

Nathaniel W. Yang, MD

Department of Otolaryngology-Head and Neck Surgery
College of Medicine - Philippine General Hospital
University of the Philippines Manila

Department of Otolaryngology -Head and Neck Surgery
Far Eastern University - Nicanor Reyes Medical Foundation
Institute of Medicine

Fenestral Otosclerosis: A Subtle Lesion Easily Missed

A 29-year-old Filipina of Chinese descent presented with progressive bilateral conductive hearing loss of several years' duration. While working overseas, she consulted with an otolaryngologist and underwent computerized tomographic (CT) imaging of the temporal bone as part of her evaluation. She was informed that no abnormalities were identified in the imaging exam, and she was offered exploratory middle ear surgery with possible stapes surgery. She then sought a second opinion, with the intention of obtaining a more definitive diagnosis prior to any invasive medical intervention. A review of the CT imaging study, with particular emphasis on looking for radiologic evidence of otosclerosis, revealed the presence of a focal region of bone demineralization in the region of the *fissula ante fenestram*. (Figure 1) This finding is consistent with a diagnosis of **fenestral otosclerosis**.

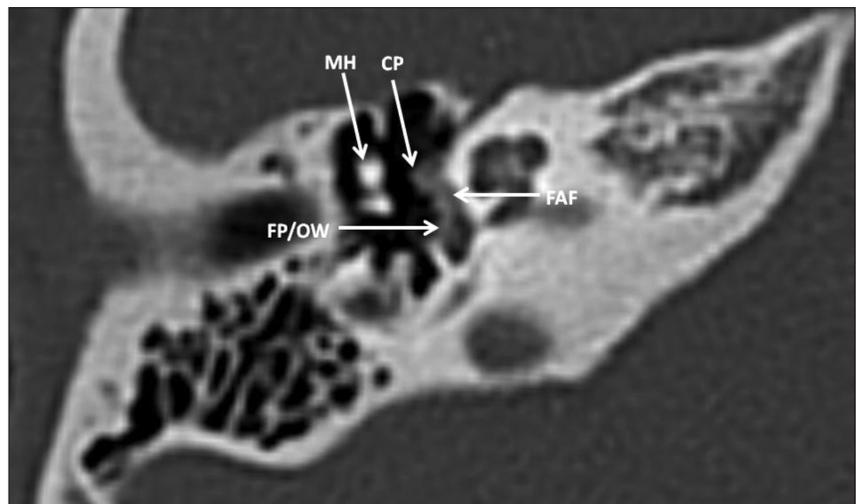


Figure 1. Axial CT image at the level of the stapes footplate / oval window, using a bone window setting for temporal bone imaging (WW 4000, WL 1000). A focal area of demineralization can be identified in the area where the *fissula ante fenestram* (FAF) is located. The landmarks for this area include the cochleariform process (CP), from which the tensor tympani tendon arises to attach to the malleus (MH); and the oval window, where the thin bone of the stapes footplate is located (FP/OW).

Correspondence: Dr. Nathaniel W. Yang
Department of Otolaryngology - Head and Neck Surgery
Ward 10, Philippine General Hospital
University of the Philippines Manila
Taft Avenue, Ermita, Manila 1000
Philippines
Phone: (632) 8526 4360
Fax: (632) 8525 5444
Email: nwyang@up.edu.ph

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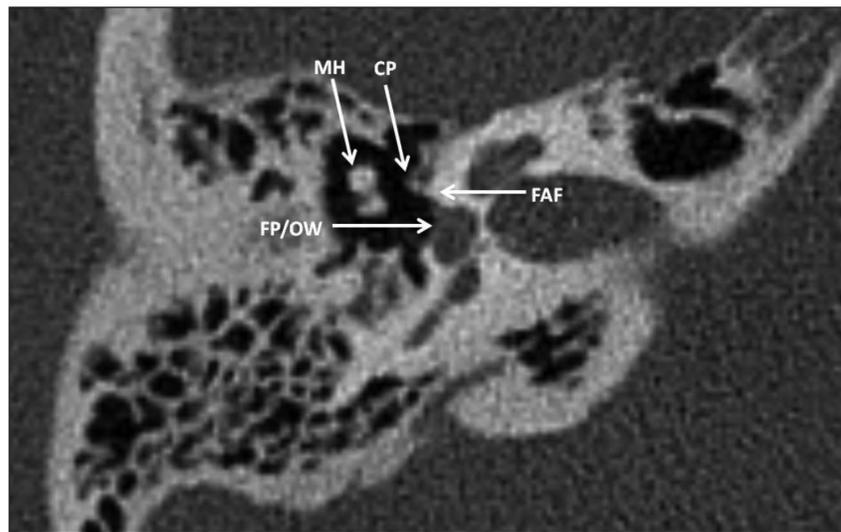


Figure 2. Axial CT image of a normal temporal bone at the same level and bone window setting for comparison, showing the dense bone in the region of the *fissula ante fenestram* (FAF). The density of this region normally matches that of the otic capsule that surrounds the cochlea.

Otosclerosis is one of the main differential diagnoses for a patient presenting with bilateral conductive hearing loss and no other visible evidence of otologic disease. Although it is more common in the Caucasian population,¹ it must remain as one of the considerations in the Asiatic population, including Filipinos. High-resolution CT is the imaging technique of choice in the evaluation of conductive hearing loss.² When evaluating a scan for evidence of otosclerosis, it must be remembered that the most common location of involvement is the bone just anterior to the oval window, in a small cleft known as the *fissula ante fenestram*. It is this relationship that gives rise to the term **fenestral otosclerosis**. The *fissula* is a thin fold of connective tissue

extending through the endochondral layer, located in the region between the oval window and the cochleariform process, where the tensor tympani tendon turns laterally toward the malleus.³ (Figure 2) Since the average length of the stapes footplate along its short axis is around 1.5 mm, it is highly recommended that submillimeter image slice thickness be routinely ordered for the CT imaging study, in order to maximize the opportunity to identify the oftentimes small and subtle areas of focal demineralization. At a slice thickness of 0.5 mm, such a lesion might only be identified by an astute clinician in 2-3 sequential axial imaging slices.

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