Case Report :

Presence of Foramen of Huschke in a Temporal Bone

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ABSTRACT

The persistent Foramen of Huschke (F.H.) is an area of incomplete ossification of the tympanic plate of the temporal bone, has another name the 'Foramen tympanicum'. The presence of this foramen may render middle and inner ear structures vulnerable to injury during arthroscopy of the Temporomandibular joint (TMJ). In rare cases, this foramen can be the cause of temporomandibular joint herniation or fistulization through the anterior wall of the bony external auditory meatus. One temporal bone with a persistent Foramen of Huschke and persistent sutures (both on the external and internal surfaces) between the squamous and petromastoid parts, was detected during the undergraduate studies in NRS Medical College, Kolkata, India, in the year 2013.

KEY WORDS: Foramen of Huschke, foramen tympanicum, tympanic plate ,temporal bone

INTRODUCTION

The temporal bone consists of four components – the squamous, petromastoid parts, tympanic plate and the styloid process. After birth apart from general growth, the tympanic ring extends posterolaterally to become cylindrical, growing into a fibrocartilaginous tympanic plate, which forms the adjacent part of the external acoustic meatus at this stage. This growth is not equal but is rapid in the anterior and posterior regions which meet and blend together. Thus, for a time an opening **(Foramen of Huschke)** exists in the floor of the external acoustic meatus. It finally closes at about 5th year; but is sometimes permanent (5 - 46%) of adult crania from ancient and modern populations[1]. The base of the petrous part of the temporal bone should correspond to the part that lies on the base of the skull and is separated from the squamous part by a suture. However, the suture disappears soon after birth. The subsequent development of the mastoid process means that the precise boundaries of the base are no longer identifiable[1].

MATERIALS AND METHODS

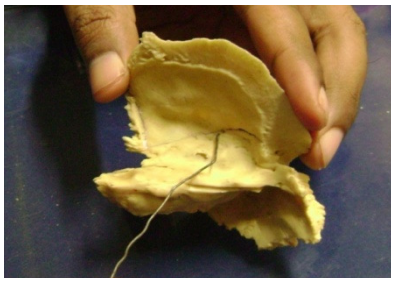
Few variations were detected in a temporal bone during teaching the MBBS students in NRS Medical College, Kolkata, India in the year 2013. The bone was observed properly to detect the variations. Relevant photographs were taken using a probe.

OBSERVATIONS

A round foramen was detected in the central part of the tympanic plate of the temporal bone. It was a Foramen of Huschke with the diameter of 0.2cm. It was indicated with a probe when the photograph was taken. Moreover, a suture exists between the petro-mastoid part and the squamous part of the temporal bone concerned. The suture is present both on the external surface and the internal or cerebral surface of the temporal bone. On the external surface, the suture is called the petromastoid suture and on the internal or the cerebral surface it is called the petro-squqmosal suture.

Photograph 1) Foramen of Huschke in the tympanic plate of the temporal bone (indicated with a probe).

Photograph 2) Petromastoid suture on the external surface of the temporal bone (indicated with a probe).



Photograph 3) Petrosquamosal suture on the internal surface of the temporal bone (indicated with a probe).

DISCUSSION

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[2].Toyama et al in 2009 reported persi-stent foramen tympanicum as a rare congenital cause of Temporomandibular joint (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 this bony anomaly is crucial to prevent iatrogenic complications mainly related to surgical and TMJ procedures like arthroscopy[3]. External auditory canal intimately related to TMJ separated only by its bony anterior wall[4].The presence of this Foramen of Huschke may render middle and inner ear structures vulnerable to injury during arthroscopy of the temporoman-dibular joint (TMJ)[5].

A review of 377 dried skulls, in a study conducted by Wang et al, revealed that the foramen of Huschke was present in adult life in 7% of the skulls examined. According to the same workers a patent foramen of Huschke in the adult may in rare cases, be the cause of temporomandibular joint herniation or

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fistulization through the anterior wall of the bony external canal. It may however, persist in a few rare cases (2/300) [6]. Spontaneous herniations are much rare and the main symptoms are otalgia and tinnitus. In half of the cases, they are minor and no treatment is necessary[7]. Many Surgeons perform a complete otoscopic examination in all patients with temporomandibular disorders. The presence of a bulge in the external auditory meatus that disappears with mouth opening may suggest the persistence of the foramen of Huschke. The clinician should rule out the presence or history of infection, trauma, or neoplasm before ascribing the etiology of a defect to a developmental aberration[6]. Persistent foramen of Huschke may be multiple, vary in size and may mimic the branchial cleft anomaly in its presentation[8, 9] . It may result in complication such as TMJ herniation and salivary fistula as reported by Sharma and Dawkins in 1987[10] and Hashimoto et al in 2011[11]. The difference in presence of such bony deficiency between males (12%) and females (20%) has statistically significant female preponderance ($p<0.001$) [11].

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[12]. Surgical closure of these defects is known to be effective in ameliorating symptomatic cases [7 , 8]. A patient with otorrhoea had been initially treated for otitis externa. The otorrhoea fluid was collected and tested positive for amylase. Sialography and computed tomography imaging of the temporal bone confirmed a **sialo-aural fistul**a from the right parotid gland to the bony external acoustic meatus. The defect was consistent with a patent **foramen of Huschke**. The fistula was identified surgically via a superficial parotidectomy approach, after contrast injection of Bonney's blue dye into the parotid duct, and then ligated and divided. The patient had immediate and sustained resolution of her otorrhoea. **Sialo-aural fistulae** are extremely rare, and usually arise as a complication of surgery or as an acquired disease process[13]**.** On the external surface of the temporal bone, the lower limit of the squamous part extends 1.5cm. below the supra-mastoid crest, and the line of fusion is occasionally represented by the traces of **squamomastoid suture**. The supramastoid crest curves upwards and backwards across the posterior part. Internal or the cerebral surface of the squamous part is continuous with anterior region of the petrous part, but traces of **petrosquamosal suture** often persist in adult bones[1, 14]. In the temporal bone concerned both of these sutures (squamomastoid and petrosquamosal) were prominent. In neonate, the petrous and the squamous parts of the temporal bone are usually partially separated by the petrosquamous fissure which opens directly into the antrum of the middle ear. The petro-squamous fissure closes in 40% of infants during the 1st year, but remains unclosed in 20-40% upto the age of 19 years. It is a route for the spread of infection from the middle ear to the meninges[1].

CONCLUSION

This case report describes different variations of a temporal bone, specially, the 'Foramen of Huschke' with its embryological and clinical aspects. This case will also enhance our knowledge in gross anatomy regarding the temporal bone.

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