Introduction

Professor Emil Huschke (1797-1858), a German anatomist first described the probability of deficiency in the development of tympanic plate of temporal bone, which was named as “Foramen of Huschke” or foramen tympanicum, which usually to get apposed in adulthood [1, 2].

It, if persistent in adult life, may result in complications like herniation of temporomandibular joint (TMJ), formation of salivary otorrhea, spread of infection or tumor from external auditory canal to the infratemporal fossa and vice versa. There may be other otologic complications also due to inadvertent passage of arthroscope into the external auditory canal during TMJ arthroscopy [2–6].

Previous studies have explored its prevalence in different populations with variations of different developmental deficiencies of tympanic plate of temporal bone, but till date no such data gets available amongst Bengali population from India, till searched for.

Case Report

With prior permission from the principal of the institutes and Head of the Department, the dry adult human crania (with intact tympanic plates) were collected from the Museum of Anatomy Department. Tympanic plates were observed meticulously to rule out any deficiency in the form of foramen of Huschke. Shapes of such foramina were confirmed by naked eye examination with the help of divider, pointers, ruled scale and flat cardboard.

Amongst the 53 skull studied, seven of them found to have the deficiencies of tympanic plates in form of foramen of Huschke with variant presentations as below:

Case 1: In a cranium, on the left side a single large oval foramen having transverse diameter of 0.2 cm and longitudinal diameter of 0.3 cm encroaching to the free margin of tympanic plate was present. Whereas, the right side tympanic plate showed no variations (Figure 1).

Case 2: In another cranium, on the left side three pinhead-sized foramina were present at different levels at tympanic plate, whereas on the fellow side a single round foramen of diameter of 0.2 cm was noted centrally (Figure 2).

Case 3: A single triangular foramen having base of 0.1 cm and two sides of 0.2 cm each was noted in tympanic plate on left side and in the right side a pinhead-sized foramen was found (Figure 3).

Case 4: A single oval shaped foramen having transverse diameter of 0.2 cm and longitudinal diameter of 0.1 cm was noted on left tympanic plate and a single rounded foramen of 0.1 cm in diameter present was noted on fellow side (Figure 4).

Abstract

So far the development of tympanic plate is concerned; gaps or ‘foramen of Huschke’ may affect its surface, which bear not only anatomical significance but also clinical correlation with etiogenesis of different diseases. Such records though available in literature in different ethnicity and groups, but till date not available in Bengali population of India. A meticulous observation in preserved adult human crania in the Museum of Anatomy Department at the Medical College of Kolkata, seven crania showed variant presentations, detailed in the report.


Key words: Foramen of Huschke [tympanic plate]
Case 5: A single rounded foramen found to be present having diameter of 0.2 cm was noted only on left side with intact tympanic plate on right side (Figure 5).

Case 6: A single oval foramen having transverse diameter of 0.2 cm and longitudinal diameter of 0.1 cm was present close to the petrotympanic fissure on the left side only with no deficiency in right side (Figure 6).

Case 7: In one skull three foramina found on left side tympanic plate placed at different levels. The upper foramen was oval having transverse diameter of 0.2 cm and longitudinal diameter of 0.1 cm; lower right one was triangular in shape having base of 0.1 cm and two sides of 0.2 cm each; and lower right one was rounded having diameter of 0.1 cm. Whereas on the right side a large rounded foramen was present at the center having diameter of 0.2 cm and two small pinhead sized foramina were present on the tympanic plate (Figure 7).

Discussion

Variations of ‘foramen of Huschke’ has been evident that such a deficiency may exist in single or pleural; it may be pin-head sized to a large gap; and it may central to in margin of the tympanic plate. Three of them have unilateral defect and that is on the left side.

Figure 1. Picture shows a single large oval foramen on the left side (red arrow), having transverse diameter of 0.2 cm and longitudinal diameter of 0.3 cm encroaching to the free margin of tympanic plate.

Figure 2. Picture shows a cranium, having pinhead-sized three foramina (white arrows) on the left side present at different levels at tympanic plate, whereas on the fellow side a single round foramen (red arrow) of diameter of 0.2 cm was noted centrally in the tympanic plate.

Figure 3. Picture showing here a single triangular foramen on the left side (red arrow) having base of 0.1 cm and two sides of 0.2 cm each; and a pinhead-sized foramen on the right side (white arrow).

Figure 4. Figure showing a single oval shaped foramen (red arrow) having transverse diameter of 0.2 cm and longitudinal diameter of 0.1 cm was noted on the left tympanic plate, and a single rounded foramen (white arrow) of 0.1 cm in diameter is present on the right side.
Ontogenetically it has been described that at birth the bony meatus exists as an incomplete ring (tympanic ring) and bony external auditory canal is formed by lateral extension of that incomplete ring. During the first year of life, the anterior and posterior processes of the tympanic plate grow towards each other to fuse and finally enclose a substantial opening, and forms the tympanic plate. The defect in enroachment of ossifying plate results in occasional persistence of foramen as ‘foramen of Huschke’. [1–6].

Toyama et al. in 2009 reported persistent foramen tympanicum as a rare congenital cause of TMJ herniation into external auditory canal with coronal tomographic imaging from Sao Paulo, Brazil. Most patients as mentioned by them were female, of average age of 55 years with unilateral presentation. They also reported that masticatory movements could further widen the bony defect. Recognition of the bony defect being crucial to prevent iatrogenic complications mainly related to surgical and TMJ procedures like arthroscopy as stated by them [7]. Mao and Nah in 2004 identified different mechanical factors like, mastication, deglutition, respiration and hereditary factors to be responsible for influencing the ossification of tympanic plate resulting in persistence of foramen of Huschke [8].

A persistent foramen of Huschke may mimic the branchial cleft anomaly in its presentation. It may result in complication such as TMJ herniation and salivary fistula as reported by Sharma and Dawkins in 1987 [9] and Haschimoto et al. in 2011 [10]. They noted the difference in presence of such bony deficiency between males (12%) and females (20%) with statistically significant female preponderance (p<0.001). An unusual case of spontaneous salivary otorrhea of right side was reported by Rushton and Pemberton in 2005, in which advanced imaging CT and T1-T2 weighted MRI of external auditory meatus was used to identify developmental defect in the anterior wall of bony external auditory meatus [11]. Such Radiologic evaluations of deficiencies were further studied also in later period [12]. The foramen of Huschke was reported as the source of fistula, which may mimic branchial cleft [13]. Measurement of foramen tympanicum by anatomical cone beam CT study has been reported very recently by Tozoglu et al. from [14]. They found foramen tympanicum in 37 of 207 patients (17.9%), unilateral in 24 patients (11.6%) and bilateral in 13 patients (6.3%). Mean axial (transverse) diameter was 5

Figure 5. Figure shows a single rounded foramen (red arrow) having diameter of 0.2 cm only on the left side.

Figure 6. Figure shows a single oval foramen (red arrow) having transverse diameter of 0.2 cm and longitudinal diameter of 0.1 cm close to the petrotympanic fissure on the left side.

Figure 7. Photograph shows three left sided foramina (red arrows) in different gaps, and three adjacent gaps (white arrows) on the right side.
Foramen of Huschke

mm and mean sagittal (longitudinal) diameter was 2 mm. In archeological excavation at the region of Mediterranean sea, foramen of Huschke was present among 11.7% Jews, 10.7% Nabataeans and 4.2% of other local populations as reported by Yossi in 2011 [15].

Thus, from literature it could be made evident that persistent foramen of Huschke, may herald clinical problems in adult life.

Its prevalence was recorded earlier in different groups. Such an endeavor to record its variation in Bengali population is probably untouched as searched for. Such a data is expected to be helpful to not only to the arena of Anatomy, but also for ENT surgeons, dentists as well as radiologists.

References