MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2014.12.182.184

OPEN ACCESS

Key Words
Metopic sutures, cranium, trigonocephaly, craniosynostoses

Corresponding Author
Dr. Mohd Abdul Umran Khan, Department of Pediatrics, Dr VRK Women's Medical College Aziznagar, Moinabad, Telangana, India

Author Designation
Assistant Professor

Received: 20 August 2014
Accepted: 29 November 2014
Published: 27 December 2014

Citation: Dr. Mohd Abdul Umran Khan, 2024. Study on Metopic Suture and its Clinical Importance in Pediatrics. Res. J. Med. Sci., 18: 182-184, doi: 10.36478/makrjms. 2014.12.182.184

Study on Metopic Suture and its Clinical Importance in Pediatrics

Mohd Abdul Umran Khan
Department of Pediatrics, Dr VRK Women's Medical College Aziznagar, Moinabad, Telangana, India

ABSTRACT
The metopic suture is one of the main sutures of the calvaria and its premature closure is responsible for trigonocephaly, one of the most common of all craniosynostoses. The natural history of the metopic suture is different from that of other sutures, since it fuses and totally disappears early in life. Total disappearance of the metopic suture in early childhood is a peculiarity it shares with other calvarial sutures, as well as facial sutures. The systematic presence of the metopic suture at birth then early disappearance suggest its usefulness for cranial molding during delivery., this is corroborated by the high incidence of delivery complications, up to 30%, related to metopic suture. The unusually late closure of the metopic suture in our species has been attributed to bipedalism and the delivery risk associated with a closed pelvis. The present study conducted with 52 adult dry skull. We identified36 skulls as male and sides 16 skulls as female. We have observed for metopic suture in all the skulls carefully. The incidence of metopic suture was recorded. Out of 52 skulls, 2 (3.84%) skulls were found with complete me topic suture which is completely extended from bregma to nation (Fig. 1). In 3(5.76) skulls we found incomplete metopic suture. The present study findings may be helpful to pediatrics and fetal surgeons.

INTRODUCTION

The term trigonocephaly is derived from the Greek words "trigonon", which means triangle and "kephale, which means head. This type of craniosynostoses is thus characterized by a triangular, or wedge-shaped forehead, resulting from a premature fusion and subsequent ossification of the metopic suture . The term trigonocephaly was first proposed by Welcker in 1862, who used it to describe a child presenting with a wedge-shaped skull combined with a cleft lip[1,2]. The metopic suture separates the two frontal bones at birth and is the first skull suture to close physiologically, starting as early as at 3 months and generally being completely fused at the age of 8 months[1,3,4]. A premature fusion however, results not only in an obvious ridge over the midline of the forehead due to ossification of the suture, but also in a lateral growth restriction of the frontal bones. According to the theory of Virchow, this wedge shape is even further enhanced by the increased compensatory growth of the remaining skull sutures while the skull keeps expanding[1,5]. The severity of metopic synostosis can vary considerably. The premordia of trigonocephaly can be seen in children with a metopic ridge due to an increased deposition of bone along the metopic suture. The etiology of this finding is unknown and usually there are no other clinical or radiological features. The supra-orbital retrusion, which is so typical in trigonocephaly, ranges from mild to severe and can be classified using the following methods[1]. The frontal bone is a curved plate of pneumatic flat bone. The two halves of the developing frontal bone remain separate as the metopic suture, which is disappears during infancy or nearly childhood. Remnants of the metopic suture may persist in some skulls at the glabella or a complete suture extending from the Nasion to the Bregma. Metopim which is defined as a condition in which the two pieces of the frontal bone fail to merge in early childhood. Growth at metopic suture increases the breadth of the skull. The metopic suture fuses at around 18 months after birth, by which time most of the increase in breadth of the forehead is complete. Premature fusion result in the formation of a narrow, elongated skull1. Incomplete metopim is present in different shape linear shape, U shaped and V shaped of which linear shape is most common. This is important for radiologist, neurosurgeon and forensic medicine, because the fracture of frontal bone is most common in metopic suture[6,7]. The present study was conducted to find out metopic suture in adult dry skulls and analyze metopic suture importance in pediatric practice.

MATERIALS AND METHODS

The present study conducted with 52 adult dry skull, from department of anatomy, forensic medicine and Dr VRK Women's Medical College Aziznagar Moinabad. We identified36 skulls as male and sides 16 skulls as female. We have observed for metopic suture in all the skulls carefully. The damaged skulls were excluded, the skulls which were present with clear suture only noted for the study. The incidence of metopic suture was recorded.

RESULTS AND DISCUSSIONS

Out of 52 skulls, 2 (3.84%) skulls were foundwith completemetopicsuturewhichiscompletelyextendedf rombregmatonasion(Fig. 1). In 3(5.76) skulls we found incomplete metopic suture.

Fig. 1: Skulls Showing with Complete Metopic Suture

The persistence of the metopic suture has been reported in frequencies ranging from 1-12% of skulls. Keith[8] mentions that the metopic suture disappears at the end of the first year, or in the beginning of the second year of life, Piersol[9] claims that it may close by the end of the fourth year, with a faint trace persisting at the lower end. According to Romanes[10], the metopic suture is present at birth but is normally closed by the fifth or sixth year, only traces of it being left above and below. Warwick and Williams[11] state that the two halves of the frontal bone begin to unite in the second year and the suture is usually obliterated by the eighth year. Hamilton[12] has states that the metopic suture disappears by the seventh year. Basmajian[13] claims that the two halves of the frontal bone fuse about the second year but in some skulls they remain separate, that is the inter frontal or metopic suture persists. Wood Jones[14] is of the opinion that when the metopic suture persists it has very definitecharacteristics[15]. In present study we found out of 52 skulls, 2 (3.84%) skulls were found with completemetopicsuturewhichiscompletelyextendedf rombregmatonasion (Fig. 1). In 3(5.76) skulls we found incomplete metopic suture. The Turkish study, conducted on the Anatolian population chronologically from the Neolithic to the 20th century, observed a higher incidence of metopim (between 3.33% and 14.3%), with the highest frequencies in the Hellenistic -Roman (14.3%) and 20th-century (11.6%) populations[16]. The study on Italian-territory

populations from the Roman and modern period also showed a higher frequency for the older (11.8%) than for the modern time period (5.8%-9.6%)[17]. In study of Anjoo Yadav[18] metopic suture was found to be present in the midline, in altogether 184 skulls (18.04%)., out of which complete persistent Metopic suture was reported in 36 skulls (3.5%) and partially obliterated suture in 148 skulls (14.6%)- it was present in the lower part of Frontal bone in 142 skulls (14%), in the upper part in 4 skulls (0.38%) and in the middle part in 2 skulls (0.19%). The upper end of Metopic suture was observed to meet the median sagittal suture, end-to-end, at Bregma in 6 skulls (15%) while in the rest of 34 skulls (85%), the upper end of Metopic suture failed to meet the anterior end of median sagittal suture and the deflection ranged between 12mm-2mm. Mean suture length was computed to be 128mm. Data from comparative anatomy and paleoanthropology suggest that postnatal metopic suture persistence in humans results from the risk of dystocia caused by the closed pelvis associated with bipedalism. The increasing incidence of trigonocephaly appears to parallel the fall in prevalence of metopism. The increasing use of cesarean section may have eliminated a potent selection factor in favor of postnatal persistence of the metopic suture.

CONCLUSION

The metopic suture, unlike other calvatia sutures, is programmed to close early in infancy. Its pattern of closure is a continuous rather than binary variable, there appears to exist a continuum between delayed closure of the metopic suture and its definitive persistence known as metopism. It is thus logical to associate the rising prevalence of metopic suture synostosis and the decreasing prevalence of metopism. The present study results may be helpful in practice of pediatrics and surgery.

REFERENCES

1. Meulen, J.V., 2012. Metopic synostosis. Child's Nervous Syst., 28: 1359-1367.
2. Welcker, H., 1862. Untersugungen uber wachstum und bau des menschlichen Schädels. Leipzig: Engelmann., Vol.
3. Vu, H.L., J. Panchal, E.E. Parker, N.S. Levine and P. Francel, 2001. The Timing of Physiologic Closure of the Metopic Suture: A Review of 159 Patients Using Reconstructed 3D CT Scans of the Craniofacial Region. J. Craniofacial Surg., 12: 527-532.
4. Weinzweig, J., R.E. Kirschner, A. Farley, P. Reiss, J. Hunter, L.A. Whitaker and S.P. Bartlett., 2003. Metopic synostosis: defining the temporal sequence of normal suture fusion and differentiating it from synostosis on the basis of computed tomography images. Plast. Reconstr. Surg., 112: 1211-1218.
5. Virchow, R., 1851. Über den Cretinismus, namentlich in Franken, und über pathologische Schädelformen. Verh Phys Med Gesell., 2: 230-270.
6. Eroglu, S., 2008. The frequency of metopism in Anatolian populations dated from the Neolithic to the first quarter of the 20th century. Clin. Anat., 21: 471-478.
7. Castilho, S.M.A.,Y.J. Oda. and G.D.M. Santana., 2006. Metopism in adults skulls from southern Brazil. Int. J .Morphol., 24: 61-66.
8. Keith, A., 1984. Human Embryology and Morphology. 6th ed. Edn., Edward Arnold, London.
9. Piersol, G.A., 1916. Human Anatomy. 5th ed Edn., Lippincott, Philadelphia.
10. Romanes, G.J., 1972. Cunningham's Textbook of Anatomy. 11th ed. Edn., Oxford University Press,, London, Pages: 133.
11. Partrica, Collins., 1995. Gray's Anatomy. 38th ed Edn., Churchil Livingstone, London, Pages: 354.
12. Hamilton, W.J., 1976. Textbook of Human Anatomy. 2nd ed Edn., Macmillan and Co, London, Pages: 60 .
13. Basmajian, J.V., 1975. Grant's Method of Anatomy. Chand, S. and L.T.D. Co., (Eds.)., New Delhi, 0 pp: 451-604.
14. Wood, F., 1953. Buchanan's Mcnual of Anatomy, Pailliere. 8th ed, Edn., Tindall, . London,.
15. Hussain Saheb, S., G.F. Mavishetter, S.T. Thomas and L.C. Prasanna., 2010. Incidence of metopic suture in adult South Indian skulls. J Biomed Sci and Res. 2: 223-226.
16. Ardito, G., 1977. The epigenetic variants of the skulls in some ancient and recent Italian populations. J. Hum. Evol., 6: 689-695.
17. Yadav, A., V. Kumar and R.K. Srivastava, 2010. Study of Metopic Suture in the Adult Human Skulls of North India. J. Anatomical Soc. India, 59: 232-236.