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Original Research Article

Morphological Study on Types of Asterion

Pavan P. Havaldar [1], Shruthi B.N [2], Shaik Hussain Saheb *[3], Henjarappa K S [4].

[1] Associate Professor, Department of Anatomy, Gadag Institute of Medical Sciences, Gadag, India.

[2] Associate Professor, Department of Anatomy , Raja Rajeswari Medical College & Hospital, Bengaluru, Karnataka, India.

[*3] Assistant Professor, Department of Anatomy, JJM Medical College, Davangere, Karnataka, India.

[4] Assistant Professor, Department of Anesthesia, Kidwai Memorial Institute of Oncology, Bangalore, Karnataka, India.

ABSTRACT

Background: The asterion is the junction of the parietal, temporal and occipital bones. The asterion is a surgical landmark to the transverse sinus location which is of great importance in the surgical approaches to the posterior cranial fossa. The sutural morphology was classified into two types, Type I where a sutural bone was present and type II was where sutural bone was absent. The study of asterion may be helpful to ENT and Neurosurgeons.

Materials and Methods: A total of 500 asterion were examined from 250 adult dry skulls. The present study was undertaken in adult south Indian skulls from different regions of south India, from different medical colleges. We have observed different types of asterion like Type I where a sutural bone was present and type II was where sutural bone was absent.

Results: The sutural morphology of the asterion is important in surgical approaches to the cranial fossae. 250 human skulls of known gender (148 male, 102 female) were examined on both sides. Two types of asterion were observed – Type I was 18% in males, 20% in females and in total, Type II was 82% in males, 80% in females and 81% in total.

Conclusion: Sutural morphology of the asterion in the Indian population does not differ much from that of other populations. These findings useful in surgical approaches and interventions via the asterion.

KEY WORDS: Asterion, Skull, Ocipital, Parital, Temporal.

Address for correspondence: Shaik Hussain Saheb, Assistant Professor, Department of Anatomy, JJM Medical College, Davangere, India. Mobile no.: +919242056660
E-Mail: anatomyshs@gmail.com

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INTRODUCTION

Asterion is the junction of the parietal, temporal and occipital bones [1]. During surgical approaches asterion should be given consideration to the superficial anatomic reference points of the posterior cranial fossa that allow the topographic location of the intracranial structures to avoid causing injury or accessing them. The posterior cranial fossa is framed by important venous structures such as the superior, occipital and lateral petrous sinuses and its confluence. The lateral venous sinus is large and originates in the confluence of the sinuses. The right lateral venous sinus tends to be the continuation of the superior sagittal sinus and the left the continuation of the straight sinus.

Each lateral venous sinus has an inferolateral pathway in the lateral sulcus of the occipital portion that has a small curve with its convexity where the lateral margin of the tentorium is inserted until reaching the base of the petrous pyramid or petromastoideo channel. This channel is in relationship with the mastoid portion where it curves inferiorly and forms an "S", for which reason it is called the sigmoid sinus. It continues towards the jugular foramen where it extends with the bulb of the internal jugular vein [2]. The anatomic points of reference to analyse the topography of the posterolateral surface of the skull are asterion, external occipital protuberance, suprameatal crest, apex of the mastoid process, root of the zygomatic arch, Frankfurt horizontal plane, and the mastoid foramen. These reference points are of great importance in surgical procedures to locate the site where the initial trepanning will be carried out. The surgical importance of the posterior cranial fossa lies in its dense collection of neurovascular structures housed in a small, rigid space, which makes the invasive approach very delicate and prone to accidents or medical errors in surgery [3,4,5].

Formation of sutural bone can be explained Embryologically, According to Gray's Anatomy [6], sutural bone develops due to appearance of additional ossification centers which may occur in or near sutures. According to Hess[7], Finkel[8] these bones may be result of pathological influences such as hydrocephalus. According to the study of Opperman et al[9], there is a close association between developing duramater and calvarial bones. Transplants of sutures in which fetal duramater is left intact, results in continuous fibrous suture between developing vault bones, but in transplants if the fetal dura is removed, bony fusion occurs. This interaction of underlying duramater with the developing calvarial bones has been demonstrated experimentally in rabbit showing that the dura not only promotes the position and maintenance of sutures, but also duramater can re-pattern both the appearance and position of the bones and sutures of the cranial vault after removal of calvaria in the neonate. According to Murphy[10], Pal & Routal[11] that sutural bones develop from normal processes and are genetically determined. Although the control of the pattern of articulation of bones forming the pterion and asterion is not known, genetic factors may play some role. The MSX2 gene, which encodes a home domain transcription factor, plays a crucial role in craniofacial morphogenesis by influencing fusion of sutures[12]. The study of asterion morphology may be helpful to neuro and ENT surgeons.

MATERIALS AND METHODS

A total of 500 asterion were examined from 250 adult dry skulls. The present study was undertaken in adult south Indian skulls from different regions of south India, from different medical colleges. We have observed different types of asterion like Type I where a sutural bone was present and type II was where sutural bone was absent.

RESULTS

The sutural morphology of the asterion is important in surgical approaches to the cranial fossae. 250 human skulls of known gender (148 male, 102 female) were examined on both sides. Two types of asterion were observed – Type I was 18.25% in males, 20.59% in females and 19.2% in total, Type II was 81.75% in males, 79.41% in females and 80.8% in total(Table 1).

Table 1. Types of Asterion in Male and Female.

	Types of Asterion	
	Type -I	**Type -II**
Male (n=148)	18.25% (27)	81.75% (121)
Female (n=102)	20.59% (21)	79.41% (81)
Total	19.2% (48)	80.8% (41)

DISCUSSION AND CONCLUSION

In present study two types of asterion were observed – Type I was 18.25% in males, 20.59% in females and 19.2% in total, Type II was 81.75% in males, 79.41% in females and 80.8% in total. Our results are in agreement with previous studies, Berry study in 50 North American skulls it was found type I 12% and type II 88%, in 53 south American skulls found that 7.5% as type I and 92.5% as type II, in 250 skulls of Egyptian found type I as 14.4% and 85.6% as Type II, In

51 Indian skulls belongs to Burma region found that type I as 14.7% and type II as 85.3%, in another study by same investigator in Punjab region of Indiain 53 skulls the result was 16.9% as type I and 83.1% as type II[13]. In study of Gumusburun[14] in 302 Turks, type I was 9.92% and type Ii was 90.8%. In study of Mwachaka[15] in 79 Kenyans the result was 20% as type I and 80% as type II. In study of Hussain Saheb et al[16], it was found that 23.15% as type I and 76.85% as type II in 125 skulls. The study of Rajini Singh[17] in 55 Indian skulls was 14.81% as type I and 85.19% as type II. The present study results may be helpful in surgery to the cranium through this craniometrical point and also when interpreting radiological images of fractured skulls. Further, it can also be useful for identification of human male and female skulls in association with other parameters. This results may also helpful to Anthropologists and forensic experts in their practice.

REFERENCES

[1]. Williams L, Bannister L, Berry, M, Collins P, Dyson, M. & Dussek E. Gray's Anatomy. 38th Ed. Churchill Livingstone, London, 1998.

[2]. Martínez F, Laxague A, Vida L, Prinzo H, Sgarbi N, Soria VR, et al. Anatomía topográfica del asterion. Neurocirugía 2005;16:441-446.

[3]. Bozbuga M, Boran BO, Sahinoglu K. Surface anatomy of the posterolateral cranium regarding the localization of the initial burrhole for a retrosigmoid approach. Neurosurg Rev 2006;29:61-63.

[4]. Mwachaka PM, Hassanali J, Odula PO. Anatomic position of the asterion in Kenyans for posterolateral surgical approaches to cranial cavity. Clin Anat 2010;23:30-33.

[5]. Tubbs RS, Elton S, Grabb P, Dockery SE, Bartolucci A, Oakes WJ. Analysis of the posterior fossa in children with the Chiari 0 malformation. Neurosurgery 2001;48:1050-1055.

[6]. Standring, S. Sutural bones in bones of skull. In: Gray's anatomy. 39th Ed. Elsevier Churchill Livingstone, New York, 2005. pp.486.

[7]. Hess, L. Ossicula wormiana. Hum. Biol.,1946;18:61-80.

[8]. Finkel D. I. Wormian bones: a study of environmental stress. Am. J. Phys. Anthropol., 1971;35:278.

[9]. Opperman L. A, Sweeney T. M, Redmon J, Persing, J. A. & Ogle R. C. Tissue interactions with underlying dura mater inhibit osseous obliteration of developing cranial sutures. Dev.Dyn., 1993;198(4):312-22.

[10]. Murphy T. The pterion in the Australian aborigine. Am. J. Phys. Anthropol., 14(2):225-44, 1956.

[11]. Pal G. P. & Routal R. V. A study of sutural bones in different morphological forms of skulls. Anthropol. Anz., 1986;44(2):169-73.

[12]. Liu Y, Tang Z, Kundu, et al. Msx2 gene dosage influences the number of proliferative oesteogenic cells in growth centres of the developing murine skull: a possible mechanism for MSX2-mediated craniosynostosis in humans. Dev Bio 1999;205:260-274.

[13]. Berry A. C. & Berry R. J. Epigenetic variation in the human cranium. J. Anat.,1967;101:361- 79.

[14]. Gumusburun, E.; Sevim, A.; Katkici, U.; Adigüzel, E. & Gülec, E. A study of sutural bones in Anatolian-Ottoman skulls. Int. J. Anthropol., 1997;12(2):43-8.

[15]. Mwachaka P. M, Hassanali J. & Odula P. O. Anatomic position of the asterion in Kenyans for posterolateral surgical approaches to cranial cavity. Clin. Anat., 2010;23(1):30-3.

[16]. Hussain Saheb S, Mavishettar, Thomas ST, Prasanna, Muralidhar P, Magi. A study of sutural morphology of the pterion and asterion among human adult Indian skulls: Biomedical research: 2011;22(1):73-75.

[17]. Rajani Singh. Incidence of sutural bones at asterion in adults indian skulls. Int. J. Morphol., 2012;30(3):1182-1186.

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