Structured Notes According to

ENT

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(Author)

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1 ANATOMY OF EXTERNAL EAR AND MIDDLE EAR

Temporal Bone Anatomy

Anatomy

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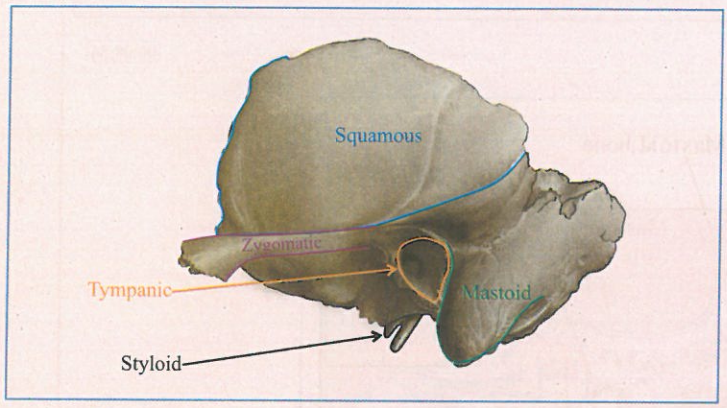
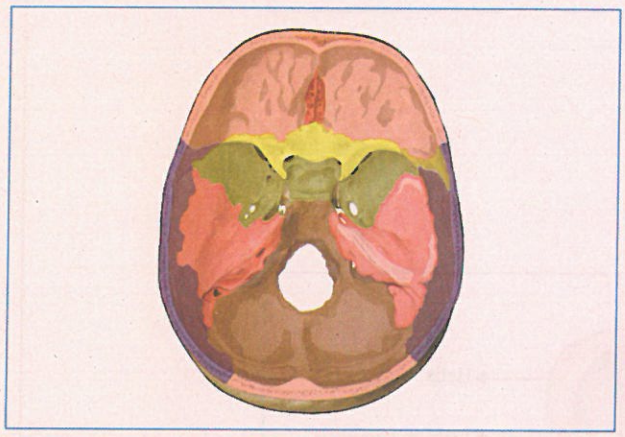
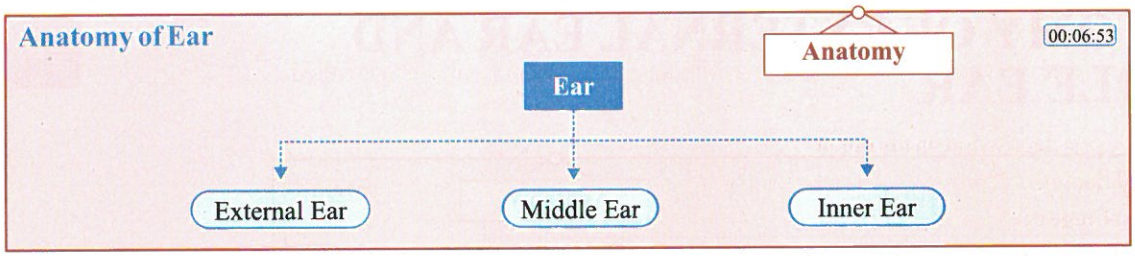


- The temporal bone is made up of five parts. They are -
  - **Part 1: Squamous**: Biggest part and lies at the upper end of the temporal bone.
  - **Part 2: Tympanic**: Present between the styloid and zygomatic part; contains the middle ear
  - **Part 3: Styloid:** It is the elongated projection at the base of the temporal bone.
  - **Part 4**: **Petromastoid:** Lateral surface → mastoid part, medial surface → petrous part
  - **Part 5: Zygomatic:** Projects anteriorly from the squamous Part.



- The petrous part has two slants - anterior and posterior slants.
- The anterior slant articulates with the squamous temporal bone, and the posterior slant articulates with the occipital bone.
- Petrous bone continues as the mastoid temporal bone posteriorly, → forming Petro mastoid complex.
- On the posterior slant → internal auditory canal/meatus
- The petrous apex lies close to the brainstem → continues downwards as the spinal cord.
- Cranial nerves 5,6,7,8 originate from the pons.
- 5th and 6th cranial nerves → Go anteriorly towards the petrous apex (present medially towards the brain).
- 7th and 8th nerves → Go into the internal auditory canal

Anatomy of Ear



External Ear

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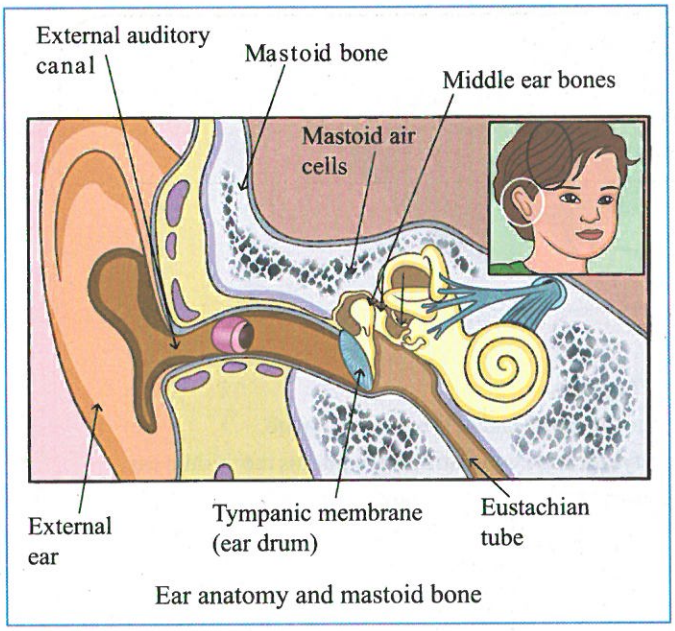
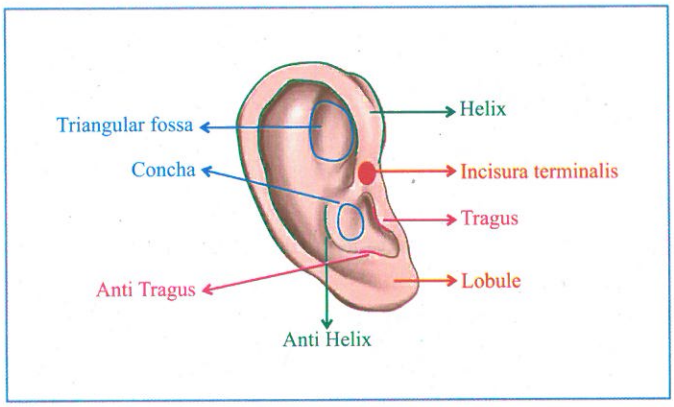


Ear anatomy and mastoid bone

3 parts of external ear:

1. Pinna
2. External auditory canal
3. Tympanic membrane

Pinna



- It is also called the auricle.
- Made up of elastic cartilage.
- **Helix:** Most prominent elevation present on the outermost part of the pinna.
- **Anti-helix:** Smaller projection present along the helix in the opposite direction

- **Tragus:** A triangular projection present medial to the anti-helix
- **Anti-tragus**: In the reverse direction of the tragus, there is another projection present which is called the anti-tragus.
- **Cavum concha:** Biggest depression on the pinna.
- **Triangular fossa:** Triangular depression above the concha.
- **Areas devoid of cartilage are**
  - Incisura terminalis: The space between the tragus and the helix
  - Ear lobule

Important Information

- Incisura terminalis is the site of incision in an endaural surgery.
- This incision is known as Lempert's endaural incision.
- Ear lobule contains fat. Therefore, it becomes the site for fat graft.

External Auditory Canal

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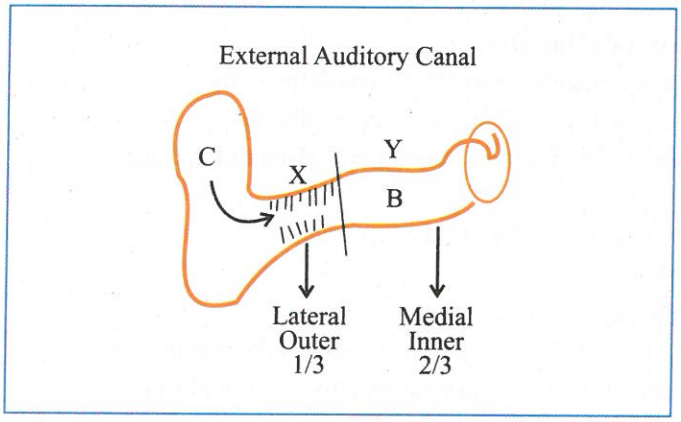
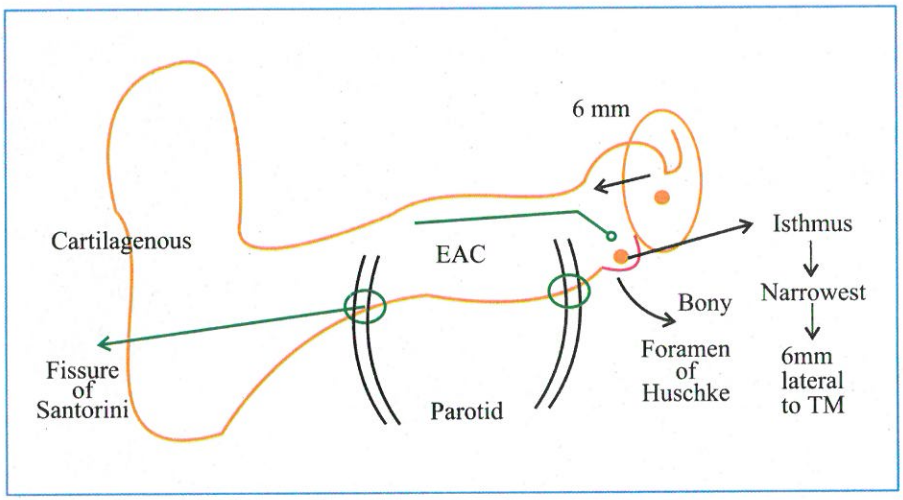


- It is the continuation of the pinna.
- The length of the external auditory canal is 24mm.
- **Two parts of EAC:**

Cartilaginous part	Bony part
• Lateral or outer part.	• Medial or inner part.
• Accounts for 1/3rd length of EAC (8 mm)	• Accounts for 2/3rd length of EAC (16 mm)
• Hair follicles, sebaceous glands, and • ceruminous are present	• Hair follicles, sebaceous glands, and • ceruminous are absent
• Otitis externa or folliculitis • (staphylococcus infection) are seen	• Not seen

- **Shape**: The canal is S-shaped
- **For tympanic membrane examination**:
  - In adults, TM is pulled upwards, backwards, and outwards.
  - In children, TM is pulled downwards and backwards. (because the bony part of EAC is not fully developed)



- Parotid gland is present below the EAC.
- **2 Communications between EAC and parotid gland are:**
  - Fissure of Santorini: Present between the cartilaginous part of EAC and the parotid gland.
  - Foramen of Huschke: Present between the bony part of EAC and the parotid gland.
    - → These communications are responsible for infection from parotid gland to EAC and vice versa.
    - → These two communications usually disappear by the age of 5-7 years.
- Isthmus: Narrowest portion of EAC, 6mm lateral to TM.
  - Foreign bodies or wax impaction is common in isthmus.
  - During removal of wax or foreign body from isthmus with probe → Higher risk of perforation
    - → Thus, Local anaesthesia in adults and sedation/short general anaesthesia in children is given before removal to prevent any movements.
    - → Magnification devices like endoscope or microscope is used to prevent damage.

Nerve Supply of Pinna and External Auditory Canal

Anatomy

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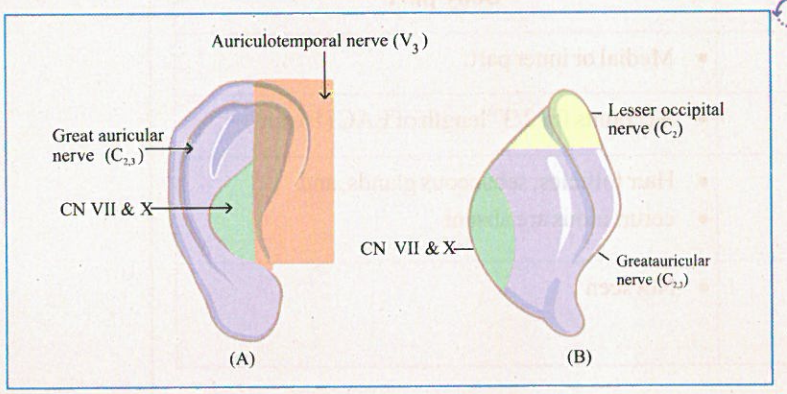
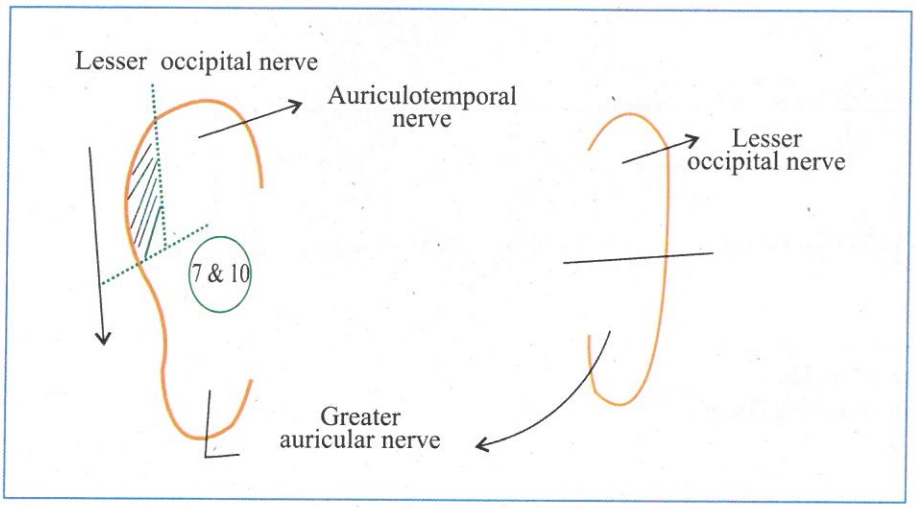


- **Nerve supply of Pinna:**
  1. Lesser occipital nerve
  2. Auriculotemporal nerve
  3. Greater auricular nerve
  4. 7th and 10th cranial nerves (Facial and vagus nerve)

- Mnemonic: LAG 7 & 10
- Greater surface area of the pinna is supplied by the greater auricular nerve.



Lateral Surface		Medial Surface	
Lower half	Greater auricular nerve	**Lower half**	Greater auricular nerve
Upper half anterior 2/3rd	Auriculotemporal nerve	**Upper half**	Lesser occipital nerve
Upper half posterior 1/3rd	Lesser occipital nerve		
Concha	7th & 8th nerves		

Nerve supply of EAC:

Area	Nerve supply
Anterior wall and roof	Auriculotemporal nerve
Posterior wall and floor	Arnold's nerve (Auricular branch of Vagus nerve)

Important Information

Stimulation of Arnold's nerve:

- During any procedure → can cause cough reflex (since it is a branch of vagus nerve, which innervates larynx).
- Can precipitate a vasovagal attack or syncope

Nerve supply of lateral surface of TM:

- Auriculotemporal nerve + Arnold's nerve.

Tympanic Membrane

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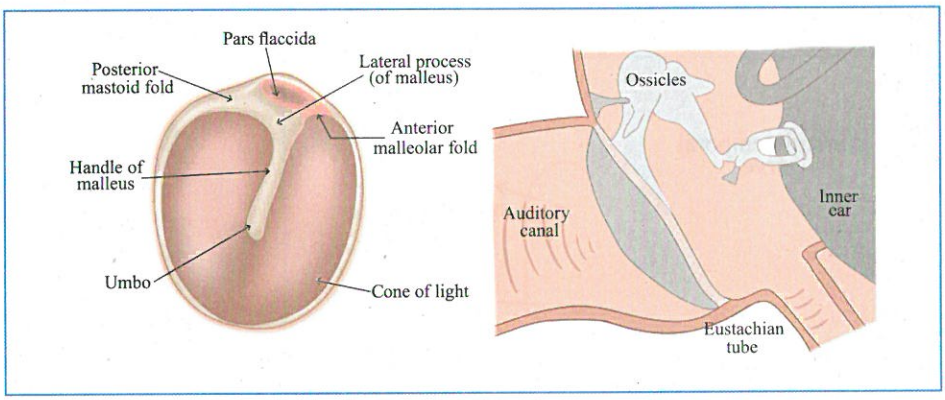
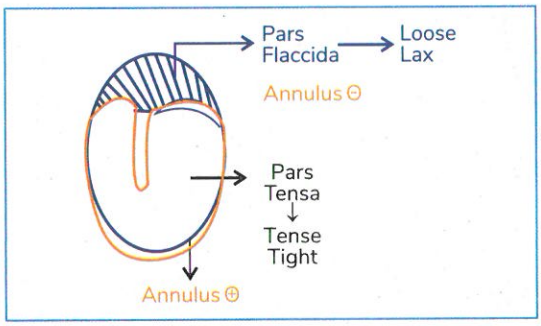


- Partition between external ear and middle ear
- Obliquely placed to the floor EAC at the angle of 45°
- Oval in shape
- 9-10 mm tall
- 8 mm wide
- TSA = 10 x 9 = 90mm^2
- 0.1mm thick
- Vibrating area of TM: Peripheral portion (since the handle of malleus rests medially in the centre, preventing vibrations)
- Effective vibrating area= ½ TSA
  - Effective vibrating area = ½ 90 mm^2 = 45mm^2

Parts of Tympanic Membrane



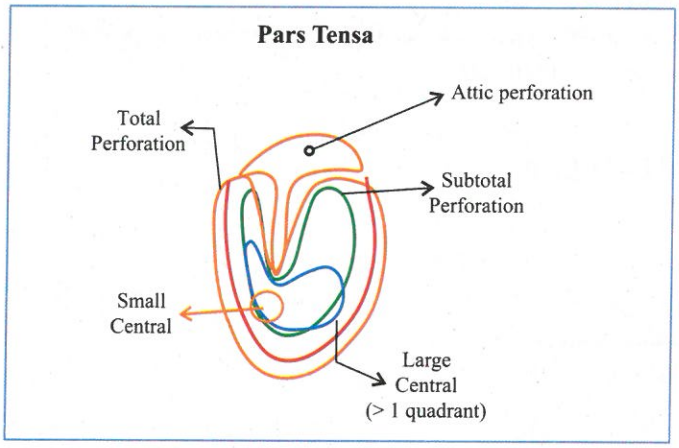
	Pars Tensa	Pars Flaccida
Nature	It is tense and tight	It is loose and lax
Annulus	Present	Absent
No. of layers	3 (outer epithelial layer, the middle fibrous layer, and the inner endothelial layer.)	2 (outer epithelial layer and the inner endothelial layer)
Umbo and cone of light	Umbo in centre and cone of light in antero-inferior part	

- The point at which the tip of handle of malleus attaches to the tympanic membrane is known as the umbo.
- 2 malleolar folds: Anterior (short) and posterior (long)
- Two imaginary lines: one passes through the umbo horizontally, and the other passes through the handle of the malleus vertically.

- Divides the pars tensa into 4 quadrants:
  - → Anterosuperior quadrant
  - → Anteroinferior quadrant
  - → Posterosuperior quadrant and
  - → Posteroinferior quadrant.

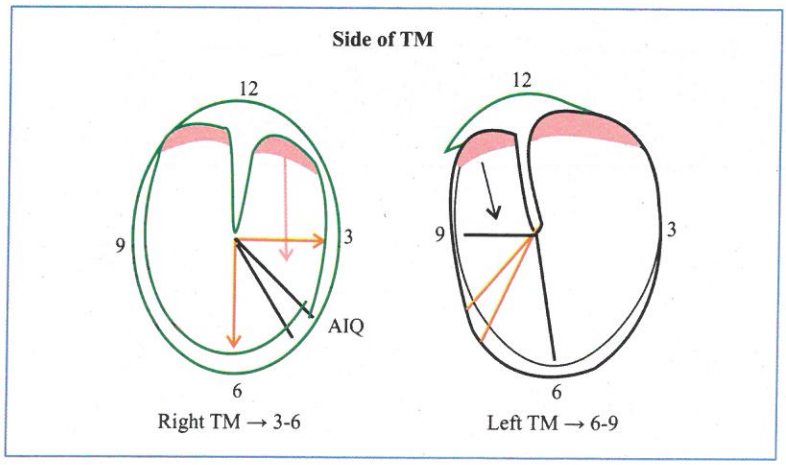
- **Cone of light**: It is present in the anteroinferior quadrant of the pars tensa.
- **Perforations**:

Central perforation	Any perforation in the pars tensa
Attic perforation	Any perforation in the pars flaccida
Small central perforation	Perforation involving only one quadrant
Large central perforation	Perforation involving more than one quadrant
Subtotal perforation	Perforation involves all the quadrants of the pars tensa, but the annulus is intact
Total perforation	Perforation involves all the quadrants and the annulus



Side of tympanic membrane:

Right tympanic membrane	Cone of light is present in the 3 o'clock to 6 o'clock position
Left tympanic membrane	Cone of light is present in the 6 o'clock to 9 o'clock position



Middle Ear Cleft

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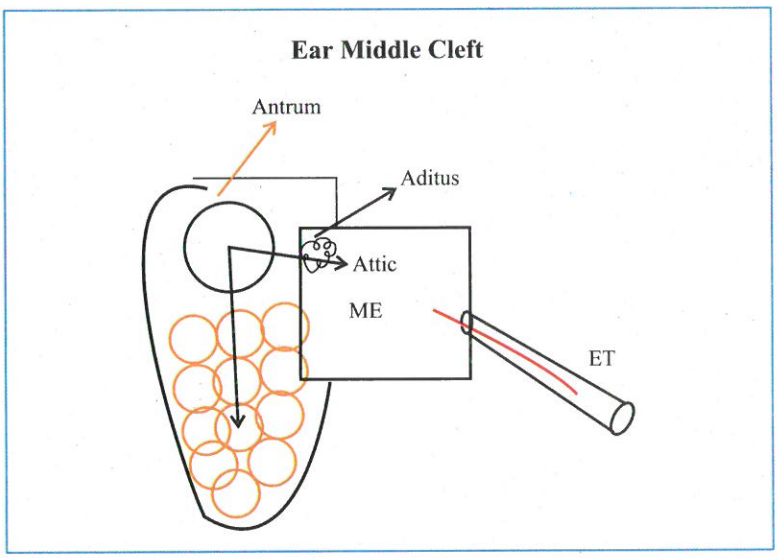
- **Function:** Ventilation of the middle ear
- **Components:**
  - Eustachian tube (anterior): connects the middle ear and the nasopharynx.
  - Middle ear proper
  - Attic
  - Aditus (communication between the attic and the Antrum)
  - Mastoid air cells (posterior)

- **Four parts of Middle ear proper**:

Epitympanum/ Attic	Part of the middle ear that lies against the pars flaccida.
Mesotympanum	Part of the middle ear that lies against the pars tensa
Hypotympanum	Part of the middle ear that lies below the level of the annulus.
Pro tympanum	Part of the middle ear that lies against the eustachian tube.

- **Ventilatory pathway of the middle ear/ Middle ear cleft:**
  - On inhalation, the air reaches the nose→ nasopharynx → eustachian tube →middle ear proper →Attic →Aditus →Antrum → Rest of the mastoid air cells.



Important Information

- The largest mastoid air cell is antrum

Anatomy of the Middle Ear Proper

01:12:11

- Shape: Hourglass
- Anteroposterior dimension of
  - Attic - 4mm
  - Mesotympanum - 2mm.
  - Hypotympanum - 6mm.