

Skulls with Multiple Wormian Bones: Reports of Two Cases

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Abstract

Wormian bones have been described as small irregular ossicles which are present within the cranial sutures and fontanelles. A vast majority of these wormian bones are located in the lambdoid suture (lambda). Two dry adult human skulls were found during medicolegal examination out of which one skull showed persistent metopic suture and a series of sutural bones while the other showed the presence of only wormian bones. The incidence of metopic suture varies in different races and can be due to various causes. The metopic suture is a dentate-type suture extending from the nasion to the bregma. It fuses at around 18 months to 7 years after birth, by which time most of the increase in breadth of the forehead is complete. When the metopic suture persists into adulthood it is known as "metopism". Presence of more than ten sutural bones is unusual. It may warrant further investigations to identify an underlying pathology of hereditary disorder that has affected the skull growth at an early stage of development. The presence of metopic suture simulates the fracture of frontal bone, therefore it should be properly ruled out in x-rays by radiologists and neurosurgeons. The anatomical knowledge of Wormian bones is clinically important as they are markers for diseases and important in the primary diagnosis of brittle bone disease like osteogenesis imperfecta.

Keywords: Lambdoid Suture; Wormian Bones; Metopic Suture.

Introduction

Wormian bones have been described as small irregular ossicles which are present within the cranial sutures and fontanelles. A vast majority of these wormian bones are located in the lambdoid suture (lambda) [1]. Nearly 40% of skulls contain sutural bones in the vicinity of the lambdoid suture [2].

The next most common sutural bone is the epipteric bone found near the anterolateral fontanelle [3].

The human frontal bones begin to ossify in the mesenchyme via two ossification centers at approximately eight weeks gestation [4]. The primary centres are one near each frontal tuber [5]. At birth, the frontal bone is seen to be divisible into two symmetrical halves by a median suture, the frontal suture (metopic suture).

The two halves begin to fuse together at the upper part during the second year and the fusion gradually extends downwards till the two halves are completely united by the eighth year [6].

The metopic suture fuses at around 18 months after birth, by which time most of the increase in breadth of the forehead is complete [5]. When the metopic suture persists into adulthood it is known as "metopism". It is rare to find this suture in adults and its presence is not considered pathological [4].

In the present study, we studied two skulls in which one skull presented with multiple sutural or wormian bones along the lambdoid suture and presence of metopic suture. Another skull showed only wormian bones along the lambdoid suture.

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Received | 11.09.2017, Accepted | 25.09.2017

Case Reports

Case 1: A dry adult human skull was found during medicolegal examination. Anthropologic examination revealed it to be a female skull of about 30 years with persistent metopic suture and a series of sutural bones. It showed a complete persistent metopic suture (Fig. 1) extending from nasion to bregma. The total numbers of Wormian bones present were 21. Out of these, 2 were present along the posterior part of sagittal suture (Fig. 2), 1 along the occipitomastoid suture on the left side (Fig. 3) and the rest 18 were along the lambdoid suture (Fig. 3 and 4). Out of these 18, 8 were present on the left side and 10 on the right side. Apart from this, multiple small wormian bones were found along the coronal suture near the anteroinferior angle of the parietal bone on both sides.



Fig. 1: Black arrow showing persistent metopic suture



Fig. 2: Norma occipitalis showing wormian bones along posterior part of sagittal suture and lambdoid suture



Fig. 3: Left oblique view of skull showing wormian bones along coronal suture, lambdoid suture and occipitomastoid suture



Fig. 4: Right oblique view of skull showing wormian bones along coronal suture and lambdoid suture

Case 2: Another dry adult human skull was found during medicolegal examination. Anthropologic examination revealed it to be a male skull of age between 30-40 years with a series of sutural bones along the lambdoid suture. The total numbers of Wormian bones present were 16. Out of these, 2 were present along the right side (Fig. 5), and the remaining 14 were along the left side (Fig. 5 and 6).



Fig. 5: Norma occipitalis showing wormian bones along posterior part of sagittal suture and lambdoid suture



Fig. 6: Left oblique view of skull showing wormian bones along lambdoid suture

Discussion

Presence of more than ten sutural bones is unusual. It may warrant further investigations to identify an underlying pathology of hereditary disorder that has affected the skull growth at an early stage of development and as they can be easily misunderstood for a fracture of frontal bone or even for sagittal suture in radiological images [2]. Significant sutural bones as against normal developmental variants were considered to be those more than 10 in number, measuring greater than 6 mm and arranged in a general mosaic pattern. They were found in all the cases of osteogenesis imperfecta but not in the normal skulls [3].

Najjar suggested that the incidence is lower in fetuses (11.3%) than in adults (62.1%-76.2%). Incidence of Wormian bones in humans varies from 8% to 15% in a random population and reaches 54% in a mentally impaired population. The incidence of wormian bone is more among the female skulls (64.80%) [7].

The incidence of metopic suture varies in different races and can be due to various causes, such as abnormal growth of cranial bones, growth interruption, heredity, sexual, hormonal influence, atavism, cranial malformations and hydrocephalus [2]. Agarwal (1979) reported the finding of 38.17% in Indian Skulls [8]. Chandrashekhra P (1985) showed 3% each in Maharashtra and South India respectively [9]. Bilodi AK et al (2003) at Chisapni (Nepal) in 51 skulls reported 11.4% complete metopism, incomplete metopic suture 7.84% [10]. Mangal giri AS et al (2010) reported that 3.95% had complete metopism in central India [11].

Earlier studies revealed that the metopic suture was associated with the Wormian bones [2]. Hussain Saheb S et al has reported the metopism in 125 Indian skulls, according to them the complete metopic suture was found in 3.2% of cases and incomplete metopic suture in 26.4% of the skulls [12].

Conclusion

The anatomical knowledge of Wormian bones is clinically important as they are markers for some diseases and important in the primary diagnosis of brittle bone disease like osteogenesis imperfecta. The present case report reveals the presence of multiple Wormian bones along the lambdoid sutures and in the posterior fontanelle which may lead to problems in posterior approach to the cranial cavity.

The presence of metopic suture simulates the fracture of frontal bone, therefore it should be properly ruled out in x-rays by radiologists and neurosurgeons.

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