., & East, C. A. (2013). Ear, Nose and Throat and Head and Neck Surgery: An Illustrated Colour Text (4th ed.). Churchill Livingstone.
4. National Institute for Health and Care Excellence (2015). Suspected cancer: recognition and referral (NG12), head and neck section.

Figures, Plates, Tables, and Boxes

1. Figure 4.1: Diagram illustrating flexible nasendoscopy passage through the nasal cavity to visualise the larynx. AI-generated using the prompt: "A single clean, accurate cross-sectional medical diagram of the head and neck showing a thin flexible endoscope passing through the nasal cavity down to the larynx, textbook diagnostic illustration style, clearly labelled anatomical structures and scope path, neutral background, no other panels."
2. Table 4.2: Comparing vocal cord nodules and vocal cord polyps. AI-generated using the prompt: "Create a clean clinical reference table titled Comparing Vocal Cord Nodules and Polyps, listing feature, vocal cord nodules, and vocal cord polyps. Medical reference table style with outside border, no photographic elements."
3. Figure 4.3: Laryngoscopic view diagram comparing a normal glottis with an irregular mass lesion on the vocal cord. AI-generated using the prompt: "A single clean, accurate paired laryngoscopic view diagram showing normal smooth symmetrical vocal cords on one side, and an irregular raised mass lesion replacing part of one vocal cord on the other side, medical textbook diagnostic reference style, clear labels, neutral background, no other panels."
4. Table 4.4: Comparing sialadenitis and salivary gland tumour. AI-generated using the prompt: "Create a clean clinical reference table titled Comparing Sialadenitis and Salivary Gland Tumour, listing feature, sialadenitis, and salivary gland tumour. Medical reference table style with outside border, no photographic elements."

Course code: ORL 601

Course title: Otology

Course credit load: 2 Units

Series 5: Laryngological and Head and Neck Emergencies and Management

- **Part 5.1: Airway Emergencies**
  - Sub Part 5.1.1: Acute stridor and airway obstruction
  - Sub Part 5.1.2: Epiglottitis
  - Sub Part 5.1.3: Foreign body aspiration and inhalation injury
- **Part 5.2: Other Laryngological and Head and Neck Emergencies**
  - Sub Part 5.2.1: Deep neck space infections
  - Sub Part 5.2.2: Laryngeal trauma
  - Sub Part 5.2.3: Haemorrhage following head and neck surgery
- **Part 5.3: Basic Surgical Principles and Postoperative Complications**
  - Sub Part 5.3.1: Tracheostomy: indications and technique
  - Sub Part 5.3.2: Principles of head and neck cancer surgery
  - Sub Part 5.3.3: Postoperative complications and their management
- **Part 5.4: Rehabilitation, Follow-Up, Community Risk Factors, and Prevention**
  - Sub Part 5.4.1: Voice and swallowing rehabilitation
  - Sub Part 5.4.2: Follow-up criteria after laryngological and head and neck treatment
  - Sub Part 5.4.3: Community risk factors and preventive measures

Introduction

In the last Series, we established the diagnosis and differential diagnosis of laryngological and head and neck disease. We now conclude this course with **laryngological and head and neck emergencies**, conditions demanding the most urgent recognition given their direct threat to the

airway, together with the **basic surgical principles**, **postoperative complications**, **rehabilitation process**, and **preventive measures** relevant to comprehensive management of this important body region.

The aim of this Series is to equip you with a thorough understanding of laryngological and head and neck emergencies, their initial treatment and indications for referral, the basic surgical principles of management and postoperative complications, the rehabilitation process, follow-up criteria, community risk factors, and preventive measures.

This Series begins with **airway emergencies**, before turning to **other laryngological and head and neck emergencies**. We then examine **basic surgical principles and postoperative complications**, concluding with **rehabilitation, follow-up, community risk factors, and prevention**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 5.1:** recognise acute stridor and airway obstruction and describe their initial management
- **SLO 5.2:** recognise epiglottitis and foreign body aspiration and describe their initial management
- **SLO 5.3:** recognise deep neck space infections and laryngeal trauma as emergencies
- **SLO 5.4:** describe the management of haemorrhage following head and neck surgery
- **SLO 5.5:** describe the indications and basic technique of tracheostomy
- **SLO 5.6:** describe the basic principles of head and neck cancer surgery and its postoperative complications
- **SLO 5.7:** describe voice and swallowing rehabilitation and follow-up criteria after laryngological and head and neck treatment, and
- **SLO 5.8:** describe community risk factors and preventive measures relevant to laryngological and head and neck disease.

5.1 Airway Emergencies

5.1.1 acute stridor and airway obstruction

A harsh, high-pitched sound signalling significant airway narrowing

Stridor is a harsh, high-pitched sound resulting from turbulent airflow through a narrowed airway, with **inspiratory** stridor generally indicating extrathoracic obstruction at or above the level of the larynx, and **biphasic** stridor suggesting a fixed obstruction, discussed in relation to specific causes throughout this Part.

Any patient presenting with significant stridor requires urgent clinical assessment of airway **patency**, avoiding unnecessary distressing examination or investigation that might precipitate complete obstruction, and immediate involvement of senior anaesthetic and otolaryngology colleagues given the potential need for urgent airway **intervention**.

Fill in the blank: Inspiratory stridor generally indicates extrathoracic obstruction at or above the level of the _____.

5.1.2 epiglottitis

Acute epiglottitis is a rapidly progressive infection and swelling of the epiglottis and surrounding supraglottic structures, historically most commonly caused by **Haemophilus influenzae type b**, presenting with rapid-onset sore throat, drooling, and a characteristic **muffled**, "hot potato" voice, with the patient often preferring to sit forward.

Suspected epiglottitis represents a genuine airway **emergency**, requiring immediate senior anaesthetic and otolaryngology involvement for controlled airway management, generally within a **theatre** setting, and avoiding direct oropharyngeal examination or upsetting the patient, since either can precipitate sudden, complete airway obstruction.

Fill in the blank: Acute epiglottitis presents with rapid-onset sore throat, drooling, and a characteristic muffled, hot potato _____.

5.1.3 foreign body aspiration and inhalation injury

Foreign body aspiration, particularly common in young children, may present with acute choking, coughing, and stridor, discussed earlier in this Part, or, where the foreign body passes beyond the larynx into a main bronchus, more subtle findings including unilateral reduced air entry, requiring **bronchoscopy** for definitive diagnosis and removal.

Inhalation injury, resulting from thermal or chemical exposure, such as in house fires, discussed in relation to burns in an earlier related course, may produce progressive airway **oedema** over several hours following initial exposure, meaning early, proactive airway

assessment and, where indicated, early intubation, is essential even in patients with initially preserved airway patency.

Fill in the blank: Inhalation injury may produce progressive airway oedema over several hours, meaning early, proactive airway _____ is essential even with initially preserved patency.

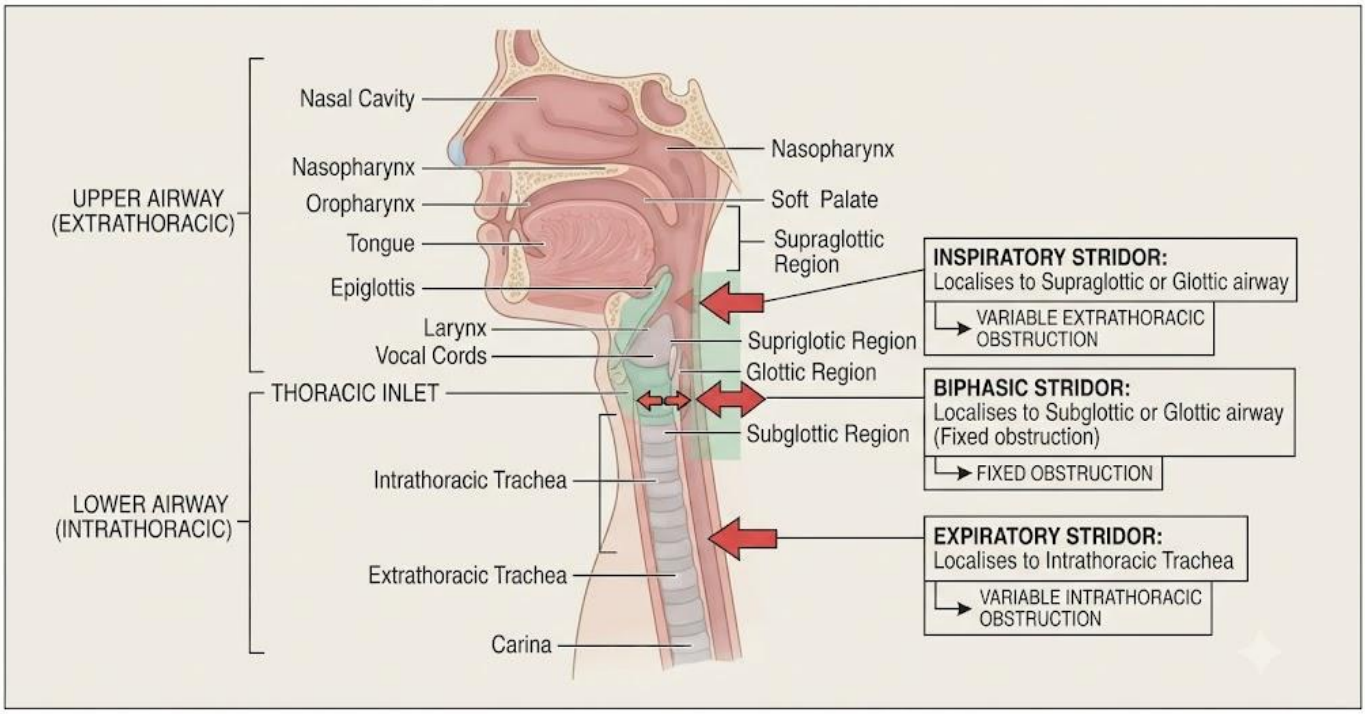

Figure 5.1: Diagram illustrating the anatomical level of airway obstruction corresponding to inspiratory, expiratory, and biphasic stridor.

Figure 5.1: Diagram illustrating the anatomical level of airway obstruction corresponding to inspiratory, expiratory, and biphasic stridor.

Pilot questions 5.1

- Define stridor and distinguish inspiratory from biphasic stridor. (Linked to SLO 5.1)
- Describe the immediate priorities when assessing a patient with significant stridor. (Linked to SLO 5.1)
- Describe the typical clinical presentation of acute epiglottitis. (Linked to SLO 5.2)
- Explain why direct oropharyngeal examination should be avoided in suspected epiglottitis. (Linked to SLO 5.2)
- Describe the clinical presentation of foreign body aspiration and the investigation required for a bronchial foreign body. (Linked to SLO 5.2)

5.2 Other Laryngological and Head and Neck Emergencies

5.2.1 deep neck space infections

Infections tracking through fascial planes with airway implications

Peritonsillar abscess, or quinsy, presents with severe unilateral sore throat, trismus (difficulty opening the mouth), and a characteristic **muffled**, "hot potato" voice, discussed earlier in this Series, generally requiring needle aspiration or incision and drainage, together with appropriate antibiotic therapy.

Ludwig's angina is a rapidly progressive, bilateral cellulitis of the floor of the mouth, generally arising from a dental infection, carrying significant risk of airway compromise given resulting elevation and posterior displacement of the tongue, and requiring urgent airway assessment together with surgical drainage and intravenous **antibiotics**.

Fill in the blank: Ludwig's angina carries significant risk of airway compromise given resulting elevation and posterior displacement of the _____.

5.2.2 laryngeal trauma

Laryngeal trauma, whether blunt (such as from direct impact) or penetrating, may present with hoarseness, discussed in the previous Series of this course, subcutaneous emphysema, haemoptysis, and, in severe cases, acute airway obstruction, discussed earlier in this Series, requiring urgent clinical assessment given the potential for rapid airway **compromise**.

Any suspected laryngeal trauma warrants a low threshold for urgent otolaryngology referral, since clinical signs may initially understate the true severity of underlying laryngeal injury, with **imaging** and, where indicated, direct laryngoscopy, discussed in the previous Series of this course, required to fully assess the extent of injury before determining appropriate management.

Fill in the blank: Any suspected laryngeal trauma warrants a low threshold for urgent referral, since clinical signs may initially understate the true severity of the underlying _____.

5.2.3 haemorrhage following head and neck surgery

Postoperative haemorrhage following head and neck surgery, particularly thyroid or major neck dissection surgery, discussed further later in this Series, represents a genuine surgical emergency, since expanding **haematoma** within the confined fascial spaces of the neck can rapidly compromise the airway through direct compression.

Immediate management of suspected postoperative neck haematoma includes urgent wound **exploration**, which may require bedside opening of the wound in a genuine airway emergency before formal return to theatre, together with immediate senior surgical and anaesthetic involvement given the potential for rapid clinical **deterioration**.

Fill in the blank: Expanding haematoma within the confined fascial spaces of the neck can rapidly compromise the airway through direct _____.

Table 5.2: Comparing peritonsillar abscess and Ludwig's angina.

Feature	Peritonsillar abscess	Ludwig's angina
Typical location	Peritonsillar space, unilateral	Floor of mouth, bilateral
Typical origin	Tonsillar infection	Dental infection
Airway risk mechanism	Trismus and pharyngeal swelling	Tongue elevation and posterior displacement

Pilot questions 5.2

1. Describe the clinical presentation and management of peritonsillar abscess. (Linked to SLO 5.3)
2. Define Ludwig's angina and explain why it carries significant airway risk. (Linked to SLO 5.3)
3. Describe the clinical presentation of laryngeal trauma. (Linked to SLO 5.3)
4. Explain why suspected laryngeal trauma warrants a low threshold for urgent referral. (Linked to SLO 5.3)
5. Describe the immediate management of suspected postoperative neck haematoma. (Linked to SLO 5.4)

5.3 Basic Surgical Principles and Postoperative Complications

5.3.1 tracheostomy: indications and technique

Establishing a surgical airway below the level of obstruction

Tracheostomy creates a surgical opening into the trachea, generally performed to secure the airway in the setting of upper airway obstruction, discussed throughout this Series, to facilitate

prolonged mechanical ventilation, or as an elective component of major head and neck cancer surgery, discussed further in the next sub-Part.

The procedure generally involves a horizontal skin incision over the second or third **tracheal ring**, careful dissection through the strap muscles and, where necessary, division or retraction of the thyroid isthmus, before controlled incision into the trachea and insertion of an appropriately sized **tracheostomy tube**.

Fill in the blank: Tracheostomy generally involves a horizontal skin incision over the second or third tracheal _____.

5.3.2 principles of head and neck cancer surgery

Head and neck cancer surgery, relevant to laryngeal and hypopharyngeal malignancy discussed in the previous Series of this course, generally aims for complete surgical excision of the primary tumour with adequate clear **margins**, together with appropriate management of the neck lymph nodes, discussed in relation to cervical lymphadenopathy in the previous Series of this course, through neck dissection where indicated.

Reconstruction following major resection, using local, regional, or free tissue **flaps**, aims to restore form and function, including swallowing and speech, discussed further later in this Series, with multidisciplinary team input, including oncology and speech and language therapy colleagues, essential to optimal overall patient **outcome**.

Fill in the blank: Head and neck cancer surgery aims for complete surgical excision of the primary tumour with adequate clear _____.

5.3.3 postoperative complications and their management

Recognised postoperative complications following major head and neck surgery include wound infection and, of particular significance following pharyngeal or laryngeal reconstruction, **pharyngocutaneous fistula**, an abnormal communication between the pharynx and overlying skin, generally managed with wound care and nutritional support, occasionally requiring further surgical intervention.

Further recognised complications include **chyle leak**, following neck dissection involving injury to lymphatic channels, particularly the **thoracic duct** on the left side of the neck, and flap failure following reconstructive surgery, discussed earlier in this Part, each requiring prompt recognition and appropriate management to optimise eventual surgical **outcome**.

Fill in the blank: Chyle leak may follow neck dissection involving injury to lymphatic channels, particularly the thoracic duct on the left side of the _____.

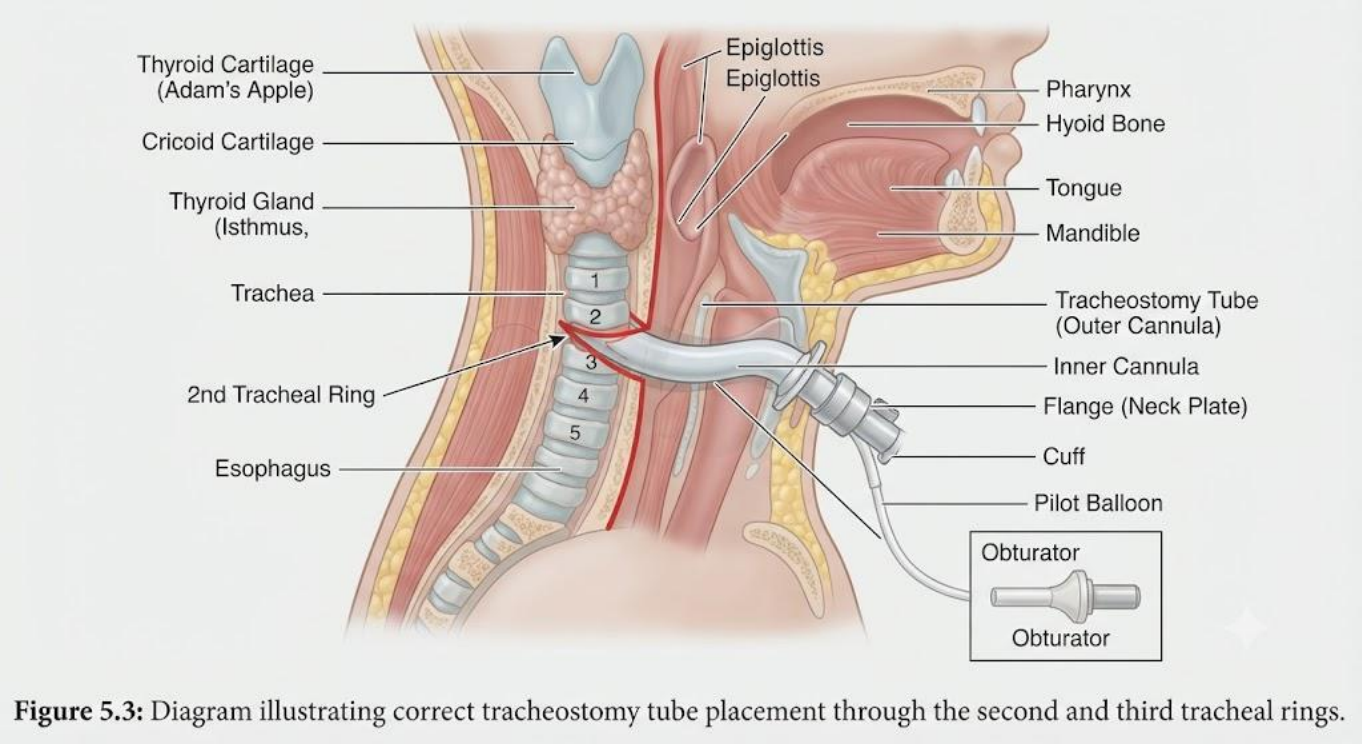

Figure 5.3: Diagram illustrating correct tracheostomy tube placement through the second and third tracheal rings.

Figure 5.3: Diagram illustrating correct tracheostomy tube placement through the second and third tracheal rings.

Pilot questions 5.3

1. List the indications for tracheostomy. (Linked to SLO 5.5)
2. Describe the basic surgical technique of tracheostomy. (Linked to SLO 5.5)
3. Describe the general aims of head and neck cancer surgery. (Linked to SLO 5.6)
4. Define pharyngocutaneous fistula. (Linked to SLO 5.6)
5. Define chyle leak and describe the anatomical structure most commonly implicated. (Linked to SLO 5.6)

5.4 Rehabilitation, Follow-Up, Community Risk Factors, and Prevention

5.4.1 voice and swallowing rehabilitation

Restoring communication and safe swallowing after treatment

Voice rehabilitation following laryngeal surgery, including total laryngectomy for advanced laryngeal carcinoma, discussed in the previous Series of this course, generally involves either a surgically created **tracheoesophageal puncture** with voice prosthesis, or, alternatively, **oesophageal speech** or an electronic artificial larynx device.

Swallowing rehabilitation, essential following major head and neck surgery or radiotherapy, discussed further later in this Series, generally involves close collaboration with **speech and language therapy** colleagues, including structured swallowing assessment and exercises, with temporary or, occasionally, longer-term alternative feeding support required for patients with significant swallowing **impairment**.

Fill in the blank: Voice rehabilitation following total laryngectomy may involve a surgically created tracheoesophageal puncture with voice _____.

5.4.2 follow-up criteria after laryngological and head and neck treatment

Follow-up after treatment for head and neck malignancy, discussed in the previous Series of this course, generally follows a structured schedule of increasingly spaced clinical review, combining physical examination and, where indicated, endoscopic assessment, to detect **recurrence** or a new second primary tumour at the earliest possible opportunity.

Patients treated for benign conditions such as vocal cord nodules or polyps, discussed in the previous Series of this course, generally require a shorter period of follow-up confirming symptom resolution and successful voice rehabilitation, discussed earlier in this Series, reflecting the considerably different follow-up **intensity** appropriate to benign compared with malignant disease.

Fill in the blank: Follow-up after treatment for head and neck malignancy follows a structured schedule to detect recurrence or a new second primary _____.

5.4.3 community risk factors and preventive measures

Community risk factors relevant to laryngological and head and neck disease include **tobacco use**, discussed in relation to laryngeal carcinoma in the previous Series of this course, alcohol consumption, and, in some communities, chewing of areca nut or related products, each carrying substantial malignancy risk warranting targeted public health **attention**.

Preventive measures include tobacco and alcohol cessation support, discussed in relation to health education in an earlier related course, occupational protection against relevant inhaled

carcinogens, and community awareness raising regarding the significance of persistent hoarseness or a neck mass, discussed in the previous Series of this course, encouraging earlier presentation and, correspondingly, earlier diagnosis of significant head and neck disease.

Fill in the blank: Preventive measures include community awareness raising regarding the significance of persistent hoarseness or a neck mass, encouraging earlier _____ and diagnosis.

Figure 5.4: A speech and language therapist guiding a patient through a swallowing rehabilitation exercise using a mirror.

Figure 5.4: A speech and language therapist guiding a patient through a swallowing rehabilitation exercise using a mirror.

Pilot questions 5.4

1. Describe the options for voice rehabilitation following total laryngectomy. (Linked to SLO 5.7)
2. Describe the role of speech and language therapy in swallowing rehabilitation. (Linked to SLO 5.7)
3. Describe the follow-up schedule generally appropriate after treatment for head and neck malignancy. (Linked to SLO 5.7)
4. List three community risk factors for laryngological and head and neck disease. (Linked to SLO 5.8)

5. Describe two preventive measures relevant to reducing head and neck cancer risk and supporting earlier diagnosis. (Linked to SLO 5.8)

Series Summary

This final Series examined **laryngological and head and neck emergencies and management**, beginning with **airway emergencies**, acute stridor, epiglottitis, and foreign body aspiration, before turning to **other laryngological and head and neck emergencies**, deep neck space infections, laryngeal trauma, and postoperative haemorrhage.

We then examined **basic surgical principles and postoperative complications**, tracheostomy, head and neck cancer surgery, and their recognised complications, concluding with **rehabilitation, follow-up, community risk factors, and prevention**, voice and swallowing rehabilitation, structured follow-up criteria, and community risk factors and preventive measures. Having worked through this Series, and indeed this entire course, you should now possess a comprehensive, clinically grounded foundation in otolaryngology, from otological diagnosis and emergencies through rhinological management to laryngological and head and neck diagnosis and emergencies addressed throughout ORL 601.

Glossary of Terms

1. **Stridor:** a harsh, high-pitched sound resulting from turbulent airflow through a narrowed airway.
2. **Epiglottitis:** rapidly progressive infection and swelling of the epiglottis, a genuine airway emergency.
3. **Peritonsillar abscess (quinsy):** a collection of pus adjacent to the tonsil causing severe sore throat and trismus.
4. **Ludwig's angina:** a rapidly progressive bilateral cellulitis of the floor of the mouth, generally of dental origin.
5. **Tracheostomy:** a surgical opening into the trachea to secure the airway or facilitate ventilation.
6. **Neck dissection:** surgical removal of cervical lymph nodes as part of head and neck cancer treatment.
7. **Pharyngocutaneous fistula:** an abnormal communication between the pharynx and overlying skin following surgery.

8. **Chyle leak:** leakage of lymphatic fluid, typically from thoracic duct injury during neck surgery.
9. **Tracheoesophageal puncture:** a surgically created connection allowing voice restoration after laryngectomy.
10. **Oesophageal speech:** a voice restoration method using air trapped in the oesophagus, an alternative to a voice prosthesis.
11. **Total laryngectomy:** complete surgical removal of the larynx, generally performed for advanced laryngeal carcinoma.
12. **Second primary tumour:** a new, separate malignancy distinct from a previously treated cancer.

Concept Check Questions [Series 5]

Objective questions

- Inspiratory stridor generally indicates extrathoracic obstruction at or above the level of the _____.
- Ludwig's angina carries significant airway risk given elevation and posterior displacement of the _____.
- Tracheostomy generally involves a horizontal skin incision over the second or third tracheal _____.
- Chyle leak may follow neck dissection involving injury to the thoracic duct on the left side of the _____.
- Voice rehabilitation following total laryngectomy may involve a tracheoesophageal puncture with voice _____.

Short-answer questions

1. Describe the typical clinical presentation of acute epiglottitis.
2. Distinguish peritonsillar abscess from Ludwig's angina in terms of typical origin.
3. Describe the immediate management of suspected postoperative neck haematoma.
4. Define pharyngocutaneous fistula.
5. List three community risk factors for laryngological and head and neck disease.

Long-answer questions

6. Discuss acute stridor, epiglottitis, and foreign body aspiration as airway emergencies. (Linked to SLO 5.1, SLO 5.2)
7. Discuss deep neck space infections, laryngeal trauma, and postoperative haemorrhage. (Linked to SLO 5.3, SLO 5.4)

8. Discuss the indications and technique of tracheostomy and the principles of head and neck cancer surgery. (Linked to SLO 5.5, SLO 5.6)
9. Discuss the postoperative complications of head and neck surgery. (Linked to SLO 5.6)
10. Discuss voice and swallowing rehabilitation, follow-up criteria, community risk factors, and preventive measures. (Linked to SLO 5.7, SLO 5.8)

Answers to Concept Check Questions [Series 5]

Objective questions

11. Larynx.
12. Tongue.
13. Ring.
14. Neck.
15. Prosthesis.

Short-answer questions

16. Rapid-onset sore throat, drooling, and a muffled, hot potato voice, with the patient often sitting forward.
17. Peritonsillar abscess arises from tonsillar infection; Ludwig's angina arises from dental infection.
18. Urgent wound exploration, which may require bedside opening in a genuine airway emergency, with senior surgical and anaesthetic involvement.
19. An abnormal communication between the pharynx and overlying skin, generally following pharyngeal or laryngeal reconstruction.
20. Tobacco use, alcohol consumption, and chewing of areca nut or related products.

Long-answer questions

21. **Basic response:** Acute stridor requires urgent airway assessment, epiglottitis demands controlled airway management avoiding distressing examination, and foreign body aspiration requires bronchoscopy for bronchial foreign bodies.

Value-added response: Each condition demands early involvement of senior anaesthetic and otolaryngology colleagues given the potential for rapid airway deterioration.

22. **Basic response:** Peritonsillar abscess and Ludwig's angina both carry airway risk through different anatomical mechanisms, while laryngeal trauma may understate its severity on initial examination.

Value-added response: Postoperative haemorrhage following neck surgery represents a further emergency, given the potential for rapid airway compromise from expanding haematoma in confined fascial spaces.

23. **Basic response:** Tracheostomy secures the airway through a controlled surgical opening at the second or third tracheal ring, indicated for obstruction, prolonged ventilation, or elective cancer surgery.

Value-added response: Head and neck cancer surgery aims for complete tumour excision with clear margins and appropriate neck node management, supported by reconstruction and multidisciplinary team involvement.

24. **Basic response:** Postoperative complications include pharyngocutaneous fistula following pharyngeal reconstruction and chyle leak following thoracic duct injury during neck dissection.

Value-added response: Flap failure following reconstructive surgery represents a further recognised complication, each requiring prompt recognition and appropriate management.

25. **Basic response:** Voice rehabilitation uses tracheoesophageal puncture, oesophageal speech, or an artificial larynx, while swallowing rehabilitation involves speech and language therapy collaboration.

Value-added response: Structured follow-up detects recurrence or second primary tumours, while addressing community risk factors such as tobacco and alcohol use supports both prevention and earlier diagnosis.

Answers to Pilot Questions [Series 5]

Part 5.1

1. A harsh, high-pitched airway sound; inspiratory stridor indicates extrathoracic obstruction, biphasic suggests fixed obstruction.
2. Urgent assessment of airway patency, avoiding distressing examination, and involving senior anaesthetic and otolaryngology colleagues.
3. Rapid-onset sore throat, drooling, and a muffled, hot potato voice, with the patient sitting forward.
4. Because it can precipitate sudden, complete airway obstruction.
5. Acute choking, coughing, and stridor, or subtler unilateral reduced air entry; bronchoscopy is required for a bronchial foreign body.

Part 5.2

6. Severe unilateral sore throat, trismus, and a muffled voice; managed with aspiration or drainage and antibiotics.
7. A rapidly progressive bilateral floor of mouth cellulitis; risk arises from tongue elevation and posterior displacement.
8. Hoarseness, subcutaneous emphysema, haemoptysis, and potentially acute airway obstruction.
9. Because clinical signs may initially understate the true severity of underlying injury.
10. Urgent wound exploration, potentially bedside if a genuine emergency, with senior surgical and anaesthetic involvement.

Part 5.3

11. Upper airway obstruction, prolonged mechanical ventilation, and elective head and neck cancer surgery.
12. A horizontal skin incision over the second or third tracheal ring, dissection through strap muscles, and controlled tracheal incision for tube insertion.
13. Complete surgical excision of the primary tumour with clear margins and appropriate neck node management.
14. An abnormal communication between the pharynx and overlying skin.
15. Leakage of lymphatic fluid, most commonly from thoracic duct injury on the left side of the neck.

Part 5.4

1. Tracheoesophageal puncture with voice prosthesis, oesophageal speech, or an electronic artificial larynx.
2. Structured swallowing assessment and exercises, and support with alternative feeding where needed.
3. Increasingly spaced clinical review combining examination and endoscopic assessment to detect recurrence or a second primary.
4. Tobacco use, alcohol consumption, and chewing of areca nut or related products.
5. Tobacco and alcohol cessation support, and community awareness raising encouraging earlier presentation.

References and Attributions [Series 5]

1. Gleeson, M. (Ed.). (2008). Scott-Brown's Otorhinolaryngology, Head and Neck Surgery (7th ed.). Hodder Arnold.
2. Probst, R., Grevers, G., & Iro, H. (2018). Basic Otorhinolaryngology: A Step-by-Step Learning Guide (2nd ed.). Thieme.
3. Dhillon, R. S., & East, C. A. (2013). Ear, Nose and Throat and Head and Neck Surgery: An Illustrated Colour Text (4th ed.). Churchill Livingstone.
4. National Comprehensive Cancer Network (2023). NCCN Clinical Practice Guidelines: Head and Neck Cancers.

Figures, Plates, Tables, and Boxes

1. Figure 5.1: Diagram illustrating the anatomical level of airway obstruction corresponding to inspiratory, expiratory, and biphasic stridor. AI-generated using the prompt: "A single clean, accurate cross-sectional medical diagram of the upper airway from nose to trachea with labelled zones indicating extrathoracic and intrathoracic regions relevant to stridor type, textbook diagnostic illustration style, clear labels, neutral background, no other panels."
2. Table 5.2: Comparing peritonsillar abscess and Ludwig's angina. AI-generated using the prompt: "Create a clean clinical reference table titled Comparing Peritonsillar Abscess and Ludwig's Angina, listing feature, peritonsillar abscess, and Ludwig's angina. Medical reference table style with outside border, no photographic elements."
3. Figure 5.3: Diagram illustrating correct tracheostomy tube placement through the second and third tracheal rings. AI-generated using the prompt: "A single clean, accurate cross-sectional medical diagram of the neck showing a tracheostomy tube correctly inserted into the trachea below the larynx, textbook surgical illustration style, clearly labelled anatomical structures, neutral background, no other panels."
4. Figure 5.4: A speech and language therapist guiding a patient through a swallowing rehabilitation exercise using a mirror. AI-generated using the prompt: "A single clean, realistic illustration of a therapist guiding a seated patient holding a small hand mirror during a rehabilitation exercise session, calm clinical setting, natural lighting, no legible text detail, no other panels, respectful depiction, no identifying facial features."