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Original Research Article

MORPHOLOGICAL STUDY ON SHAPES OF PTERION

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ABSTRACT

Background: Pterion is defined as an H-shaped small circular area formed by the junction of four bones: frontal, parietal, temporal and sphenoid on norma lateralis of the skull, Pterion junction has been used as a common extra-cranial landmark for surgeons in microsurgical and surgical approaches towards important pathologies of this region. Pterion is an important landmark for anterior branch of middle meningeal artery, Broca's motor speech area to the left, insula, the lateral cerebral fissure, for the pathologies of optic nerve, orbit, sphenoidal ridge and for the anterior circulation aneurysm and tumors, because of its clinical importance we focused our present study on morphology of shape of pterion.

Materials and Methods: A total of 500 pterions were examined from 250 adult dry skulls. The present study was undertaken in adult south Indian skulls from different regions of south India, from different medical colleges. We have observed different shapes of pterion like sphenoparietal frontotemporal, stellate and epipteric.

Results: The sutural morphology of the pterion and asterion is important in surgical approaches to the cranial fossae. 250 human skulls of known gender (148 male, 102 female) were examined on both sides. Four types of pterion were observed – sphenoparietal 72.8%, frontotemporal 16.4%, stellate 8.8% and epipteric 2%.

Conclusion: The pterion is points of sutural confluence seen in the norma lateralis of the skull. The patterns of formation exhibit population based variations. The sutural morphology of the pterion is important in surgical approaches to the cranial fossae. These findings may helpful in surgical approaches and interventions via the pterion.

KEY WORDS: Skull, Pterion, sphenoparietal, frontotemporal, stellate, epipteric. Neurosurgery.

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INTRODUCTION

The temporal fossa is an important area of the skull that is bounded inferiorly by the zygomatic arch, superiorly and posteriorly by the temporal lines on the calvaria, and anteriorly by the frontal process of the zygomatic bone. The frontal and parietal bones, the greater wing of the sphenoid, and the squamous part of the temporal bones from the floor of the temporal fossa. These four bones meet on each side of the head at a small circular area of sutures calledpterion[1]. According Standring reported

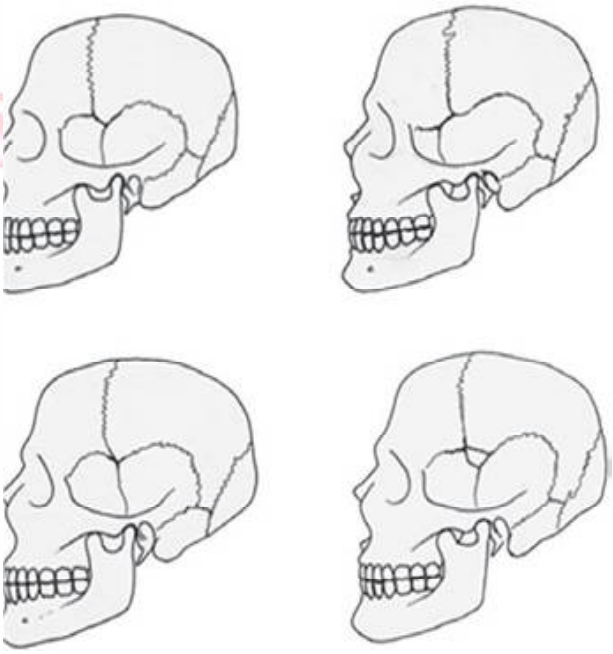
that the pterion is an important landmark on the side of the skull as it overlies both the anterior branch of the middle meningeal artery and the lateral cerebral fissure intracranially, also stated that it usually lies 3 cm above the zygomatic arch and 3.5 cm behind the frontozygomatic suture. According Moore & Dalley [2] reported that the pterion is two fingers' breadth superior to the zygomatic arch and a thumb's breadth posterior to the frontal process of the zygomatic bone. A hard blow to the side of the head may fracture the thin bones forming the pterion, with eventual rupture of this artery crossing the pterion. The hematoma resulting exerts pressure on the underlying cerebral cortex, with dire consequences if untreated for a few hours. The pterion is also known as the Sylvian point. It corresponds to the site of the anterolateral fontanelle on the neonatal skull, which disappears about three months after birth[1].

Pterion is an important guide for age and sex determination as well as archaeological and orensic estimation. It is also an important site to assess anterior branch of middle meningeal artery, Broca's area, sphenoid ridge and optic canal. Initially pterion was classified into three types by Broca[3]. They were sphenoparital, frontotemporal and stellate. Later on four types were given by Murphy[4] as sphenoparital, frontotemporal, stellate and epipteric types. The sphenoparietal type of sutural pattern occurs in which the sphenoid and parietal bone articulate directly. The frontotemporal type is one in which frontal and temporal bones are in direct contact. The stellate type has frontal, parietal, temporal and sphenoid bones articulaye at a single point. The epipteric type means the presence of the sutural bones at the pterion. Wang *et al*.[5], further elaborated and gave the six types. He gave additional zygomaticoparital type, a variation of the sphenoparietal type in which zygomatic bone articulates with the parietal bone separating the frontal bone from the temporal or sphenoid bone and zygomatico temporal type in which the zygomatic bone articulates with the temporal bone separating the sphenoid from frontal and parietal bones. It is considered as the subtype of frontotemporal type. The most common type as well as the position of the ptrion varies in different populations[6]. Pterional fracture can tear frontal branch of middle meningeal artery leading to extradural hematoma[7]. The anatomical location of the pterion helps in surgical interventions following extradural hemorrhage as well as tumor involving the inferior aspect of frontal lobe such as olfactory meningeomas[8]. It is also helpful in operations involving Brocas motor speech area[9] in repairing the aneurysms of middle meningeal artery amd upper basilar complex[10]. The present study is focused on morphological variations of pterion.

MATERIALS AND METHODS

A total of 500 pterions were examined from 250 adult dry skulls. The present study was undertaken in adult south Indian skulls from different regions of south India, from different medical colleges. We have observed different shapes of pterion like sphenoparietal frontotemporal, stellate and epipteric (Fig. 1).

Fig.1: Murphy's classification of the shape of the mpterion.[16] A) sphenoparietal; B) frontotemporal; C) stellate D) epipteric



RESULTS

Four types of pterion were observed in the 250 skulls (500 sides) examined. Sphenoparietal type 73.6% in males, 71.7% in females and 72.8% in total; frontotemporal type 14.2% in males, 19.6% in females and 16.4% in total; stellate type 10.1% in males, 6.8% in females and 8.8% in total;

epiteric type 2.1% in males, 1.9% in females and 2 % in total. Sphenoparietal type was observed in more cases - 39.2% on right and 33.6% on left, frontotemporal type was seen in 6% of cases on right and 10.4% on left; stellate type in 3.2% on right and 5.6% on left; epipteric type in 1.6% on right and 0.4% on left (Table 1).

Table 1: Types of pterion in Male and Female, Right and Left.

	Type of Pterion			
	Sphenoparietal	Fronto-temporal	Stellate	Epipteric
Male(n=148)	73.60% -109	14.20% -21	10.17% -15	2.10% -3
Female(n=102)	71.70% -73	19.60% -20	6.80% -7	1.90% -2
Total	72.80% -182	16.40% -41	8.80% -22	2% -5
Right	39.20%	6%	3.20%	1.60%
Left	33.60%	10.40%	5.60%	0.40%

DISCUSSION AND CONCLUSION

The type and location of the pterion and its relation to surrounding bony landmarks is important. Such detailed information can only readily be obtained from an examination of dry skulls. However, as imaging techniques continue to develop, it may become possible to use these to determine more precise relationships between bony landmarks and the underlying soft tissues. Since the shape and location of the sutures associated with the pterion are variable, the pterion has been classified according to its shape, with four groups being described depending on the shape of the sutures between the associated bones: sphenoparietal, frontotemporal, stellate and epipteric. An accurate knowledge of the location and relations of the pterion is important in relation to surgical intervention, particularly with respect to the course of the branches of the middle meningeal artery and Broca's motor speech area on the left side. The distances between the pterion

and the lesser wing of the sphenoid and optic canal are of practical importance in surgical approaches to these regions via the pterion. Both the type of pterion and the associated measurements variations present between different racial groups, and hence the need for accurate and up to date data when performing intracranial surgery guided by recognizable bony landmarks [11,12].

The present study were observed Four types of pterion in the 250 skulls (500 sides) examined and the results were, Sphenoparietal type72.8%, Frontotemporal type 16.4%, Stellate type 8.8%, Epiteric 2 % . These results in agreement with previous studies, Murphy[4] study in 388 skulls of Australian aborigine observed that Sphenoparietal type73%, Frontotemporal type 7.5%, Stellate type 18.5%, Epiteric 1%. Matsumura G et al[13] study in 614 Japanees Skulls found that Sphenoparietal type79.1%, Frontotemporal type 2.6%, Stellate type 17.7%, Epiteric 0.6%. Saxena et al[14] in 203 Indian skulls observed that Sphenoparietal type 84.72%, Frontotemporal type 10.01%, Epiteric 5.17%. In an study of 300 Turks skull by Ersoy et al. the results were Sphenoparietal type 87.35%, Frontotemporal type 3.47%, Stellate type 8.98%, Epiteric 0.2%. In an another study of 26 Turkish male skulls by Oguz O[11] found that Sphenoparietal type 88%, Frontotemporal type 10%, Stellate type 2%. In a Kenyan study by Mwachaka PM[16] the results were Sphenoparietal type 66%, Frontotemporal type 15%, Stellate type 12%, Epiteric 7%. In an Indian study done by Hussain Saheb et al[12] found that Sphenoparietal type69.25%, Frontotemporal type 17.35%, Stellate type 9.7%, Epiteric 3.7%. in an anaother study by Seema D[17] it is observed that Sphenoparietal type94%, Frontotemporal type 1%, Stellate type 3%, Epiteric 2%. Sutural morphology of the pterion in the Indian population does not differ much from that of other populations. These findings may be of useful in surgical approaches and interventions via the pterion.

Conflicts of Interests: None

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