

Research Article

Study of Anatomical Types of Pterion for Pterional Surgical Approach

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A B S T R A C T

Introduction: Pterion is useful anatomical landmark for neurosurgeons during operations on frontal lobe tumours, extradural haemorrhage, Roca's speech area or pathologies of middle cerebral artery.

Material and Methods: This study was conducted in the on 120 dry human skulls. On the both side of each skull, the morphology of pterion was examined based on Murphy's classification.

Results: On examining the sutural pattern and types of pterion we found that Sphenoparietal type of pterion was most common type while the least common type was the epipteric type of pterion. Percentage of types was Sphenoparietal type 73.75%, Fronto temporal type 9.08%, stellate type 20% and epipteric type 7.16%.

Conclusion: Types of the pterion in normal skulls shows great degree of variations among individuals and different racial groups. Therefore, precise and scientific data are required when performing intracranial surgery.

Keywords: Asterion, Pterion, Skull, Suture

Introduction

Pterion is an H shaped suture located on lateral side above the zygomatic arch on either side of skull. It formed by union of four bones, the frontal and parietal bones superiorly and the greater wing of sphenoid and squamous temporal inferiorly.¹ Embryologically it represents the site of anterolateral fontanelle of neonatal skull. It is membranous at birth but get fully ossified by third month after birth.² Pterion is useful anatomical landmark for neurosurgeons during operations on frontal lobe tumours, extradural haemorrhage, Roca's speech area or pathologies of middle cerebral artery.³ Pterion is also significant landmark used in anthropometry. The pterion is one of the weakest parts of the skull commonly injured during sports like boxing,

cricket, rugby and other high intensity sports. Pterion has been classified by different authors into 4-6 morphological types. Best known classification is by Murphy's given in 1956 into four types-sphenoparietal, frontotemporal, stellate, and epipteric.⁴

The present study was conducted to document the various types of pterion on basis of Murphy's in Indian population.

Materials and Methods

This study was conducted in the on 120 dry human skulls of unknown sex and age from the bone bank of our medical college. Any skull with gross pathology or abnormality or damage were excluded from study. On the both side of each skull, the morphology of pterion was examined

based on Murphy's classification into four types: 1. Sphenoparietal type; 2. Frontotemporal type; 3. Stellate type and 4. Epipteric type. The presence of sutural or epipteric bones was also noted. The types of pterion were sorted and documented into tables. The data was compared with the findings of previous studies and analysed.

Result

On examining the sutural pattern and types of pterion we found that Sphenoparietal type of pterion was most common type while the least common type was the epipteric type of pterion (Table 1 and Figure 1). Our study shows following types of pterion.

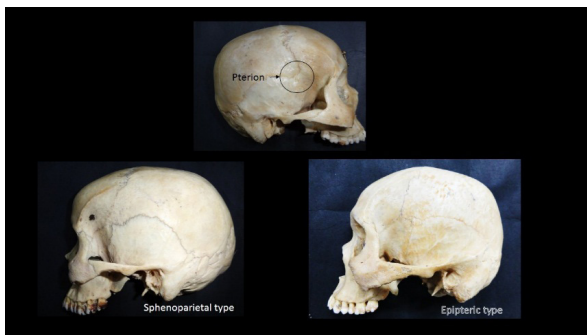


Figure 1. Most common and least common type of pterion in our study

- Spheno-parietal type (73.75%): Greater wing of sphenoid articulates with the parietal bone to form the letter 'H'.
- Frontotemporal type (9.08%): Squamous part of the temporal bone articulates with the frontal bone.
- Stellate type (20%): Here all bones articulate at a point in the form of letter 'K'.
- Epipteric type (7.16%): A sutural bone is lodged between the 4 bones forming the pterion.

Table 1 shows the different types of pterion in our study.

Discussion

In present study we observed all four types of pterion-sphenoparietal, stellate, stellate and epipteric. Table 2 shows comparisons of observation of present study with previous studies. Sphenoparietal was the most common type of pterion in present study, 73.75% among total pterion, which was comparable to the previous studies.⁵⁻⁷

Table 2. Comparison of the percentage of four types of pterion in different studies

Study	Sample size	Sphenoparietal	Frontotemporal	Stellate	Epipteric
Mats-umura G et al. ¹⁷	614	79.10%	2.60%	17.7%	0.60%
Saxena RC et al. ³	203	84.72%	10.01%	5.17%	0.0%
Sudha R et al. ⁸	150	80%	3%	5.30%	11.30%
Mod-asiya UP et al. ¹²	220	80.9%	0.0%	10.9%	8.18%
Present study	120	73.75%	9.08%	20%	7.16%

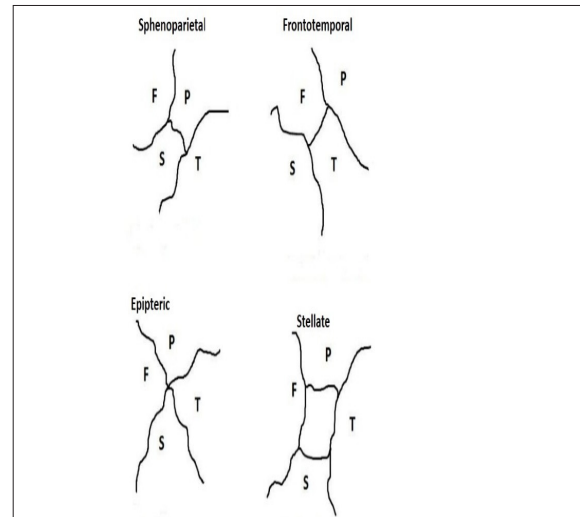


Figure 2. Different types of pterion in our study

Table 1. The percentage of four types of pterion in current study

Type of pterion	Right (120)	Left (120)	Total (240)
Spheno-parietal type	90 (75%)	87 (72.5%)	177 (73.75%)
Frontotemporal type	11 (9%)	11 (9.17%)	22 (9.08%)
Stellate type	12 (10%)	12 (10%)	24 (20%)
Epipteric type	7 (6%)	10 (8.33%)	17 (7.16%)

The ethnic and region wise variations in the type of pterion are due to various factors contributing to skull growth.⁷ These factors include genetic factors and environmental factors.^{8,9} According to Chao et al. successful removal of sylvian fissure lipoma by pterion keyhole surgery requires the detail knowledge of morphology and morphometry of pterion.^{10,11,12} The wormian bones can cause weakness in skull and extend the fractures. The presence of wormian bones provides false diagnosis of fractures radiologically or during surgery may lead to complications during burr hole.^{13,14} The extensive knowledge of pterion types and nearby landmarks is crucial for neurosurgeons in the management and treatment of vascular microsurgery and neurosurgery via pterion approach.^{15,16}

Conclusion

Types of the pterion in normal skulls shows great degree of variations among individuals and different racial groups. Sex and side also affect the type of the pterion. Therefore, precise and scientific data are required when performing intracranial surgery. Preoperative radiological imaging like X-rays, CT and MRI of the pterion should be done to determine a safe location for performing surgical and interventional procedures.

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Conflict of Interest: None

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