

A STUDY ON SUTURAL BONE AT BREGMA

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ABSTRACT

Background: The bregma is an anatomical point of the skull located where the coronal suture intersects perpendicularly to the sagittal suture. It is the meeting point of the frontal bone and the parietal bone. Sutural bones of the cranial vault are formations associated with insufficient rate of suture closure, and regarded as epigenetic and hypostatic traits. These bones rest along sutures and / or fill fontanelles of the neonatal skull. Sutural bones at pterion and lambda more come but at bregma it is unusual. There are very few study worked on bregma sutural bone. The present study aim is to find out the incidence of bregma sutural bones.

Materials and Methods: Total 500 skulls were used for this study from different medical institutions of south India.

Results: Out of 500 skulls, only five skulls (1%) were found with bregma sutural bones.

Conclusion: Bergama sutural bones shows the possibility of discrete diversification of the ossification centers, as well as the relative stability of the structural skull matrix in response to discrete changes. Knowledge of this variation is very important for anthropologists, radiologists, orthopedic and neurosurgeons.

KEY WORDS: Sutural bones, Anterior fontanelles, Bregma, Skull.

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INTRODUCTION

Sutural bones of the cranial vault are formations associated with insufficient rate of suture closure and regarded as epigenetic and hypostatic traits. These bones rest along sutures and / or fill fontanelles of the neonatal skull.

Wormian bones /supernumerary ossicles/ sutural bones /cranial discrete are intrinsically innocuous minor skeletal variants of the human skull. Though the term epigenetic was originally applied to discrete traits in order to emphasize their possible modification during ontogeny,

subsequently this term has been used to stress the difference of these features versus those of the so called Mendelian traits, the latter being determined by a direct gene character relationship and completely independent on the environment. These traits received attention also in the study of fossil hominids, as a source of information about growth patterns in extinct taxa. This evidence points to the fact that the formation and distribution of supernumerary ossicles may reflect different stress types, acting on the cranial vault during late prenatal and early postnatal periods of bone growth [1-3]. Among cranial epigenetic traits, sutural bones are irregular in shape and size, and located in the sutures and / or fontanelles. As other discrete traits, their formation and prevalence may be under genetic control even though the inheritance of these bones has not been perfectly assessed so far [4-6].

Wormian or sutural bones are usually small irregular ossicles located within the cranial sutures. They are formed as a result of alterations in the normal formation of the flat bones of the skull and are usually regarded as normal variants. They are not named, because they vary in number and shape from skull to skull. They are studied and reported as ethnic variables, being of interest to human anatomy, physical anthropology, radiology, and forensic medicine [7]. Pathological, mechanical, and genetic factors have been proposed as the primary causal mechanism in the occurrence of Wormian bones. According to some, Wormian bones may be the result of additional ossification centers in the fibrous tissue occurring during late fetal ages or postnatally and which remain separated from the primary centers of ossification of cranial bones. Very high frequencies of Wormian bones in some populations and their absence in others, geographically nearby or subject to similar environmental stresses, suggest a genetic mechanism. In general, males are more frequently affected than females [8]. They are most commonly found in the lambdoid suture. The next most common site is the epipterice bone found near the former anterolateral fontanelle. Very rarely they are seen in other sutures especially the coronal, sagittal, and squamosal sutures. Knowledge of this bregma sutural bone

study is very important for anthropologists, radiologists, orthopedic surgeons, and neurosurgeons.

MATERIALS AND METHODS

Total 500 skulls were used for this study from different medical institutions of south India. All the skulls were observed carefully for bregma sutural bones, if any other variation along with bregma sutural bones were recorded.

RESULTS

Out of 500 skulls, only five skulls (1%) were found with bregma sutural bones. Bregma sutural bone seen very rarely in out of 500 large amount of skulls, we found only five skulls with bregma sutural bones (figure 1).

Fig. 1: Showing the sutural bone at bregma



DISCUSSION

Skull growth is affected by dural attachments and is related to brain development. The developments of WBs occur at an early membranous stage of skull growth and it is difficult to correlate this with brain disorders or relate it specifically to any one type. It was reported that the sutural bones and skull growth are not affected by the mechanical distortion of the skull, which is a traditional practice in certain tribal communities [9]. Parker [10] suggested that, the number of sutural bones increases with the capacity of the skull and a similar relationship exists with the total length of sutures, greater the sutural length, greater the number of sutural bones. Sanchez Lara

et al [11] suggested that sutural bones may arise as a consequence of mechanical factors that spread sutures apart and affect dural strain within sutures and fontanelles. Since sutural bones belong to the neurocranium, they share its embryology. They appear as isolated ectopic islands of intramembranous ossifications. In the foetus, the diploe is not formed yet and thus sutural bones are composed of a single layer of compact bone on the dural side [12].

Although the mechanisms of formation of sutural bones are unknown, some studies have shown that their presence may serve as a marker for the identification of anomalies of the central nervous system [13]. When sutural bones occur as a normal variant, they tend to be smaller and less numerous than when they are associated with skeletal dysplasias [12]. Most of the earlier studies opine that they are not pathognomonic, as they occur in normal individuals, but the presence of more than ten sutural bones is unusual. It may warrant further investigations to identify an underlying pathology or hereditary disorder that has affected the skull growth at an early stage of development [14-18]. Sutural bones are very common in the skull. According to Bergman et al [19], nearly 40% of skulls have sutural bones in the vicinity of the lambdoid suture. The next most common is the epipteric bone found near the former anterolateral fontanelle. The occurrence of preinterparietal bone or Inca bone at the lambda has been reported by previous workers [20,21]. Studies [22-24] have shown that the presence of sutural bones may be associated with other cranial and central nervous system abnormalities. There are no previous studies about the presence of a sutural bone at the bregma but there are some case reports [5,6]. 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. The knowledge about a sutural bone like what we have studied may be of importance to the radiologists, orthopedic surgeons and neurosurgeons. Since bregma is an important clinical and surgical landmark, it is worth coining a term to the sutural bone found here as median frontoparietal sutural bone.

Conflicts of Interests: None

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