



ORIGINAL RESEARCH PAPER

Anatomy

PTERION -AN ANATOMICAL LANDMARK AND ITS MORPHOLOGICAL ENTITIES

KEY WORDS: Pterion, Middle meningeal artery, Sphenoparietal

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ABSTRACT

Pterion is an important bony landmark present on the lateral aspect of the skull. It is formed by the fusion of sphenoid, frontal, parietal and temporal bones. It is an anatomical point for underlying middle meningeal artery, Broca's area and insular area. Four different patterns of pterion were described by authors. The present study was conducted on 40 human dry skulls obtained from department museum. The bones at the pterion were observed and different patterns were tabulated. The present study identified sphenoparietal pattern as the most commonest type followed by stellate and epiptereric types. Bilateral variations were observed along with obliteration of sutures near the point of pterion. This varied pattern has anthropological importance and due to thin bones that forms this point, any fracture at this area will cause extradural hemorrhage.

Introduction:

Pterion is a point of sutural confluence on the norma lateralis where frontal, parietal, temporal and greater wing of sphenoid meet with each other by H shaped suture. It is the craniometric point near the anterolateral frontanella. It is located superior to the zygomatic arch and posterior to the fronto zygomatic suture. Pterion is located two fingers above the zygomatic arch, with a width of the thumb at its back to the frontal process of the zygomatic bone [1]. It is the weakest point of the skull and can be fractured by indirect blows to the top or back of the head. It is an important landmark for locating Broca's motor speech area, anterior pole of insula and middle cerebral artery. Some physicians described this point as God's little joke due to the presence of vital artery at relatively thin bony structure (2).

Pterion is the primary site for surgeons to access to sphenoid ridge and optic canal. It is commonly used neurosurgical landmark to approach anterior and middle cranial fossae, tumors of frontal lobe, operations of Broca's area and repair of aneurysms of middle cranial fossa. This neurological landmark is differentiated into various types based on the meeting pattern of the bones. Broca in 1875 studied the morphology of pterion for the first time. He classified three types of pterion as Sphenoparietal, frontotemporal and stellate types. (3) In sphenoparietal type the sphenoid and parietal bones meet directly, in frontotemporal type frontal and temporal bones meet and stellate type frontal, parietal and sphenoid meet at a common point. Murphy in 1956 explained fourth type of pterion as epiptereric type in which a sutural bone is present at this point. (4) These variations are important for anthropologists as the initial studies were exploratory and descriptive, in which patterns of articulation in pterion in humans and primates were identified (5) and now a days this point is useful in the clinical setting during an interventional surgical approach in neurology.

Materials and methods:

The study was conducted on 40 dry human skull bones of unknown sex. The bones have been taken from the departmental museum of anatomy. The skulls without any damage were taken for the study. The skulls were studied on both sides based on Murphy's classification. The different types of pterion was noted on right and left side of the skull.

Observation:

This study observed sphenoparietal type of pterion as commonest type in most of the skulls. This is followed by stellate and epiptereric type. Frontotemporal type was identified in only one side of the skull. Some skulls had varied pattern of pterion on both sides. A degree of sutural obliteration was observed in this study. 26 skulls showed bilateral sphenoparietal type of pterion, 4 skulls had stellate type and 1 showed epiptereric type of pterion. Pterion pattern varied on both sides in 7 skulls, 3 skulls showed sphenoparietal pattern on right side and epiptereric pattern on left side and 2 skulls presented with right stellate and left sphenoparietal pattern, 1 skull with right stellate and left epiptereric and in 1 skull it presented with right frontotemporal and left sphenoparietal type. 2 skulls showed obliteration of sutures near the pterion. (Fig.1)

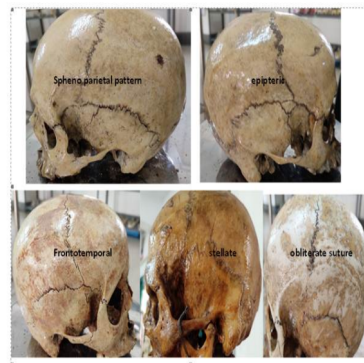
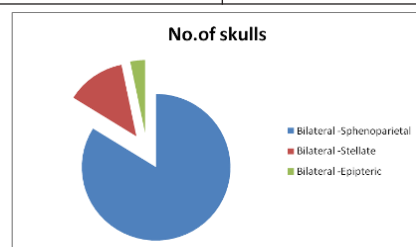


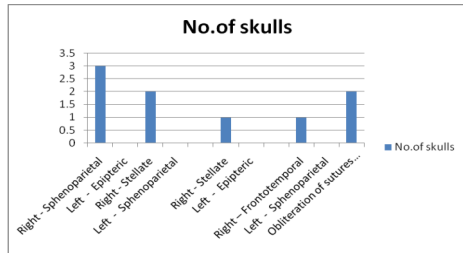
Fig.1 showing various patterns of pterion

Pattern of pterion	No. of skulls
Bilateral -Sphenoparietal	26
Bilateral -Stellate	4
Bilateral -Epiptereric	1



Bilateral variation in Pterion pattern:

Pattern of pterion	No. of skulls
Right - Sphenoparietal Left - Epipteric	3
Right - Stellate Left - Sphenoparietal	2
Right - Stellate Left - Epipteric	1
Right - Frontotemporal Left - Sphenoparietal	1
Obliteration of sutures near the pterion	2



Discussion:

Pterion is a craniometric bony landmark for significant intracranial structures. It is a membranous area in fetal life forming anterior frontanelle for skull bones to overlap during parturition. Ossification of bones occurs at this frontanelle after birth. The bones at the pterion are considered to be thin making this area weak and vulnerable to fracture. Out of different patterns of pteria, sphenoparietal pattern is most common and reported by many authors. Seema in their study on south Indian population observed 94% sphenoparietal type, 3% stellate, 2% epipteric and 1% frontotemporal pattern which is similar to the present study. (6) Manjunath study on south Indian population showed sphenoparietal type most common followed by epipteric, frontotemporal and stellate type. (7) As reported by Mary Antony Praba et al it was sphenoparietal, epipteric, stellate and least was frontotemporal pattern. (2) The reason for greater incidence of sphenoparietal variety as opined by Ashley-Montague is evolutionary and this pattern is common in human beings and frontotemporal is common in nonhuman primates. Increase in brain size in human beings have caused the morphological changes in the calvaria, due to this greater wing of sphenoid met the parietal bone forming sphenoparietal pattern in humans. (8) Kim et al expressed that the bones of calvaria is in coordination with growth of brain and needs an interaction between different tissues in the suture. (9) Variations in pteria may be due to the result of combination of genetic and environmental factors (4)

Sutural bones develop due to accessory ossification centers found at various parts of skull. The presence of these bones may have a genetic basis or malformation of skull or Central nervous system anomalies (10,11). It mimics fractures radiologically and may complicate neurosurgical procedures. The degree of sutural obliteration at pterion is used for age estimation and from multiple studies it is evident that the pterion point partially obliterates from the age of 25. (12)

Conclusion:

The existence of various types of pteria has an evolutionary history and due to growth of brain tissue, bones that forming the pterion has varied from frontotemporal to sphenoparietal type. This point is more important due to its underlying structures and the weakness of the bones of this region leads to fractures causing damage to the vital structures of this point.

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