MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2014.178.181

Morphometric Study of Bregma and Clinical Importance of Anterior Fontanelle in Pediatrics

Dr. Mohd Abdul Umran Khan

Department of Pediatrics, Dr VRK Women's Medical College Aziznagar, Moinabad, Telangana, India

OPEN ACCESS

Key Words
Bregma, anterior fontanelle, posttrial fontanelle, skull bones

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 September 2014
Accepted: 25 November 2014
Published: 20 December 2014

Citation: Dr. Mohd Abdul Umran Khan, 2014. Morphometric Study of Bregma and Clinical Importance of Anterior Fontanelle in Pediatrics. Res. J. Med. Sci., 8: 178-181, doi: 10.36478/makrjms.2014.178.181

ABSTRACT
The bregma is a bony landmark on the skull that develops during embryology as the anterior fontanelle in a foetus or neonate. The bregma is the point where the frontal bone and the two parietal bones meet, at the intersection of the coronal and sagittal sutures. During infancy, the bregma is membranous and is known as the anterior fontanelle. The anterior fontanelle closes between four and 26 months after birth, typically around 18 months. The bregma is a craniometric point used for anthropological or radiological skull measurements. It's also a landmark in stereotaxic work. The present study conducted to find out the morphometric analysis of bregma. The present study conducted with 52 adult dry skull. We identified36 skulls as male and sides 16 skulls as female. We have observed bregma of all the skulls carefully to find out the sutura bones and taken measurement between bregma and lambda and noted. The measurements were carried out by Vernier callipers scale. The results were recorded, analyzed and expressed in Mean±SD. We measured the length between bregma and lambda, the mean bregma-lambda length was found to be 114.06±10.62mm, in case of males it was found 118.74±7.94mm and in case of females it was 109.12±9.44mm. The range was found in total 101-128mm, in case of males the range was 103-130mm and in case of female it was 100-121mm. In a single skull we found sutural bone at bregma. Bregma is the spot where three cranial plates, the frontal bone and the two parietal bones meet. Bregma is the intersection of the two sutures, the coronal suture and the sagittal suture. The present study findings may be helpful to pediatricians and neurologists.

INTRODUCTION

Fontanelles are a regular feature of infant development in which two segments of bone remain separated, leaving an area of fibrous membrane or a soft spot that acts to accommodate growth of the brain without compression by the skull. Of the six fontanelles in the human skull, the anterior fontanelle, located between the frontal and parietal bones, serves as an important anatomical diagnostic tool in the assessment of impairments of the skull and brain and allows access to the brain and ventricles in the infant. The anterior or frontal fontanelle is the diamond-shaped soft membranous gap at the junction of the coronal and sagittal sutures. It persists until approximately 18-24 months after birth, after which it is known as the bregma. The precise timing of the anterior fontanelle closure is quite variable and the research literature shows cases of closure from 6 months that may represent a normal variation in healthy babies although early or late closure of a fontanelle is associated with various pathologies. The fontanelle normally measures between 0.6-3.6 cm. The size of the anterior fontanelle tends to vary predictably with age, peaking around 2 months. It is the largest of the fontanelles and is the main sonographic window for performing cranial ultrasound[1,2]. Wormian bones occur as small, accessory bones within the cranial sutures and fontanelles. The skull itself is composed of several flat bones that fuse together after birth. These sites of fusion are the bony sutures in which wormians most commonly occur. Historically, the term "wormian" was coined by Thomas Bartholin in honor of the Dutch anatomist Olaus Wormius. Etiologically, they are believed to arise from abnormal ossification centers within the cranium, which are thought to form in addition to those that are normally present during cranial development, giving rise to supernumerary bones within the skull. Wormian bones can be considered an abnormal anatomical variant, although they occur more frequently in certain bone dysplasia conditions including ontogenesis imperfect, rickets, cleidocranial dysostosis and pycnodysostosis. Clinically, some pathological and diagnostic value has been attributed to wormian bones. One recent study suggested that their presence within the paediatric population could clarify the origins of unexplained bone fractures, helping to distinguish between conditions associated with warman bones such as ontogenesis im perfect and other causes such as physical abuse. Their presence could also help in diagnosing more hidden disorders that would otherwise go unnoticed[3-5]. The sent study was conducted to find the sutural bone at bregma and morphometric analysis of bregma.

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 identified36skulls as male and sides 16skulls as female. We have observed bregma of all the skulls carefully to find out the sutural bones and taken measurement between bregma and lambda and noted. The damaged skulls were excluded, the skulls which were present with clear suture only selected for the study. The measurements were carried out by Vernier callipers scale. The results were recorded, analyzed and expressed in Mean±SD.

RESULTS AND DISCUSSIONS

We measured the length between bregma and lambda, the mean bregma-lambda length was found to be 114.06±10.62 mm, in case of males it was found 118.74±7.94mm and in case of females it was 109.12±9.44mm. The range was found in total 101-128mm, in case of males the range was 103-130mm and in case of female it was 100-121mm. In a single skull we found sutural bone at bregma (Fig. 1).

Fig. 1: Sutural Bone at Bregma

Anterior fontanelle is the largest, prominent and most important fontanelle, which is used for clinical evaluation. It is mainly characterized by its size and shape variation and is possibly influenced by gender, race and genetics. Understanding the variation of anterior fontanelle is used for recognition of different medical disorders and abnormal skeletal morphogenesis[6]. According to Duc G and Largo[7] study size and closure of the anterior fontanel from birth to 24 months of age and their relationships to growth parameters, bone age and gestational age are reported in 111 term and 128 preterm infants. Great variability of both fontanel size and age when fontanel closed was observed. There were no significant differences in size and age at closure of the anterior fontanel between term and preterm infants or

between the sexes. At ages beyond term, fontanel size was negatively correlated with weight and length., however, only a few correlations reached statistical significance. No significant relationships were noted between anterior fontanel size and head circumference or bone age. Age at closure of the anterior fontanel was also not significantly related to any of the growth parameters or bone age. The traditional definition of wormian bones is small bones that are often found within the sutures and fontanelles of the skull. Some instances are often considered to be a simple anatomical variant. Previous studies concluded that around 8%-15% of the population has at least one wormian bone. In patients with significant pathologies, there are least ten wormian bones larger than around 6 mm×4 mm arranged in a mosaic-type pattern. The skull itself is composed of several flat bones that fuse together after birth. These sites of fusion are the bony sutures in which wormian bones most commonly occur. Wormian bones are more commonly seen in patients with several types of bone dysplasia. In present study we found the length between bregma and lambda, the mean bregma -lambda length was found to be 114.06±10.62mm, in case of males it was found 118.74±7.94mm and in case of females it was 109.12±9.44mm. The range was found in total 101-128mm, in case of males the range was 103-130mm and in case of female it was 100-121mm. In a single skull we found sutural bone at bregma. The study by Keen[8] with 50 skulls, they reported Bregma-lambda length was 126.5 mm with a range of 112-136 having standard deviation of 6.7mm. B M Margretts[9] conducted study with 70 skulls found the mean of 128.39 mm with a range of 114-144 mm having standard deviation 6.76mm. The study of Hong wei Song[10] with sample size 30 found mean to be 124.4mm having standard deviation of 9.8 mm. Deshmukh[11] study with 40 skulls, reported the distance between begma and lambda was 125+7.96mm, with 108-135mm. In present study we found in a skull sutural bone at bregma. Studies have shown that the presence of sutural bones may be associated with other cranial and central nervous system abnormalities[12-14]. There are no previous studies about the presence of a sutural bone at the bregma but there are some case reports[15,16]. The presence of the sutural bone at the bregma may be because of appearance of an abnormal ossification centre in the fibrous membrane at the anterior median fontanelle of foetal life.

CONCLUSION

The bregma, also known as the anterior fontanelle in newborns, is examined during a baby's check-up. A soft, flat fontanelle that's >3.5cm across is normal. A sunken fontanelle may indicate dehydration, while a bulging or tense fontanelle may indicate raised intra cranial pressure. The distance between the bregma and the basion, or the midpoint of the foramen magnum, is called cranial height. This measurement is linked to general growth and can be used to assess the health of a deceased person. Cleidocranial dysostosis, in this birth defect, the anterior fontanelle doesn't close to form the bregma. The knowledge of sutural bones helpful for the surgeons to arrive at an early diagnosis and timely management of disorders associated with it. The knowledge of sutural bones in the skull is also helpful to pediatricians and radiologists.

REFERENCES

1. Kiesler, J. and R. Ricer., 2003. The abnormal fontanel. American family physician., 67: 2547-2552.
2. Popich, G.A. and D.W. Smith, 1972. Fontanels: Range of normal size. The J. Pediatr.s, 80: 749-752.
3. Bellary, S.S., A. Steinberg, N. Mirzayan, M. Shirak, R.S. Tubbs, A.A. Cohen-Gadol and M. Loukas, 2013. Wormian bones: A review. Clin. Anat., 26: 922-927.
4. Sanchez-Lara, P.A., J.M. Graham, A.V. Hing, J. Lee and M. Cunningham, 2007. The morphogenesis of wormian bones: A study of craniosynostosis and purposeful cranial deformation. Am. J. Med. Genet. Part A, Vol. 143 .10.1002/ajmg.a.32073.
5. Marti, B., D. Sirinelli, L. Maurin and E. Carpentier, 2013. Wormian bones in a general paediatric population. Diagn. Interventional Imaging, 94: 428-432.
6. Bustamante, J.L., L.A. Miquelini, M. D'Agustini and A.M. Fontana., 2010. Anatomía aplicada de las fontanelas [Applied anatomy of the fontanelles]. Neurocirugia (Astur)., 21: 253-259.
7. Duc, G. and R.H. Largo., 1986. Anterior fontanel: size and closure in term and preterm infants. Paediatrics., 78: 904-908.
8. Keen, J.A., 1950. A study of the differences between male and female skulls. Am. J. Phys. Anthropology, 8: 65-79.
9. Margretts, B.M. and L. Freedman., 1977. ;Morphometrics of western Australian aboriginal skulls. Rec West Aust Mus., 6: 63-105.
10. Song, H.W., L.Z. Qing and J.J. Tao, 1992. Sex diagnosis of Chinese skulls using multiple stepwise discriminant function analysis. Forensic Sci. Int., 54: 135-140.
11. Deshmukh, A.G. and D.B. Devershi., 2006. Comparison of cranial sex determination by univariate and multivariate analysis. Joint Anatomy Society of India., 55: 48-51.

12. Pal, G.P., 1987. . Variations of the interparietal bone in man. J Anat., 152:205-208.
13. Pryles, C.V. and A.J. Khan., 1979. Wormian bones. A marker of CNS abnormality? Am J Dis Child., 133: 380-382.
14. Das, S., R. Suri and V. Kapur., 2005. Anatomical observations of osinca and associated cranial deformities. Folia Morphol., 64: 118-121.
15. Nayak, S.B., 2006. Presence of Wormian bones at bregma and paired frontal bone in an Indian skull. Neuroanatomy., 5: 42-43.
16. Hussain Saheb, S., G.F. Mavishetter, S.T. Thomas and P. Muralidhar., 2010. Unusual sutural bone at Bregma - A case report. Biomedical Research., 21: 369-370.