Difficult Head & Neck Anatomy: The Middle Ear & Ossicles

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Objectives
By the end of this lecture, you should be able to:
• Name the compartments of the middle ear and their contents
• Describe the anatomy of the ossicles
• Identify normal muscles and ligaments in the middle ear
• Describe the tympanic course of the facial nerve
• Identify key anatomic windows and spaces associated with the middle ear

Lecture Organization
• Middle ear overview
• Ossicles
• Muscles and tendons
• Facial nerve
• Windows, spaces and recesses

The Tympanic Cavity

Epitympanum
Mesotympanum
Hypotympanum

Epitympanum
Aditus ad Antrum
Mastoid Antrum
The Tympanic Cavity

Mesotympanum

Protympanum

NPC Causing Mastoid Effusion

The Ossicles

- Malleus → Incus → Stapes
- Transmit and amplify sound vibrations from tympanic membrane to oval window
- Mnemonic: “M I S O”


Malleus

Malleus

Incus

Malleus

Incus
Incus

Suspensory Ligaments of the Ossicles

Suspenory Ligaments
- Anterior malleal
- Lateral malleal
- Superior malleal
- Posterior incudal

Stapes

Muscles in the Middle Ear

Two middle ear muscles:
- Tensor tympani
  - Runs in canal along roof of bony Eustacian tube
  - Turns at cochleoinform process before inserting on malleus neck
  - Innervation: CN V3
- Stapedius
  - Smallest muscle in human body
  - Located adjacent to FN in pyramidal eminence
  - Inserts on stapes neck
  - Innervation: CN VII

Tensor Tympani

Stapedius Muscle

Stapes tendon
Stapedius belly
Incus lenticular process
Facial Nerve

Windows and Recesses

Windows
- Oval window
- Round window

Spaces & Recesses
- Prussak’s space
- Facial recess
- Sinus tympani
- Supratubal (anterior epitympanic) recess

Oval Window

Fenestral otospongiosis
Round Window

Prussak’s Space

Epitympanic Cholesteatoma

Facial Recess & Sinus Tympani

Anterior Epitympanic (Supratubal) Recess

Summary

- Middle ear compartments
- Ossicular anatomy
  - “M I S O”
- Muscles & tendons
  - Only 2: Tensor tympani & stapedius
- Facial nerve
- Windows, spaces & recesses
  - Put these in your checklist
CROSS SECTIONAL ANATOMY REVIEW

AXIAL CT ANATOMY

1. Head of malleus
2. Additus ad antrum
3. Mastoid antrum

AXIAL CT ANATOMY

1. Oval window (stapes footplate)
2. Tensor tympani tendon
3. Neck of malleus
4. Incus long process
5. CN7 – descending (mastoid) segment

AXIAL CT ANATOMY

1. Tensor tympani tendon
2. Neck of malleus
3. Incus long process
4. CN7 – descending (mastoid) segment

AXIAL CT ANATOMY

1. Manubrium of malleus
2. Incus body and short process
3. CN7 – tympanic segment
4. Tensor tympani

AXIAL CT ANATOMY

1. Manubrium of malleus
2. Incus body and short process
3. CN7 – tympanic segment
4. Tensor tympani
5. Pro-tympanum
6. Round window
7. Promontory
8. Sinus tympani

AXIAL CT ANATOMY

1. Tensor tympani tendon
2. Neck of malleus
3. Incus long process
4. CN7 – descending (mastoid) segment

AXIAL CT ANATOMY

1. Head of malleus
2. Additus ad antrum
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AXIAL CT ANATOMY

1. Tensor tympani tendon
2. Neck of malleus
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AXIAL CT ANATOMY

1. Manubrium of malleus
2. Incus body and short process
3. CN7 – tympanic segment
4. Tensor tympani

AXIAL CT ANATOMY

1. Manubrium of malleus
2. Incus body and short process
3. CN7 – tympanic segment
4. Tensor tympani
CORONAL CT ANATOMY

- Incus - Lenticular Process
- Incus short process
- Incus - mastoid segment
- Stapes entering oval window
- Posterior SCC
- Superior SCC
- Lateral SCC
- Internal jugular vein
- Stylomastoid foramen
- Neck & lateral process of malleus
- Prussak’s space
- Tensor tympani tendon
- Prussak’s space
- CN7 – tympanic segment
- CN7 – mastoid segment
- CN7 – tympanic segment
- Head of malleus