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Endoscopic Revisit To Basal View Of Stylomastoid Foramen

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Abstract

The stylomastoid foramen is located between the styloid process and mastoid process of the temporal bone. The stylomastoid foramen transmits facial nerve and stylomastoid branch of posterior auricular artery. The facial nerve can be blocked at this foramen but it has high risk of nerve damage. A total of 30 dry skull bones were obscured from the Bone bank of department of Anatomy, Sri Devraj Urs Medical College, Tamaka, Kolar. The basal view of stylomastoid foramen was analysed using an endoscope for morphological variations and the mean distance of stylomastoid foramen from tympanomastoid suture line was measured using a ruled scale caliper. Most common morphology found was round shaped foramen which was noted in 15 skull bones (50%). Oval shaped foramen was the next common variant and was observed in 6 skull bones (25%). Square shaped variant was found in 3 skull bones(10%). 5 skull bones were having serrated stylomastoid foramen (10%), 1 skull bone had kidney shaped foramen (5%). In 11 skull bones (36.6%) we found out that the stylomastoid foramen was bifurcated. We also found the mean length of stylomastoid foramen to tympanomastoid suture line as ± 2.37 mm and 20.6 ± 2.08 mm on right and left side respectively. Their range is 18 - 23.34 mm and 18 - 21.7 mm. All measurements were tabulated and statistically analysed. This study helps to determine the precise location of the stylomastoid foramen in relation to various anatomical structures which will be very helpful for the surgeons to plan surgeries in this region.

Objectives

To endoscopically analyse any variation in the morphology of stylomastoid foramen
To measure the mean distance of stylomastoid foramen from tympanomastoid suture line.

Keywords: NIL

Introduction

The facial nerve lies in the tympanic cavity within the facial canal and leaves the skull via stylomastoid foramen[1]. The stylomastoid foramen, which is positioned in the midway of the base of the styloid and the mastoid process of the temporal bone over the inferior aspect of the petrous part of the temporal bone, is the end of the facial canal. The foramen along with the facial nerve also transmits the stylomastoid artery, which is a branch of posterior auricular artery [2]. The facial canal is approximately 3 cm long and is divided into three parts, labyrinthine, tympanic and mastoid.

The styloid process's root is located anterior to the stylomastoid foramen and lateral to the jugular foramen. The styloid process, mastoid process, jugular surface, and stylopharyngeus muscle all surround the stylomastoid foramen.

Available literature suggests anatomical difference between the luminal size of facial canal along its entire length and diameter of facial nerve, which predisposes nerve to compression in varied conditions leading to neuritis and clinically presenting as ipsilateral facial palsy called as Bell's palsy[3] [4] [5]

Surgeons and anaesthetists need to know the exact location of the foramen in order to locate the trunk of the facial nerve during various procedures. As a result, the goal of this study is to determine the size and form of the stylomastoid foramen in dry adult human skulls.

Materials And Methods

In our study, 30 dry temporal bones were taken of unknown age and sex. The basal view of stylomastoid foramen were then analysed using a 0 degree STORZ rigid endoscope and a high resolution camera to look for any variations in the morphology of stylomastoid foramen. The bones were also examined to measure the mean distance of stylomastoid foramen from tympanomastoid suture line using the help of a ruled scale calliper (Fig-4).

The bones were obscured from the Bone bank of department of Anatomy, Sri Devraj Urs Medical College, Tamaka, Kolar. It was ensured that all selected skulls were without any evident deformity or sign of injury. All measurements were tabulated and statistically analysed.

Results

In our study, 30 dry temporal bones were taken and the basal view of stylomastoid foramen were analysed using endoscope and high resolution camera in which we found stylomastoid foramen to be a prominent bony structure in all bones (100%), Most common morphology found was round shaped foramen which was noted in 15 skull bones (50%). Oval shaped foramen was the next common variant and was observed in 6 skull bones (25%). Square shaped variant was found in 3 skull bones(10%). 5 skull bones were having serrated stylomastoid foramen (10%), 1 skull bone had kidney shaped foramen (5%) and we found that these rare variants were always a unilateral occurrence.

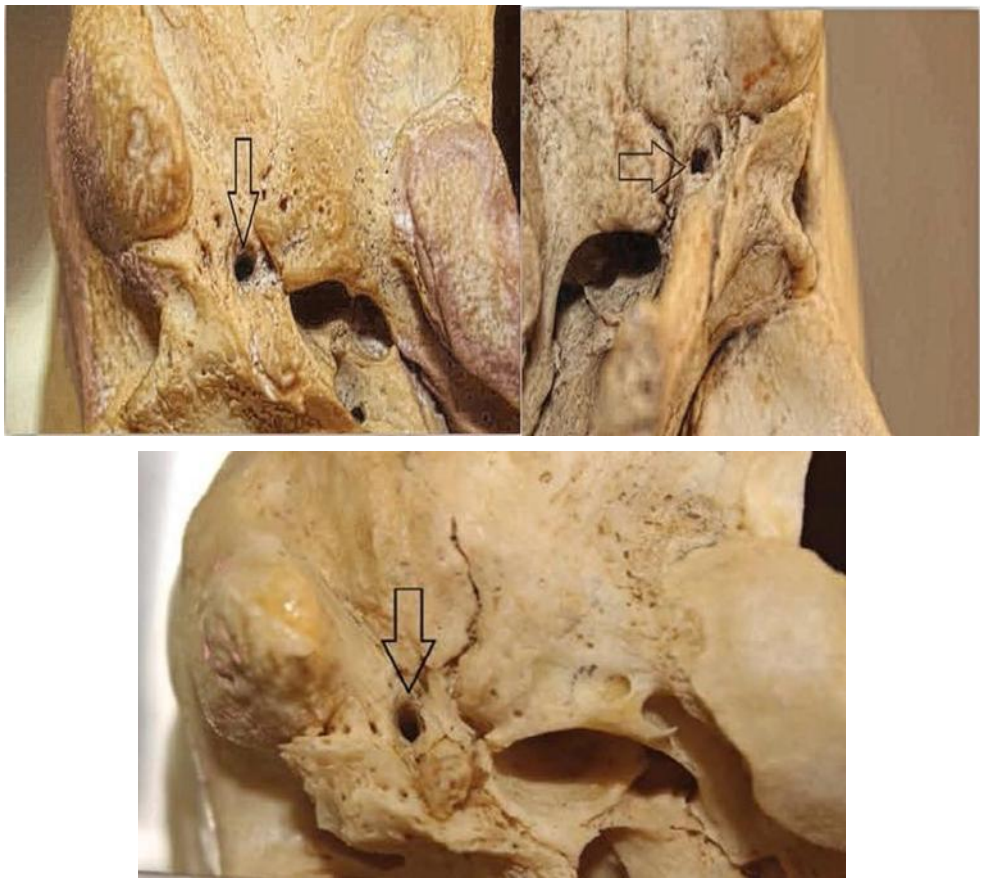

Figure 1. The common variants of stylomastoid foramen in terms of shape;

A. Round stylomastoid foramen; B. Square stylomastoid foramen; C. Oval stylomastoid foramen. All the variants of foramen are shown as arrow marked area in the figures.

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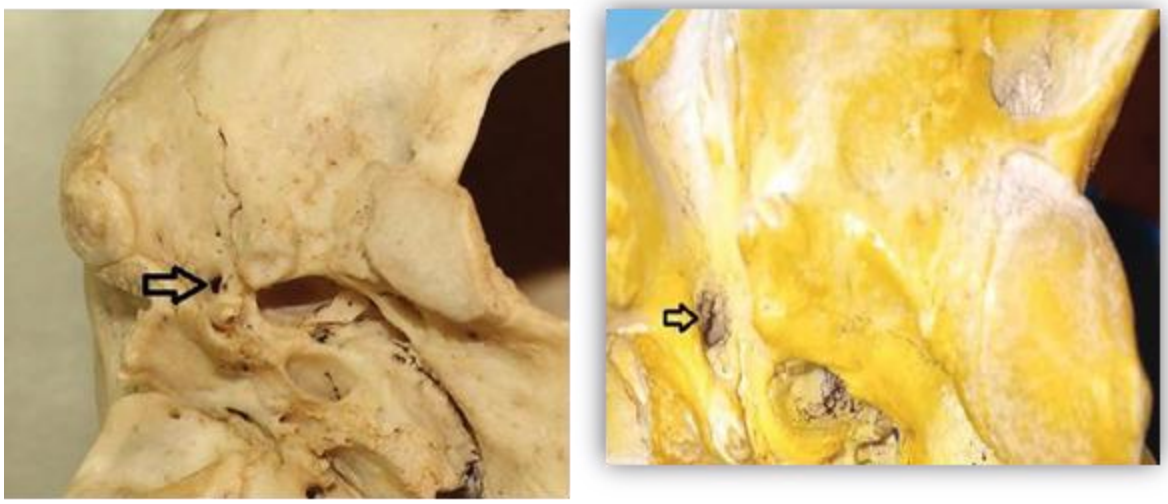

Figure 2. The uncommon variants of stylomastoid foramen in terms of shape; A. Serrated stylomastoid foramen; B. Kidney -shaped stylomastoid foramen. Both the variants of foramen are shown as arrow marked area in the figures.

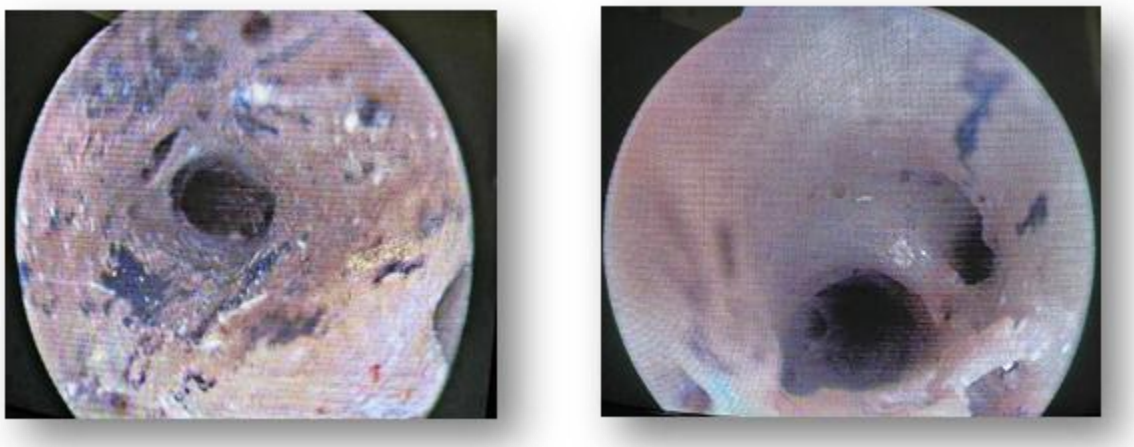

Fig:3 – Bifurcation of stylomastoid canal/foramen

Notably it was observed in 11 skull bones (36.6%) the stylomastoid foramen was bifurcated (Fig. 3). Foramen with bifurcation was found in two variants of stylomastoid foramen in terms of shape (oval and round) and was always a unilateral occurrence

Fig 4 : Ruled scale caliper

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Fig 5: Endoscopic evaluation of stylomastoid foramen

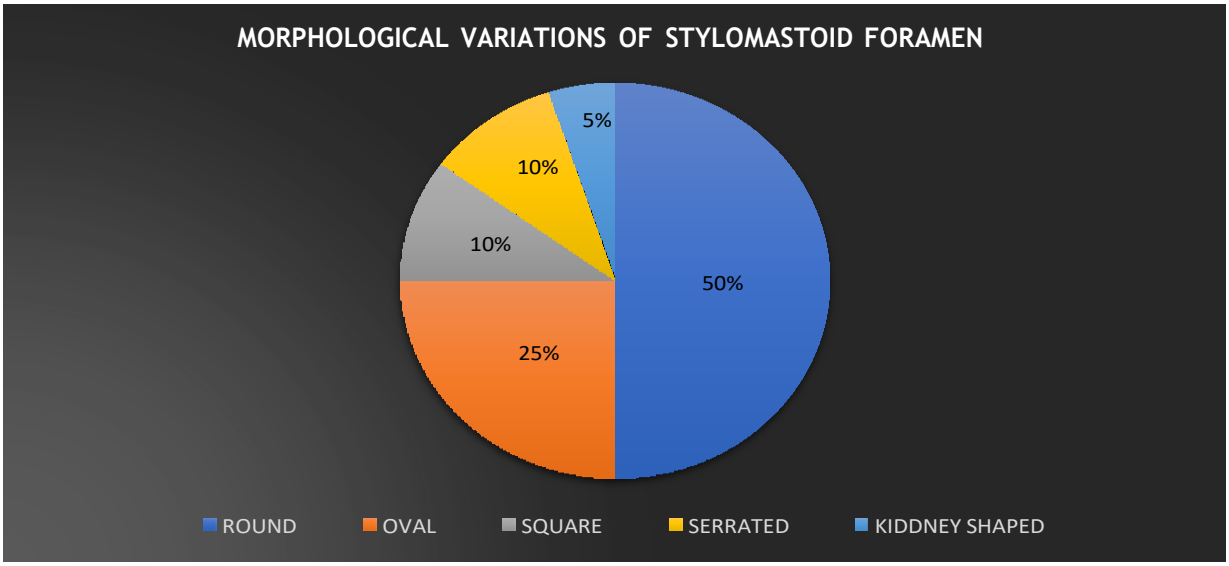

Figure:6 - Graphical representation of morphological variations of stylomastoid foramen

In our study, we found the mean distance of stylomastoid foramen to tympanomastoid suture line as 20.2 ± 2.37 mm and 20.6 ± 2.08 mm on right and left side respectively. Their range is between 18.2- 23.34 mm and 18.6-21.7 mm on right and left side respectively.

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Table:1 - Range and mean distance of Stylomastoid foramen to tympanomastoid suture line

	STYLOMASTOID FORAMEN TO TYMPANOMASTOID SUTURE LINE	
	RANGE	**MEAN**
RIGHT	18.2-23.34 mm	20.2 ± 2.37 mm
LEFT	18.6-21.7 mm	20.6 ± 2.08 mm

Discussion

The trunk of the facial nerve must be understood in order to preserve the nerve during surgery on the mastoid process, parotid gland, cranial base, and facial nerve.[3]

According to the findings of this study, stylomastoid foramen can be divided into common and unusual types based on their morphology. The stylomastoid foramen comes in a variety of shapes and sizes, with the most common being round, oval, and square. The stylomastoid foramen also comes in serrated and kidney-shaped varieties. The Stylomastoid foramen is the end of the facial canal and the departure point for the facial nerve from the base of the skull.

Variations in the dimensions (form and size) of the stylomastoid foramen may have a role in Bell's palsy cases that are not explained. There are many discrepancies in the existing literature when it comes to anatomical characteristics of the stylomastoid. As a result, the current research was done in order to shed light on the differences in the size and shape of stylomastoid foramen.

Previous studies which were done on morphometric analysis of stylomastoid foramen showed that 83.5% of skulls had stylomastoid foramen located anterior to the line passing through the anterior border of the mastoid process.[6] The tympanomastoid suture is one of the temporal bone's intrinsic sutures, running parallel and posterior to the bony external auditory canal and splitting the temporal bone's tympanic and mastoid processes. Its radiological significance is as a fracture mimic (pseudofracture). Its surgical significance is as a commonly used palpable landmark to localize the facial nerve trunk during parotidectomy or repair after facial trauma. Another study concluded that the trunk of the facial nerve was in close proximity to the stylomastoid artery, which originated from the posterior auricular artery in 70% of the specimens, from the occipital artery it is 20% and directly from the external carotid artery it is 10%. The stylomastoid artery passed medial to the trunk of the facial nerve in 63 of the specimens and laterally in 37%.[7]

The anatomical details of the stylomastoid foramen, which could be the cause of unilateral facial nerve injury leading to Bell's palsy, seems to be this study's most significant observation. As a result, it is possible to conclude that, in addition to HSV-I infections, the aetiology of Bell's palsy could be linked in part to anatomical changes of the stylomastoid foramen, which is the terminal point of the facial canal.

The stylomastoid artery also originates from occipital or peripheral carotid arteries. In 19 cases of 30 the stylomastoid artery passes medially to the nerve, and 11 cases laterally. Another study concluded during the examination of cranial bones, they observed an abnormality in one of the right temporal bones. In this variation, the stylomastoid foramen was not completely formed on the temporal bone, and instead of the foramen, the sulcus was located on the bone. It may be suggested that rare variants such as serrated (due to sharp edges), kidney-shaped (due to narrow concave margin) and irregular stylomastoid foramen could interfere with the smooth exit of facial nerve and thereby could have a bearing on unilateral injury of the nerve. There was no significant difference in the location of stylomastoid foramen between its sides from the anatomical landmarks. However, to the best of our knowledge the present study is the first to explore the endoscopic anatomy of size and

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shape of stylomastoid foramen in dry adult human skulls.

Conclusion

The stylomastoid foramen was seen in five different shapes in the current study, which was conducted on dry adult human skulls. The most prevalent varieties were round, oval, and square, while serrated and kidney-shaped forms were rare.

These unilateral differences, as well as uncommon changes, could be risk factors for facial nerve damage at the site of exit from the skull base, resulting in Bell's palsy.

This study helps to determine the precise location of the stylomastoid foramen in relation to various anatomical structures which will be very helpful for the surgeons to plan surgery in this region.

Acknowledgements

We acknowledge our Department of Anatomy for allowing us to use bones from their collection for this study.

Ethical clearance: The authors have declared that the study was conducted only after approval had been obtained from the Ethical Committee of Sri Devraj Urs Medical College, Tamaka, Kolar whose guidelines are in accordance with the Declaration of Helsinki (1964) and all subsequent revisions.

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