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A Study on Shapes of Pterion in Human Adult Skulls

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Abstract

Pterion is the bony land mark which lies in the norma lateralis of the skull. It forms the floor of temporal fossa. It is almost H-shaped which is formed by the articulation of four bones with each other i.e. frontal, parietal, the greater wing of sphenoid and temporal bones. It is bony land mark to find out the place of anterior division of middle meningeal artery in the cranium. Here the bones are very thin which can be broken easily in the clinical process for drainage of subdural haemorrhage. It is having a great clinical significance. The study on variations of pterion is important in practice of radiologists, neurosurgeons, forensic medicine, anthropologists and forensic dentologist because, epipteric type of pterion sometimes is considered as fractured skull. 250 human adult skulls of known gender were examined on both sides. Four types of pterion were observed – sphenoparietal 65.19%, frontotemporal 15.19%, stellate 14.21% and epipteric 5.31%. The pterion is points of sutural confluence seen in the norma lateralis of the skull. The patterns of formation exhibit population based variations. These findings should be of use in surgical approaches and interventionsvia the pterion.

Keywords: Skull; Pterion; Sphenoparietal; Frontotemporal; Stellate; Epipteric.

Introduction

The pterion is one of the most interesting bone meetingpoints in craniofacial osteology and its complex morphology derives from the fact that is the contact point of the facial skeletal elements, skull base and calvarium. Knowledge of its peculiar morphology is mandatory for the pterional approach used in microsurgery and surgery [1].

The importance of the pterion is its relation to the middle men in geal artery, Broca's motor speech area on the left side and surgical intervention relating to pathologies of the sphenoid ridge and optic canal [2].

Murphy has described four types of pterion– sphenoparietal type where the greater wing of sphenoid articulates with parietal bone to form letter H; frontotemporal type where the squamous part of temporal articulates with frontal bone; stellate type where all bones articulate in the form of letter K and epipteric type wherea sutural bone is lodged between the four bones forming the pterion [3,4].

Pterion is a small area in the temporal fossa, which contains the junction of the frontal, greater wing of sphenoid, parietal and temporal sutures. It usually lies 4 cm above the midpoint of the superior border of zygomatic arch and 3.5 cm behind the frontozygomatic suture and marks the anterior branch of the middle meningeal artery and Sylvian point of the brain. Its position can be estimated roughly by a shallow palpable hollow, approximately 3.5 cm above the center of the zygomatic bone. It is H-shaped. The pterion is covered by the origin of temporalis muscle and temporalis fascia. Whereas inside the cranium it relates with the many structures like anterior division of middle meningeal vessels, sylvian fissure, area numbers 44 and 45, tip of the lesser

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wing of sphenoid bone and base of the posterior margin of the orbital plate of frontal bone. This area is very important for surgeons because here the bones are very thin and can easily be broken by the surgeons and neurosurgeons in their clinical work. Most important surgery is done for the drainage of haematoma formed after the accident, where the collection of blood occurs in subdural space, to drain the collected fluid or blood, the burr hole is done at the pterion site [4,5,6,7]. A Knowledge of the surface anatomy of the middle meningeal artery is important for accurate positioning of burr hole to evacuate extradural hematoma. Morphological studies on various foramina and processes of skull maybe helpful in neurosurgery and forensic medicine practice[8,9,10,11].

Materials and Methods

The present study was undertaken in different medical and dental institutions in Karnataka, India. We have observed differentshapes of pterion like sphenoparietal frontotemporal, stellate and epipteric.

Results

Four types of pterion were observed in the 250skulls (500 sides) examined. Sphenoparietal type 68.18% in males, 59.72% in females and 65.19% intotal; frontotemporal type 9.09% in males, 26.38%in females and 15.19% in total; stellate type

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

	Types of pterion			
	Sphenoparietal (%)	Frontotemporal (%)	Stellate (%)	Epipteric (%)
Male (132)	68.18	9.09	15.90	6.81
Female (72)	59.72	26.38	11.11	2.77
Total (204)	65.19	15.19	14.21	5.39
Right	34.80	6.37	6.37	3.92
Left	30.39	8.82	7.84	1.47

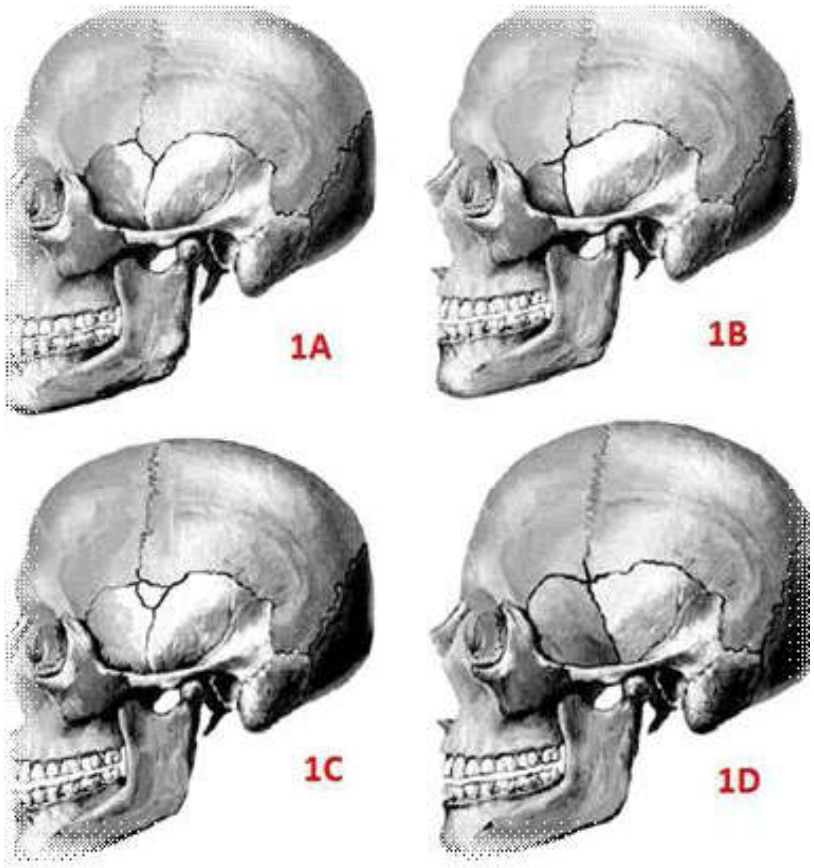

Fig. 1: Types of pterion (sphenoparietal (1A), frontotemporal(1B), epipteric(1C), stellate(1D)

15.90% in males, 11.11% in females and 14.21% in total; epiteric type 6.81% in males, 2.77% in females and 5.39 % in total. Sphenoparietal type was observedin more cases – 34.80% on right and 30.39% onleft, frontotemporal type was seen in 6.37% of cases on right and 8.82% on left; stellate type in 6.37% on right and 7.84% on left; epipteric type in 3.92% on right and 1.47% on left (Table 1).

Discussion

The type and location of the pterion and its relation tosurrounding 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 [Figure 1][7]. 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 men in geal 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 the seregions 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 upto-date data when performing intracranial surgery guided by recognizable bony landmarks [2].

The present study were observed Four types ofpterion in the 250 skulls examinedand the results were, Sphenoparietal type 65.19%,Frontotemporal type 15.19%, Stellate type 14.21%, Epiteric 5.39%. Murphy [3] study results in correlation with present study, in their study 388 skulls of Australian aborigine observed thatSphenoparietal type 73%, Frontotemporal type 7.5%, Stellate type 18.5%, Epiteric 1%. Matsumura G et al [12] study results are in agreement with our present study, in their study 614 Japanees Skulls found that Sphenoparietal type 79.1%, Frontotemporal type 2.6%, Stellate type 17.7%, Epiteric 0.6%. In study of Indian subcontinent study Saxena et al [13] found that Sphenoparietal type 84.72%, Frontotemporal type 10.01%, Epiteric 5.17%. In an Turkish study of 300 skulls by Ersoy etal.[4] 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 [2] found that Sphenoparietal type 88%, Frontotemporal type10%, Stellate type 2%. In a Kenyan study by Mwachaka PM [13] the results were Sphenoparietal type 66%, Frontotemporal type 15%, Stellate type 12%, Epiteric 7%. In an Indian study done by Hussain Saheb et al [6] found that Sphenoparietal type 69.25%, Frontotemporal type17.35%, Stellate type 9.7%, Epiteric 3.7%. in an another study by Seema D [14] it is observed that Sphenoparietal type 94%, Frontotemporal type 1%, Stellate type 3%, Epiteric 2%. Sutural morphology of the pterion in the Indian population does not differ much from that ofother populations. These findings may be of useful in surgical approaches, interventions via the pterion.

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