

Study of the Location and Morphology of the Pterion in Dry Skulls and Their Clinical Implications

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ABSTRACT

Background: Pterion is usually marked by an H-shaped form of sutures that forms the union of the frontal, parietal, greater wing of sphenoid, and temporal bones. The center of pterion is around 4.0 cm higher to the zygomatic arch and 3.0-3.5 cm posterior to frontozygomatic suture. The present study was conducted with the aim to determine the location of pterion and its clinical implications.

Materials and Methods: The present study was conducted in the Department of Anatomy, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan, India. The study included 40 skulls of unknown gender. PT was taken as the distance from the center of Pterion to the superior part of the temporozygomatic suture. For the linear measurements, one jaw of caliper pointed at the frontozygomatic suture and the other at the pterion center. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software. Mean and median values of all the results were calculated.

Results: A total of 40 skulls were studied in the present study. The mean distance on the right side was 3.5 cm and on left side was 3.6 cm with variation between 2.1 To 4.4 cm on both

sides. The median distance on the right side was 3.46 cm and on the left side was 3.48 cm.

Conclusion: The location and the type of pterion varies amongst different ethnic and racial groups. The present study may be of use to the forensic experts and anthropologists.

Keywords: Center, Pterion, Temporozygomatic.

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INTRODUCTION

Pterion is a noteworthy site that is noted by the intersection of frontal, parietal, squamous part of temporal and the greater wing of sphenoid bones and leads to the formation of the floor of temporal fossa. It is usually marked by an H-shaped form of sutures that forms the union of the frontal, parietal, greater wing of sphenoid, and temporal bones. Rarely, the frontal and temporal bones articulate with each other, most of the times all the bones join at a point.¹ The pterion matches to the region of anterolateral fontanelle of the neonatal skull that normally closes during the third month soon after birth.² As the bones enlarge, the unossified membranes of suture that connect the periosteum over the outer and inner layers of the bone, that helps in growth and binding the bones together to their needed margins.³ A sutural bone can be seen at the pterion in some instances.⁴ It also overlies anterior branch of middle meningeal artery that is commonly damages and leads to extradural hematoma, needing burr hole surgery to evacuate.⁵ The center of pterion is around 4.0 cm higher to the zygomatic arch and 3.0-3.5 cm posterior to

frontozygomatic suture.⁶ Here the greater wing of sphenoid bone joins the antero-inferior angle of parietal bone and is not indicated by any eminence or depression.⁷ In neurosurgery, it is crucial to have the most reliable bony opening to make the procedure minimally invasive.⁸ The present study was conducted with the aim to determine the location of pterion and its clinical implications.

MATERIALS AND METHODS

The present study was conducted in the Department of Anatomy, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan, India. The study included 40 skulls of unknown gender. The pterion morphology on both the sides of skull and its sutural pattern was established. The central part of pterion was estimated by making a circle which included all the four bones that took part in its formation. A sliding stainless steel caliper was used to estimate the distance between pterion and bony landmarks. In order to minimize error, measurements were obtained twice. PF

was taken as the distance from the center of the Pterion to the anterior part of the frontozygomatic suture. PT was taken as the distance from the center of the Pterion to the superior part of the temporozygomatic suture. For the linear measurements, one jaw

of caliper pointed at the frontozygomatic suture and the other at the pterion center. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software. Mean and median values of all the results were calculated.

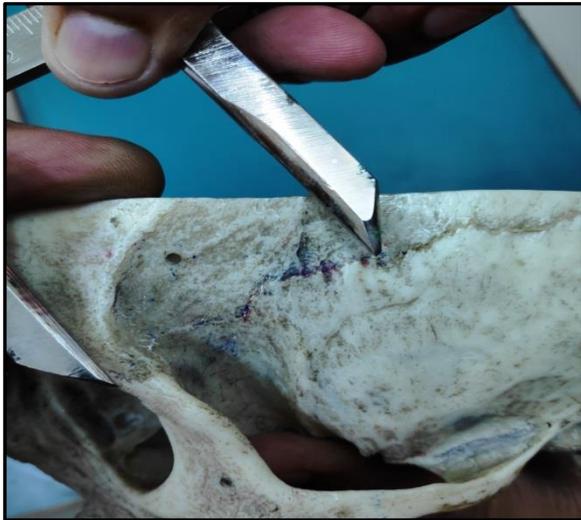


Fig 1: Measurement of parameter PF



Fig 2: Measurement of parameter PT

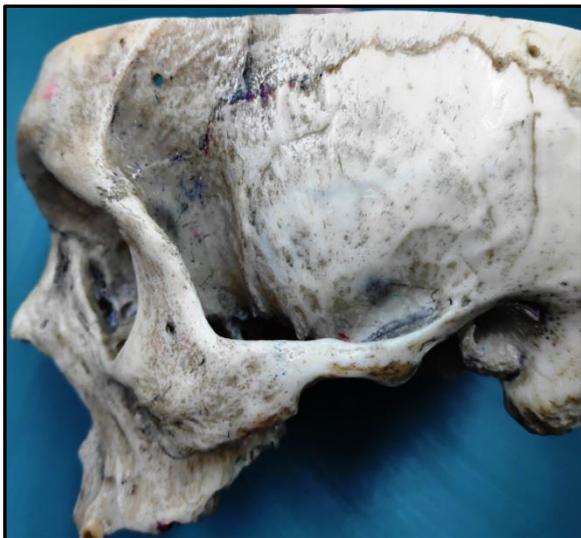


Fig 3: Sphenoparietal type is a sutural pattern



Fig 4: Frontotemporal type is a sutural pattern



Fig 5: Stellate type is a sutural pattern

RESULTS

Table 1 illustrates the Distance from pterion to the frontozygomatic suture. A total of 40 skulls were studied in the present study. The mean distance on the right side was 3.5 cm and on left side was 3.6 cm with variation between 2.1 To 4.4 cm on both sides. The median distance on the right side was 3.46 cm and on the left side was 3.48 cm.

Table 2 illustrates the Distance from pterion to the temporozygomatic suture. A total of 40 skulls were studied in the

present study. The mean distance on the right side was 3.8 cm and on left side was 3.7 cm with variation between 3.1 To 4.5 cm on both sides. The median distance on the right side was 3.71 cm and on the left side was 3.78 cm.

Table 3 illustrates the type of pterion in the study. There were 80% Sphenoparietal on right side and 85% on left side. There were 10% Frontotemporal on right side and 15% on left side. There were only 10% stellate on right side.

Table 1: Distance from pterion to the frontozygomatic suture

Parameter	No: of skulls	Mean (cm)	Median (cm)	Minimum	Maximum
PF (right)	40	3.5	3.46	2.1	4.4
PF(left)	40	3.6	3.48	2.1	4.4

Table 2: Distance from pterion to temporozygomatic suture

Parameter	No: of skulls	Mean (cm)	Median (cm)	Minimum	Maximum
PT (right)	40	3.8	3.71	3.1	4.5
PT (left)	40	3.7	3.78	3.1	4.5

Table 3: Type of pterion in the study

Type of pterion	Right side	Left side
Sphenoparietal	80%	85%
Frontotemporal	10%	15%
Stellate	10%	0

DISCUSSION

This cranial junction on the lateral aspect of skull is an significant anatomical point used by neurosurgeons and maxillo-facial surgeons because of its structural and anatomical standing. It is an area of bone joint in the anterior aspect of the temporal fossa. The sutures of the cranial vault are sutural joints that ossify within membranes. This bone is known as the pterion ossicle or flower's bone or Epipteric bone. It is the site commonly used as a guiding indication where the location of deeper assemblies and their associations to the surface of the head are clarified. This is a vital clinical landmark as the calvarium is thinner and incidence of fracture is more. As per Broca in the year 1875, the Pterion was initially classified into three subtypes (sphenoparietal, stellate and frontotemporal) by Broca in 1875. Murphy in the 1956 Four types of Pterion (frontotemporal, sphenoparietal, stellate, and epipteric) were defined by. Wang et al gave six types of pterion namely stellate, sphenoparietal, frontotemporal, zygomatico-parietal, epipteric and zygomatico-temporal. Pterion is located two fingers superior to the arch and a thumb posterior to the frontal portion of zygomatic bone.¹ The bone articulation pattern can be varied and small epipteric bones may be seen. As per a similar study conducted in Gujrat the incidence of stellate extremely as low as 0.02% but as per the studies in the state of Awadh around Lucknow accounted for 5.17% that is higher than the current study.⁹ In our study, a total of 40 skulls were studied in the present study. The mean distance on the right side was 3.5 cm and on left side was 3.6 cm with variation between 2.1 To 4.4 cm on both sides. The median

distance on the right side was 3.46 cm and on the left side was 3.48 cm. Epipteric form of pterion was not seen in the current study, this is noteworthy as in Nigerians it accounted for 23.6% (13), amongst Australian Aborigines it was 18.5%⁽¹⁰⁾, and in other Indian studies it varied from 6.74% to 11.79% that was mostly related with sphenoparietal type.^{11,12} Pterion is considered as a keyhole approach to many of intracranial surgeries.^{13,14}

CONCLUSION

Pterion also known as God's little joke by some physicians is of great clinical implication. The location and the type of pterion varies amongst different ethnic and racial groups. The present study may be of use to the forensic experts and anthropologists.

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