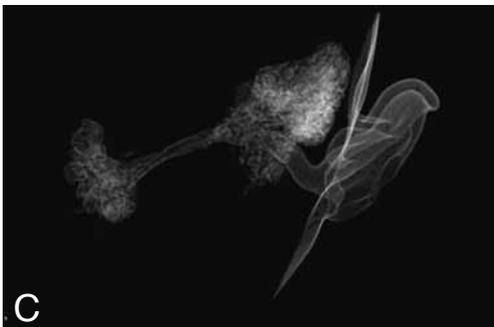
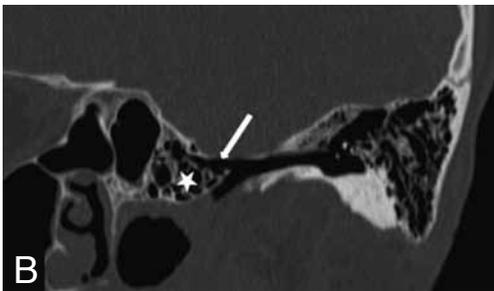
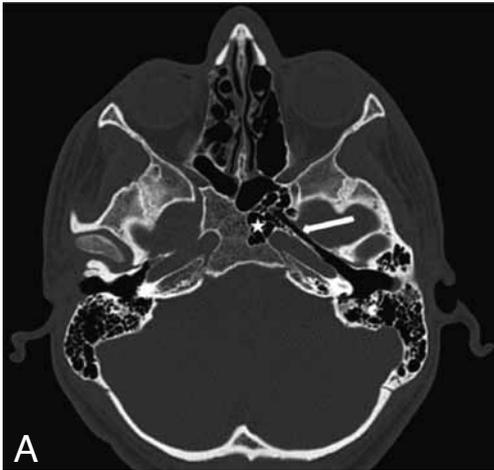


## IMAGES IN CLINICAL RADIOLOGY



### *Eustachian tube lumen opening into an abnormally pneumatized sphenoid bone*

P. Bosschaert<sup>1</sup>, A.-L. Hiel<sup>2</sup>, J. Vilain<sup>2</sup>

Morphological abnormalities of left temporal and sphenoid bone were discovered in a 17-year-old boy during a post-traumatic cranial CT scan examination. The patient had not suffered from audiological disorders previously. He did not complain of hearing loss, vertigo or autophony. Further clinical investigations were normal including micro-otoscopy and nasopharyngeal endoscopy. The Valsalva maneuver was correctly performed. Audiometry and tympanometry were without any particularity.

These abnormalities consist of a subdivision of the pharyngeal part of the lumen of the Eustachian tube and an abnormal pneumatization of the sphenoid bone. The lower part of the tubal subdivision, proximally slightly larger than normal, opens as usual onto the nasopharynx. The upper part reaches a "mastoid-like" pneumatization of the sphenoid body (Fig. A, B & C: axial, coronal oblique and Minimum Intensity Projection views – arrow and asterisk). The left pterygoid process is also unusually pneumatized and the left temporal bone is more pneumatized than the right. Note that sphenoid sinuses are hypoplastic.

#### *Comment*

To our knowledge, these anatomical aberrations we observed combined with normal auditory and Eustachian tube function had not been previously reported.

The Eustachian tube is structurally quite complex, in particular its nasopharyngeal part. Its lumen, delimited by a respiratory mucosa is surrounded by cartilage, peritubal muscles, and a superior bony support, the sphenoid sulcus. It joins the protympanum, the anterior recess of the tympanic cavity, and the nasopharynx. Its closed resting position protects the middle ear from reflux of nasopharyngeal material and sound. This tube also allows the maintenance of the balance of pressure into the middle ear, optimizes the sound transmission, and protects the inner ear from acoustic trauma and barotrauma.

It is recognized that temporal bone pneumatization is very different from one individual to another and between sides, according to air cell tracts expansion in various ways from the mastoid to the petrous apex during fetal maturation and childhood. The explanation of these abnormalities remains unclear. Lack of communication between the sphenoid sinus and this "mastoid-like" pneumatization suggests a middle ear origin with a large development of the pre-cochlear and superior perilabyrinthine cell tracts. There is also the possibility that an aberrant division of the Eustachian tube close to the sphenopetrosal suture with an extension of the mucosa through the less resistant superior tubal ligament would lead to a consecutive abnormal sphenoid pneumatization. We are unable to determine when the division of the Eustachian tube occurred. If this division occurred during the embryological development, we could expect craniofacial abnormalities but the patient did not exhibit any.

Preoperative CT scan in case of pituitary gland surgery by a trans-sphenoidal approach should be carefully looked over in order to avoid dramatic complications. Additionally, an aberrant petrous pneumatization could expose to persistent cerebrospinal fluid leak after cerebrospinal angle surgery and petrous apicitis (Gradenigo's syndrome) in the case of otomastoiditis.

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#### *Reference*

1. Jen A., Sanelli P.C., Banthia V., et al.: Relationship of Petrous Temporal Bone Pneumatization to the Eustachian Tube Lumen. *The laryngoscope*, 2004, 114: 656-660.

Departments of 1. Radiology and 2. Otorhinolaryngology, Clinique St-Pierre, Ottignies-LLN, Belgium.