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THE MORPHOLOGICAL ANALYSIS OF PTERION IN NORTH INDIAN POPULATION

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ABSTRACT

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.

A 35 dry adult human skulls of unknown sex without any gross pathology or abnormalitywere taken for the study.

Sphenoparietal was the commonest type of pterion observed on both the sides. Second most common type of pterion found in our study was stellate type. Stellate type of pterion was present only on right side of skull.

The accomplishments of this study contribute to anatomical variations of the pterion, which are of interest to anthropologists, forensic pathologists and surgeons. This topic of study deserves further investigation in other populations from different geographical areas.

KEYWORDS: Pterion, Sphenoparietal, Frontotemporal, Stellate, Epipteric, Norma Lateralis.

INTRODUCTION

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 (1-3). It lies approximately 4.0 cm above the zygomatic arch and 3.5cm behind frontozygomatic suture (2). It is also defined as a meeting point of skull base, calvarium & the skeleton part of facial anatomy. It also forms the floor of temporal fossa (4). It is a craniometric point that is related to structures in the cranial cavity. The pterion marks the anterior middle meningeal arterial ramus (5).

It is also a primary site during surgery to gain access to the sphenoid ridge and optical canal (3).

Four types of pterion i.e. Sphenoparietal, frontotemporal, stellate and epipteric were defined by (6).

1. Sphenoparietal type: - Greater wing of sphenoid articulate with the parietal bone to form the letter "H".
2. Frontotemporal type: - Squamous part of the temporal bone articulates with the frontal bone.
3. Stellate type: - Here all bones articulate at a point in the form of letter "K".
4. Epipteric type: - A sutural bone is lodged between the four bones forming the pterion.

MATERIALS AND METHODS

A total number of 35 dry adult human skulls of unknown sex without any gross pathology or abnormality were taken for the study.

A circle of smallest radius was drawn connecting the four bones involved in the formation of pterion, the center of which was taken as the centre of pterion.

The sutural pattern of the pterion was determined by measurement of distance of pterion from different bony landmarks. A circle of smallest radius was drawn connecting four bones involved in formation of pterion,the center of which was taken as centre of pterion. The sutural pattern of pterion was determined by measurement of distance of pterion from different landmarks. It was first established, with the help of compass utilizing perpendicular bisectors.

Suture between the bones coming in direct contact at pterion was utilized.Distances between centre of pterion & various bony landmarks were measured using thread and then the thread was calibrated over digital vernier caliper to get the exact distance.

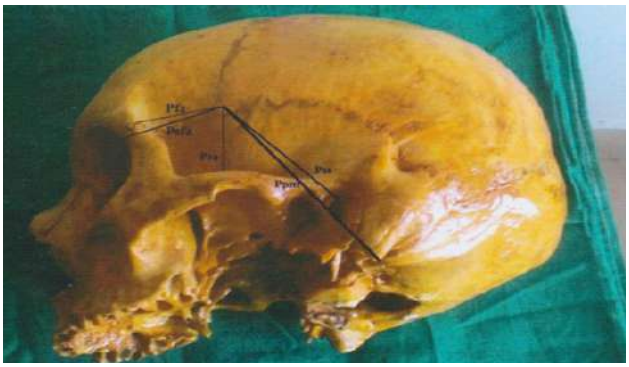

Fig 1: Shows Different Bony Landmarks

RESULTS

In the present study Sphenoparietal was the commonest type of pterion observed on both the sides. On left side, it was noted in 50.72% and on right side in 49.23% of skulls. Second most common type of pterion found in our study was stellate type. This type was seen in 1.4% of skulls and only on right side. Stellate type of pterion was absent on left side of skull. No skull was found with epipteric and frontotemporal pterion. (Table 1)

S.N.	Types of Pterion	Total Sides of Skull		Right side		Left side	
		nT	%	nR	%	nL	%
1	Sphenoparietal	69	98.57	34	49.23	35	50.72
2	Stellate	1	1.4	1	100	0	0
3	Epipteric	0	0	0	0	0	0
4	Frontotemporal	0	0	0	0	0	0

Table1: Distribution of Different Types Of Pterion According To The Side Of Skull

(nT=Total number of skull. nR= number right side of skull, nL= number left side of skull)

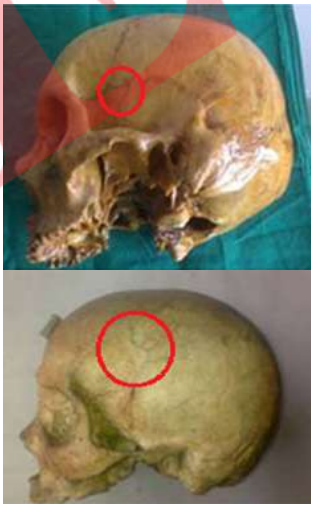

Fig 2: Showing Types Of Pterion A) Sphenoparietal Type B) Stellate Type.

DISCUSSION

Murphy and coworkers (6) observed sphenoparietal, frontotemporal, stellate and epipteric type of pterion in South Indian population. The present study was conducted in North Indian population. The digital approach was used to measure the distances in the present study. It is well known that the morphological configuration of the sutural junction of the bones associated with the pterion varies significantly in humans. Previous studies of the configuration of sutural articulation patterns associated with the pterion have focused principally on variations, classification, presence of epipteric bones, and associated cranial measurements and index (7-8)

In neurosurgery, it is important to have the most suitable bony aperture in order to be minimally invasive (1). Pterional access has, either alone or in combination with other approaches, paved the way for management of wide variety of neurosurgical disorders with minimal tissue injury. So knowledge of its peculiar morphology is mandatory for the pterional approach used in microsurgery and surgery (7).

The dominant type of pterion in our study was Sphenoparietal (98.57%) while the stellate type was least common (1.4%). Most common type of pterion reported in different studies is sphenoparietal type ranging from 81% to 95% Saxena et al (9),Manjunath et al (10) which is in accordance with the present study. The second most common variety reported is either frontotemporal Saxena et al (11), or epipteric type Zalwadia et al(12), Nair et al(13).

Year	Authors	Sample size	Population	Observation
2018	Present study	35 skulls	North Indian	Sp.98.57%,St.1.4%
2014	Richagupta et al.(14)	46 skulls	North Indian	Sp. 60.83%, Epip 23.8%, St 17.17%, Ft 3.2%
2015	Hariparsad et al.(16)	60 skulls	North Indian	Sp 86.7%(L), 91.7%(R) St 5%
2016	Walulkar et al.(15)	350 skulls	Maharashtra	Sp 82.2%, Ft 9%, Epip 5%, St 3.7%
2017	K EpharimVikramRao et al.(17)	70 skulls	South Indian	Sp.77.5%, epip.12.5%, St5.83%,ft4.16%,
2017	GyanaranjanNayak et al.(18)	50 skulls	West Indian	Sp. most common
2017	Yuvraj et al.(19)	125 skulls	South Indian	Epip. 13.11%, Ft 6.55%, St 4.91%
2017	VasudhaTk et al(20)	150 skulls	South Indian	Sp.69.33%, Epip.14%, St.11%, Ft. 5.67%

Table 2: Comparison Of Present Study With Previous Studies

The morphological configuration of the sutural junctions of the bones associated with the pterion varies significantly in humans. Epipteric and frontotemporal type of pterion was absent in the present study. Richa Gupta et al(14) in their study observed percentage of frontotemporal type 3.2% and epipteric type 23.8%. Walulkar et.al(15) in their study found frontotemporal type 9% and epipteric type 5%.

The difference in the findings can be explained on the basis of selection of different population groups leading to racial differences. Secondly, small sample size in the present study might cause different results (Table 2).

Note-Sp=Sphenoparital, Epip.=Epipteric, St.=Stellate, Ft.=Frontotempora

CONCLUSION

In the present study following conclusions were drawn:

- The commonest type of pterion observed was Sphenoperital i.e., in 98.57% of skulls on both sides.
- The second most common type of pterion was stellate type noted in 1.4% of skulls.
- Frontotemporal and Epipteric type of pterion were absent.

Thus, the accomplishments of this study contribute to anatomical variations of the pterion, which are of interest to anthropologists, forensic pathologists and surgeons. This topic of study deserves further investigation in other populations from different geographical areas.

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