**Pneumatization of Mastoid Air Cells, Temporal Bone, Ethmoid and Sphenoid Sinuses. Any Correlation?**

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**Abstract** The aim of this study is to assess the pneumatization of the paranasal sinuses (PNS) and other parts of temporal bone such as mastoid air cells and to investigate if there was any association between the aeration of these structures among the three major ethnic groups in Malaysia (Malay, Chinese, Indian) as this would be representative of Asia. A retrospective review of 150 computed tomography (CT) scans of PNS and temporal bones was done and analysed. The pneumatization of each area was obtained and compared using statistical analysis. Patients with a history of previous medical or surgical problems in the intended areas were excluded from the study. The pneumatization of the mastoid air cells and other temporal bone parts were noted to be symmetrical in more than 75%. There was a positive correlation between the pneumatization of mastoid air cells and that of the sphenoid sinus. The prevalence of Agger nasi, Haller’s and Onodi cells was observed to be significantly higher in the Chinese group. Preoperative assessment of the temporal bone and PNS with CT scan may be helpful in the evaluation of their anatomical landmark and decrease the possibility of surgical complications related to 3D structures.

**Keywords** Pneumatization · Mastoid · Ethmoid · Sphenoid · Sinuses

**Introduction**

The paranasal sinuses (PNS) and other parts of temporal bone such as the mastoid air cells system are the best characterized structures for aeration in humans. These structures develop by gradual pneumatization of solid tissue, which is achieved by positive pressure on the nasopharynx through the Eustachian tube opening [1].

Several factors including environmental conditions, genetic diseases, and past infections may affect the process of pneumatization which is the main distinctive feature of these complexes.

Temporal bone pneumatization has been divided into 5 compartments: Middle ear, Mastoid, Peri-labyrinthine, Petrous apex and Accessory regions which include squamous, zygomatic, occipital and styloid cells. Pneumatization cease around puberty, which is an adult stage, with the development of the last air cells in the petrous apex [2].

The endoscopic sinus surgery (ESS) techniques deal with the sinuses and structures around the orbit, pituitary and clivus. The sphenoid sinus is a critical sinus with its anatomic variations and relationships with the adjacent structures, Further the sphenoid sinus has been classified as Sellar, Pre-sellar and Conchal type. It’s importance is stressed in pituitary surgery, as even minimal damage to adjacent structures can lead to complications. Agger nasi, Haller’s cells and Onodi cells are some variants described.

The mastoid pneumatization and its measurement has also been studied earlier [3, 4]. In a multiracial country like Malaysia it is an advantage to do racial comparison studies with regards to the pneumatization of these structures as these should apply to the most common Asian races in general.

The aims of the present study were