

# Anatomical classification of sutural bones

## Abstract

Sutural bones are accessory bones which occur within the skull. They get a different name, derivative from the suture or sutures they are in contact with or with the centre of ossification or fontanel where they originate. They are classified into true Sutural bones and false Sutural bones. True Sutural bones derived from one or many points of ossification. False Sutural bones are ossification centers not connected to independent bones. Although Sutural bones they are poorly reported while they are quiet frequent. Sutural bones are being of interest to human anatomy, neurosurgery, physical anthropology, forensic medicine, craniofacial surgery, radiology among others.

**Keywords:** sutural bones, true sutural bones, false sutural bones, wormian bones, anatomical classification

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## Introduction

The human skull is composed of several bones that fuse together after birth additionally to the regular centre of ossification of the skull. Sutural bones are sporadically found in the course of cranial sutures and fontanels or isolated. They are supernumerary irregular, accessory and abnormal small bones interposed between cranial bones, most commonly located in the lambdoid suture. Sutural bones result from formation of abnormal ossification centers in the skulls that develop in addition to those seen normally.<sup>1,2</sup> They are poorly described although they are quiet frequent.

The presence of Sutural bones may mislead the diagnosis when X-rays are taken and they may be mistaken for fractures. Many factors have been proven to be involved in the incidence of Sutural bones in the human skull but it remains controversial what affects the prevalence of Sutural bones formation and the mechanisms responsible for the formation of Sutural bones are unknown and it is still unclear why Sutural bones are common in certain races.<sup>3</sup>

Sutural bones are studied and reported as ethnic variables, being of interest to human anatomy, physical anthropology, forensic medicine, radiology among others. Sutural bones were named Wormian bones after the Danish anatomist, Olaus Wormius, a medical doctor at the University of Copenhagen. He made a detailed description of them in 1643.<sup>4</sup> But their first description was attributed to Hippocrates. Sutural bones were also mentioned but with other names by Paracelsus<sup>5</sup> and D'Andemach Gonthier, but Vesalius was one of the first to associate Sutural bones with cerebral disorders. The international anatomical nomenclature named Sutural bones as *Ossa Suturalia* and identified them as A02.1.00.043.<sup>6</sup> The aim of this paper is to do a mini review about Anatomical Classification of Sutural bones.

## Discussion

Sutural bones are supernumerary small bones sporadically found in the course of cranial sutures and fontanels or isolated. Sutural bones articulate with the surrounding bones by sutures with indentations more complex on the outer surface of the human skull than on the inner aspect.<sup>1</sup> It is controversial whether the development of Sutural bones is influenced by genetic or external factors. They are found in

both sexes as well as in both sides of the skull. Approximately half of Sutural bones are located in the lambdoid suture and fontanel and the masto-occipital suture. The second most common site of incidence (about 25%) is in the coronal suture.<sup>7,8</sup> The rest occur in any remaining sutures and fontanels.<sup>9</sup> Knowledge of this variation is very important for neurosurgeons, radiologists and anthropologists among others.

Sutural bones can have different asymmetrical shapes: oval, round, triangular, oblong, quadrilateral and polygonal and can vary from under 1mm in diameter to 5 x 9cms. According to the location where Sutural bones are formed they obtain a different name, in generally, derivative from the centre of ossification or fontanel where they originate or with the suture or sutures they are in contact with. Some locations of Sutural bones are more common but they are not particular named in the international anatomical nomenclature because they vary in size, shape, number and thickness from skull to skull. Only the pre-inter-parietal bone a triangular Sutural bone located at the previous site of the posterior fontanel is named by some authors as Inca bone. It is so called because of his incidence in Inca bones in Peruvian mummies.<sup>10,11</sup> Sutural bones are classified into true Sutural bones and false Sutural bones.<sup>5,12</sup>

True Sutural bones originated from one or many points of ossification. They comprise all supernumerary developed bony parts in the marginal part of the skull's bones.<sup>13,14</sup> According to their location Sutural bones can be true Sutural bones, fontanel's or isolated.<sup>12,14</sup> True Sutural bones may be sagittal bone (between the two parietal bones) or develop in occipito-parietal sutures, fronto-parietal sutures, parieto-esfenoidal sutures, petro-occipital sutures or inter-parietal Sutural bone. They can be bregmatic, lambdoid, pteric or orbital.<sup>9,14</sup> The isolated Sutural bones are those that develop away from the sutures and fontanels. They frequently comprise the entire thickness of the skull, but can also be formed only at the expense of the outer table of the skull (exocranial) but more rarely are formed at the expense of the inner table of the skull (intracranial). On the other hand False Sutural bones are ossification centers not welded to independent bones, as occipital or temporal bones.<sup>12,14</sup>

## Conclusion

Sutural bones are supernumerary irregular, accessory and

abnormal small bones interposed between skull bones, they vary in size, shape, number and thickness from skull to skull. According to the location where Sutural bones are formed they obtain a different name, derivative from the centre of ossification or fontanel where they originate or with the suture or sutures they are in contact with. It is controversial whether the development of Sutural bones is influenced by genetic or external factors.

Sutural bones are classified into true Sutural bones and false Sutural. True Sutural bones derived from one or many points of ossification and false Sutural bones are ossification centers not welded to independent bones. The anatomical knowledge of Sutural bones is clinically important, because their presence is frequently used as a helpful marker of some congenital disorders, mainly bone dysplasia. Nevertheless their only presence is not a clinically significant event to determine any particular disease. Sutural bones are of interest and useful to Human Anatomy, Neurosurgery, Physical Anthropology, Forensic Medicine, Imaging Medicine, Craniofacial surgery and Legal Medicine among others.

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### Conflict of interest

Author declares that there is no conflict of interest.

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