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*AJNR Am J Neuroradiol* 1985, 6 (2) 294-295

[http://www.ajnr.org/content/6/2/294.citation](http://www.ajnr.org/content/6/2/294.citation)

This information is current as of October 22, 2023.
Pneumolabyrinth after Temporal Bone Fracture: Documentation by High-Resolution CT

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The incidence and clinical features of temporal bone fractures have been well documented in the medical literature. Characteristically, longitudinal fractures account for 80% of the total [1, 2] and result from trauma to the parietal and temporal regions of the skull [3]. The fracture line starts at the tympanic annulus and runs parallel to the petrous pyramid, traversing the external auditory canal, mastoid air cells, tympanic membrane, and ossicles before it extends across the floor of the middle cranial fossa to the area of the trigeminal ganglion. Facial weakness occurs in about 25% of the cases and is usually temporary [4]. Hearing loss is generally of the conductive type, although often there is some degree of neurosensory deafness [5].

Transverse fractures make up 10%-20% of the total and classically result from trauma to the occiput. The fracture line starts at the floor of the middle fossa and runs perpendicular to the petrous pyramid, traversing the vestibule, cochlea, and the labyrinthine part of the facial nerve near the geniculate ganglion. There is usually complete loss of cochlear and vestibular function on the side of the injury. The facial nerve is involved in almost half of the cases, often requiring surgical decompression.

Plain films of the temporal bone often do not reveal the site of fracture [6], although the evolution of hypocycloidal polytomography has tremendously aided in anatomic localization [7]. The advent of high-resolution computed tomography (CT) of the temporal bone [8, 9] has added a new dimension of accuracy to diagnosis.

Case Report

A 26-year-old man was admitted to Methodist Hospital, Houston, after being struck in the right temporal region with an unknown object. After injury, he experienced severe vertiginous episodes, associated with headaches, nausea, and vomiting. He also noted severe hearing loss and tinnitus in the right ear. Examination showed abrasions over the right face and scalp. Palpation of the patient's vertigo subsided and his hearing improved about 40–50 dB. He had a persistent conductive hearing loss secondary to the fat that was placed in the mesotympanum.

Discussion

Thin-section, high-resolution CT of the temporal bone can make sections of under 2 mm with extremely high transverse resolution (under 1 mm) [10]. CT is superior to complex-motion tomography in demonstrating air, soft tissues, and sloping bone surfaces; and it does so with less radiation exposure [11]. It has become the procedure of choice for evaluating temporal bone and cerebellopontine angle tumors, and complements tomography in evaluating cholesteatomas and fractures [10].

To our knowledge, intravestibular air, or pneumolabyrinth, indicative of a labyrinthine fistula has not been previously demonstrated on CT after temporal bone injury, although a case of pneumolabyrinth was reported in association with stapedial foot-plate fracture after mastoid surgery [12]. The labyrinthine fracture and stapedial dislocation was radiograph...
PNEUMLABYRINTH AFTER TEMPORAL BONE FRACTURE

Fig. 1.—A, Lateral pluridirectional tomogram of temporal bone. Longitudinal fracture involving attic and anterior wall of tympanic cavity (arrowheads). Fracture of manubrium of malleus (arrow). B and C, AP tomograms. Malorientation of ossicles (arrow) indicative of ossicular dislocation. No definite fracture. Radiolucency of vestibule was comparable to that on opposite-ear tomograms. D and E, Axial 1.5-mm-thick CT scans. Abnormal soft-tissue density in tympanic cavity and attic surrounding superior ossicular mass (+). Distinct collection of air fills vestibule (arrowhead), indicative of fistulous communication.

ically suggested only by the labyrintheine air, though the clinical hearing loss and vertigo strongly suggested such a lesion. The air was not noted on tomography, further underscoring the usefulness of this finding with modern CT scanning. As CT becomes more sophisticated, we believe that even more minute abnormalities of the cochlea, vestibule, semicircular canals, and facial nerve will be demonstrable.

In conclusion, CT is an increasingly accurate diagnostic tool in temporal bone abnormalities, permitting localization of injuries. It is a valuable adjunct to plain films and tomography and may become the procedure of choice in evaluating temporal bone fractures.

REFERENCES

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