



Anatomy of the Temporal Bone Illustrated by Pathological Cases

SHORT ABSTRACT

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ABSTRACT

Abstract for the BSR Annual Meeting.

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The temporal bone is composed of three bony parts: the petrous part, the squamous part, and the tympanic part. This bone contributes to the calvarium and to the skull base formation.

The squamous portion (SP) is thin and shell-like, located between the sphenoid, the parietal, and the occipital bones. The horizontal component of the SP participates in the formation of the zygomatic arch and set up the roof of the glenoid fossa and of the external auditory canal. It also forms the lateral part of the antrum. The vertical component of the SP is convex, laterally located to the temporal lobe of the brain and serves as attachment to the temporalis muscle.

The tympanic portion is a U-shape bone opening at the top, forming the most important part of the bony external auditory canal.

The petrous portion has a pyramid shape (petrous pyramid). The apex of the pyramid is forward and medially located and the base is laterally positioned. Inferiorly, the petrous part has relationships with the vasculonervous structures (entrance of carotid canal, aperture of tympanic canal [of Jacobson], jugular foramen, inferior opening of the facial canal). The petrous pyramid contains the inner ear. The posteromedian surface contains the porus acousticus (opening of the internal auditory canal for the vestibulocochlear and facial nerves), and the vestibular and cochlear aqueducts. The anterior surface of the petrous pyramid forms the tegmen tympani which is the roof of the tympanic cavity.

The analysis of the temporal bone must be systematic to avoid forgetting to analyse some structures. One way could be to check the anatomical structures from the external to the internal part of this bone.

The external auditory canal is formed by a fibrocartilage part laterally and a bony part medially, closed by the tympanic membrane. This membrane is attached to the scutum superiorly (arising from the squamous part) and to the tympanic bone inferiorly.

The middle ear (also called tympanic cavity) is divided into three compartments: the epitympanum (or attic), the mesotympanum (at the level of the tympanic membrane), and the hypotympanum. This cavity is connected to the nasopharynx via the Eustachian tube. The roof of this cavity is the tegmen tympani, separating this area from the middle cranial fossa. The anterior wall of the cavity corresponds to the carotid canal. The medial wall is related to the bony covering of the inner ear (by the petrous bone) and of the tympanic portion of the facial nerve. More posterosuperiorly there is the area of the aditus.

The tympanic cavity contains three ossicles from lateral to medial: the malleus, the incus, and the stapes, and also two muscles: the tensor tympani and the stapedius muscle.

The inner ear is formed by a bony labyrinth enclosing a membranous labyrinth and a perilymphatic space. The bony labyrinth consists of a cochlea, a vestibule, three semicircular canals, and the cochlear and vestibular aqueducts.

The cochlea is a spiral structure of two and a half turns around a central conical bony axis called the modiolus. The osseous spiral lamina, continued by the basilar membrane, divides the spiral structure of the cochlea in two parts, the scala tympani and the scala vestibuli, communicating at the apex by the helicotrema. The basal turn opens posteriorly by the round window in the round window niche.

The vestibule is an ovoid structure in relation with the middle ear by the oval window. The three semicircular canals are the superior, the posterior and the lateral canals. These canals are related to the vestibule.

The membranous labyrinth contains endolymph. It consists of the utricle and saccule located in the vestibule, semicircular channels and the cochlear canal in the cochlea.

The internal auditory canal (IAC) contains the facial nerve (VIIth nerve), anteriorly and superiorly located, and the branches of the vestibulocochlear nerve (VIIIth nerve). The cochlear branch is anteriorly and inferiorly located, and the superior and inferior vestibular branches are posteriorly located in the IAC.

The cochlear branch of the VIIIth nerve enters into the modiolus.

The facial nerve enters the facial nerve canal, formed by three parts. The first is a short labyrinthine segment curling anteriorly across the superior part of the labyrinth up to the geniculate ganglion in the geniculate fossa. There, the orientation of the nerve changes (first genu) to run posteriorly and laterally along the medial wall of the middle ear: it is the tympanic segment of the facial nerve, just below the lateral semicircular canal and above the oval window. The course of the nerve changes again (second genu) at the level of the sinus tympani to run vertically: it is the mastoid segment of the VIIth nerve. The facial nerve exits the skull base through the stylomastoid foramen.

During the presentation, the temporal bone anatomy will be illustrated by some representative pathological cases.

COMPETING INTERESTS

The author has no competing interests to declare.

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