

## Morphological Study of Pterion in Dry Human Skull

Somwanshi Shital<sup>1</sup>, Kulkarni Pratima<sup>2</sup>, Pande Mukta<sup>3</sup>, Sukre Shivaji<sup>4</sup>

### How to cite this article:

Somwanshi Shital, Kulkarni Pratima, Pande Mukta, et al. Morphological Study of Pterion in Dry Human Skull. Students. Indian J Anat. 2020;9(2):127-130.

**Author's Affiliation:** <sup>1</sup>Junior Resident II, <sup>2</sup>Associate Professor, <sup>3</sup>Assistant Professor, Professor and Head, Department of Anatomy, Government Medical College, Aurangabad, Maharashtra 431001, India.

**Corresponding Author: Kulkarni Pratima**, Associate Professor, Department of Anatomy, Government Medical College, Aurangabad, Maharashtra 431001, India.

**E-mail:** shitalnsoms@gmail.com

**Received** 13.02.2020 | **Accepted** 20.05.2020

### Abstract

**Introduction:** Pterion is irregularly H shape confluence of sutures on norma lateralis. It is an anthropological landmark situated in the floor of temporal fossa. Anterior division of middle meningeal artery is related to and commonly injured in trauma at pterion. Keeping in mind clinical and anthropological importance of pterion study was conducted.

**Aims and Objectives:** To study sutural pattern of pterion based on Murphy's classification. To locate the pterion above zygomatic arch and behind frontozygomatic suture.

**Material and Methods:** 56 dry human skulls of known sex preserved by Anatomy Department, Government medical college Aurangabad were studied for pterion pattern. Location of pterion studied from midpoint of zygomatic arch to midpoint of pterion on both sides and mean is calculated for distance from frontozygomatic suture also. Distance is measured using digital vernier caliper having 0.01 mm accuracy.

**Results:** Percentage of pattern of pterion in present study is; Sphenoparietal 69.64% Epipteric bone 23.21%, Stellate 4.46% and Frontotemporal 2.68%. Mean distance of pterion in females is 3.8 cm from zygomatic arch and from frontozygomatic suture is 2.91cm. In males it is 3.87 cm and 2.92cm respectively.

**Conclusion:** Sphenoparietal type of pterion is most frequent type of pterion in present study. Sutural pattern and location may vary in two sides in same subjects. Knowledge of morphology and distance of pterion from frontozygomatic suture and zygomatic arch is important for anthropologists, radiologists and neurosurgeons. As skull is thinnest at pterion, it is useful in pterional approach in neurosurgery.

**Keywords:** Pterion; Zygomatic arch; Sphenoparietal type; Epipteric type.

### Introduction

Pterion is irregularly H shape confluence of sutures on norma lateralis where frontal, parietal, squamous temporal and greater wing of sphenoid meets.

It is an anthropological landmark situated in the floor of temporal fossa. Pterion corresponds to the site of the anterolateral fontanelle of the neonatal skull which closes at third month after birth.<sup>1</sup>

In present project sutural pattern of pterion was studied based on Murphy's classification.<sup>2</sup>

Initially Broca classified pterion into three types namely sphenoparietal, frontotemporal, stellate.<sup>3</sup>

Later Murphy in 1956 added fourth type of pterional sutural bone known as epipteric bone.<sup>2</sup>

Pterion is important in surgical approach known as pterional approach in neurosurgery<sup>13</sup>, with pterional approach anterior and middle cranial fossa can be operated, also repair of aneurysms of middle cerebral artery, tumors such as olfactory meningioma can be approached, pterional access is of importance in operations on Broca's motor speech area, sphenoid ridge and optic canal.<sup>13</sup>

### Materials and Methods

Fifty-six dry human skulls of known sex preserved by Anatomy Department, government medical

college Aurangabad were studied for pterion pattern. Skull with broken pterion and zygomatic arch were excluded from the study. 56 intact skulls were classified morphologically into sphenoparietal, frontotemporal, stellate and epipteric types.

1. *Sphenoparietal type*: Greater wing of sphenoid articulates with the parietal bone.

2. *Frontotemporal type*: Squamous part of temporal bone articulates with the frontal bone.

3. *Stellate type*: All above said four bones articulate at a single point.

4. *Epipteric type*: Sutural bone is present at the site of pterion.

Types of pterion are shown in figures 1 to 4.

Sphenoparietal and frontotemporal types form H shaped sutural pattern.

Location of pterion studied from midpoint of zygomatic arch to midpoint of pterion. On both sides and mean is calculated for distance from frontozygomatic suture also. Distance is measured from posteriormost point of frontozygomatic suture to midpoint of pterion, which is least possible distance.

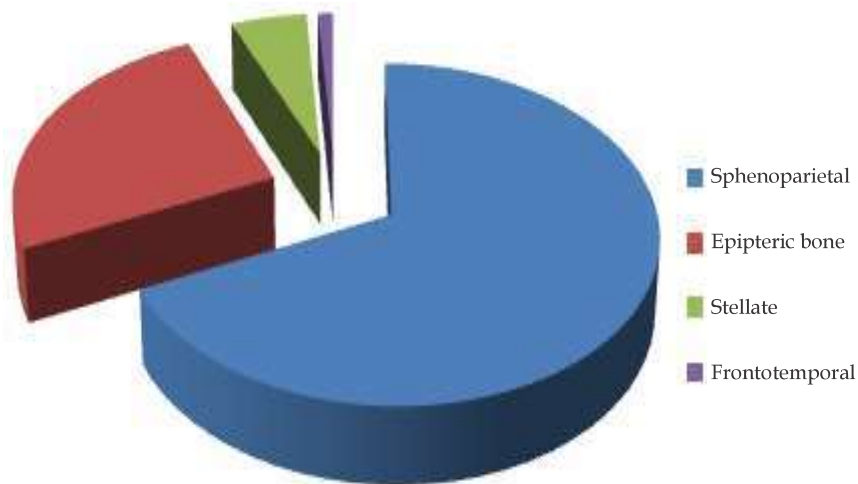
## Results

Percentage of pattern of pterion in present study is as shown in Graph 1.

Sphenoparietal 69.64%, Epipteric bone 23.21%, Stellate 4.46% and Frontotemporal 2.68%.

Mean distance of pterion from zygomatic arch

- In females - 3.8 cm
- In males - 3.87 cm



**Graph 1:** Pie chart showing percentage of pattern of pterion in present study.



**Fig. 1:** Stellate type of pterion.



**Fig. 2:** Sphenoparietal type of pterion.

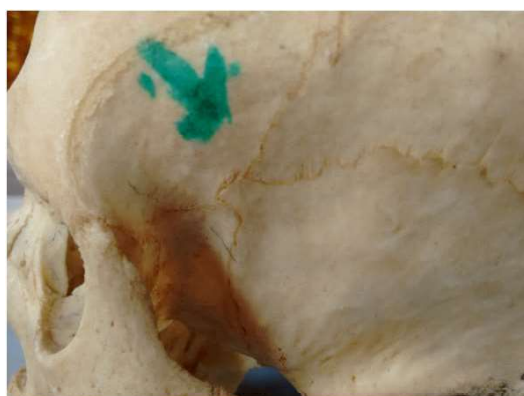


Fig. 3: Frontotemporal type pterion.



Fig. 4: Epipteric type pterion.

Mean distance of pterion from frontozygomatic suture

- In females - 2.91cm.
- In males - 2.92cm.

### Discussion

In present study, 56 skull having 112 sides 78 were sphenoparietal, 26 epipteric type, 5 stellate type and 3 of frontotemporal type.

Frontotemporal is predominant in Non-human mammals.<sup>4,5</sup> Location study in different population vary and helps to locate pterion in different populations

In present study and in previous studies<sup>6,7,8,9,10</sup> sphenoparietal is predominant suture pattern.

In Present study Sphenoparietal type is found in 69.64 % while in study by Oguz et al.<sup>6</sup> it was 88%, by Mwachaka et al.<sup>7</sup> it was 66.7% , by Adejuwon et al.<sup>8</sup> on Nigerian population it was 86%, by Gupta et al it was 60.95%. Present study is comparable to

Table 1: Comparison of present study pterion pattern with previous studies.

Studies	Spheno-parietal	Fronto-temporal	Stellate	Epipteric
Oguz et al. (2004) <sup>6</sup>	88	0	2	10
Mwachaka et al. (2009)(Kenyan) <sup>7</sup>	66.7	15.5	11.1	6.7
Adejuwon et al. (2013) (Nigerian) <sup>8</sup>	86	8.5	5.6	0
Sowmya S et al. (2017) <sup>9</sup>	77	17	0	6
Gupta et al. (2014) <sup>10</sup>	60.95	6.5	8.7	23.85
Present study (2020)	69.64	2.68	4.46	23.21

Study by Gupta et al. (2014)<sup>10</sup> in which incidence of epipteric was 23.85% and in present study it is 23.21%

Pterional approach is the most popular approach used in neurosurgery.<sup>11</sup> In present study location of pterion studied from midpoint of zygomatic arch to midpoint of pterion. On both sides and mean is also calculated for distance from posterior most point on frontozygomatic suture.

According to study done by Reis BL, et al.<sup>12</sup> sphenopteron point is located on average 21.72 mm posterior and 4.76 mm superior from frontozygomatic suture, over the sphenoidal

bone component of the pterion region. They studied 100 adult dry human skull using laser transillumination.

Epipteric bone can be misinterpreted as fracture radiologically. After sphenoparietal type epipteric bone is common in Indian population.

Location study in different population vary and helps to locate pterion in different populations.

### Conclusion

Study data may be useful for radiologists and

neurosurgeons and anthropologists. Variation may present in sutural pattern and location in right and left sides in same subjects. Pterion study is also helpful in pterional approach neurosurgeries as anterior division of middle meningeal artery is related internally to pterion to cause epidural haematoma. Racial differences seen in sutural pattern and distances from zygoma and frontozygomatic suture.

## References

1. Standring S, Ellis H, Healy J.C, et al. Gray's Anatomy: The Anatomical Basis of Clinical Practice. 39<sup>th</sup> edition. London, Elsevier Churchill Livingstone 2005.pp.441-84.
2. Murphy T. The pterion in the Australian aborigine. *Am. J. Phys. Anthropol* 1956;14(2):225-44.
3. Broca P. Instructions craniologiques et craniometriques. *Mem. Soc Anthropol. Paris* 1875;2:1-203.
4. Ashley-Montagu, FM. The tarsian hypothesis and descent of man. *J.R. Anthropol. Inst. Great Britain Ireland* 1930;60:335-62.
5. Saxena SK, Jain SP, Chowdhary DS. A comparative study of pterion formation and its variations in the skull of Nigerian and Indians. *Anthropol Anz* 1988;46:75-82.
6. Oguz O, Sanli SG, Bozkir MG, et al. The pterion in Turkish male skulls. *Surg. Radiol. Anat* 2004;26:220-24.
7. Mwachaka PM, Hassanali J, Odula P. Sutural morphology of pterion and asterion among adult Kenyans. *Braz J Morphol Sci* 2009;26:4-7.
8. Adejuwon SA, Olopade FE, Bolaji M. Study of the location and morphology of the pterion in adult nigerian skulls. *ISRN Anat* 2013;2013:403937.
9. Sowmya S, Meenakshi B, Ranganath P. Study of pterion: Its clinical and morphological aspects. *Indian Journal of Clinical Anatomy and Physiology* 2017;4(2):247-49.
10. Gupta R, Sinha MB, Aggarwal A, et al. Landmarks for keyhole neurosurgical procedures through pterion. *Int. J. of Healthcare and biomedical research* 2014;2(4):168-75.
11. Yasargil MG, Fox JL, Ray MW. The operative approach to aneurysms of the anterior communicating artery. *Advances & Technical standards in neurosurgery* 1975;2:113-70.
12. Baltazar Leao Reis, Sebastiao Nataniel Silva Gusmao B Sphenopterional Point: Strategic Point for Burr Hole Placement in Frontotemporal craniotomies. *World Neurosurgery* 2017 Sep;105:399-405.
13. Vasudha TK, D'Sa DS, Gowd S. Study Of Morphology Of Pterion And Its Clinical Implications. *Int J Anat Res* 2017;5(4.3):4674-4678.