

Mendosal Suture - Inca Bone - An Identification Tool

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Abstract

There are many techniques followed in the field of Forensic Investigations to establish the identity of an unknown. Even, anatomical variations like developmental anomalies can also be used for this purpose. The presence of Inca bone occurring due to a persistent Mendosal suture, though rare, is one such variation in humans. The knowledge of Inca bone in human skull is useful in identifying an unknown. We report a case of incidental finding of true inter parietal or Inca bone in an adult human skull.

Key words: Mendosal suture, inter parietal bone, Inca bone, identification.

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Introduction:

Identification is an important aspect of Forensic investigations especially in case of unknown, dismembered bodies or in cases of skeletal remains. Many deaths encountered due to mass disasters like airplane crash, earthquakes, tsunami etc warrant for identity of the remains.¹ Though many parameters of identification are used, many a times they are of not much help due to unavailability of the required sample. In those cases more and more rarely known and less heard parameters are searched for identity purposes. Anatomical variations like developmental anomalies act as peculiar characters and are used for identification purpose. Mendosal suture with Inca bone is one such parameter which can be used for identification.² Inca bone is a single or group of bones isolated in the upper squamo of the occipital bone^{3,4} which is accepted as one of the variants of thenormal.⁵

Case Report:

The present case of inter parietal or Inca bone was noted as an incidental finding in bone examination of a skeletonized adult body. A single inter parietal (Inca) bone (Fig.1 & 2) was found behind lambda in between left side of lambdoid suture to upper part of right side of lambdoid suture. The suture (Mendosal suture) separating the inter parietal bone from the rest of occipital bone is at the level of the highest



Fig 1. Mendosal suture (Occipital view)



Fig 2. Mendosal suture (Lateral view)

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nuchal line at a distance of 2 mm from the left of external occipital protuberance and 1cm above from superior nuchal line.

Discussion:

Squamous part of occipital bone consists of two supra occipital and an inter-parietal bone. The inter-parietal human skull vault, also known as the cranial vault, is formed by the paired parietal and temporal bones and unpaired frontal, occipital, sphenoid and ethmoid bones.⁶The occipital bone is formed from cartilage and membrane.⁷The portion may remain separated from the-supra-occipital part by a suture and is called the inter-parietal or inca bone. The supra occipital part ossify by both cartilaginous and inter membranous ossification but inter parietal part by inter membranous ossification only. The segment of supra occipital bone between the highest and superior nuchal lines form the intermediate segment. It ossifies inter membranously and probably never separates from the cartilaginous supraoccipital part. True inter parietal bones or Inca bones are bounded by lambdoid suture or suture mendosa. They were previously known as osincae. Os inter parietal Goethe's ossicles. Inca bone resembles triangular architecture monument designs of Inca tribals of South America (1200-1597 AD). The members of Royal family of Inca tribe had crown like configurations on their head, hence this ossicle has been known as Inca.⁸

Embryonic development and Anatomy:

Embryonically these bones are formed by intramembranous ossification within a layer of mesenchyme, the skeletogenic membrane, between the dermal mesenchyme and the meninges surrounding the brain.⁷The process of fusion of the ossification centers in the occipital squama is described in human embryological text banks. During the 3rd fetal month, irregular ossification centers appear in the membranous tissue behind the cartilaginous supra occipital bone plate. In the 4th fetal month, similar irregular ossification centers appear on the

internal surface of supra occipital plates. In the 5th fetal month, these ossification centers fuse with root of the secondary inter-parietal part in the midline (Fig. 3). Inter-parietal and supra occipital portion fuse by birth and obliteration of mendosal suture by 2 yrs.

In our case, the inter parietal bone with its suture formed by upper and lower nuclei of third pair medial and lateral nuclei of second pair on left side and medial nucleus of second pair on right side (Fig. 3).

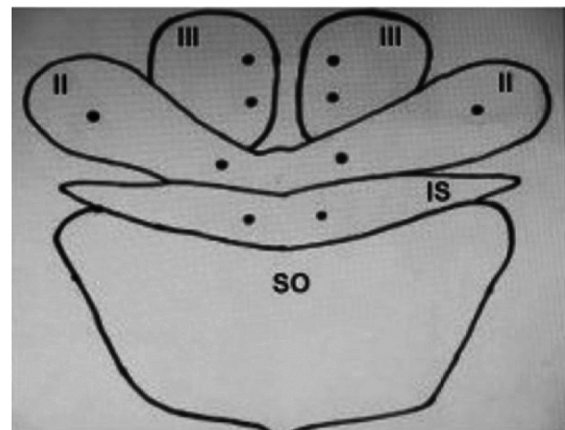


Fig 3. Embryological development of Skull

S.O-Supraoccipital bone. IS - Intermediate segment-paired nuclei in centre

II –Medial and lateral nuclei of 2nd pair of centers which forms lateral plate.

III - upper and lower nucleus of 3rd pair of centers which form the medial plate.

The incidence of inter parietal bone is variable and rare. It is reported in various books and journals as 0.8% by Shrivastava (1977)^{9,10}, 1.6% Singh et al (1979)¹¹, 2.6% by Pal et al (1984)¹², 4.0% by Cireli et al (1985)¹³, 2.5% by Saxena et al (1986)¹⁴, 1.6% by Magden&Muftuoglu (1990)¹⁵, 6.6% by Aycar (1993)¹⁶, 0.8% by Hussain Saab India (2010)¹⁷, 0.8% by Gobinathan (1992)¹⁸, 0.99% by Katkchi and Gumusburan (1995)¹⁹, 0.99% in Zambare BR (2001)²⁰, 1.35% in RR Marathe, in central India (2010)⁴, 3.81% in a study by Shah MP et al (2014)²¹ and Yucel et al (1996)²² in a study, found the incidence of interparietal bones to be 2.8%. It is evident from the various studies mentioned above that the incidence of presence of Inca bone – mendosal suture ranges from 0.8 – 4%. Hence

it can act as an identification tool in these individuals in rarest of rare instances.

Conclusion:

The Forensic expert should be able to recognize anatomical and morphological variations, including these type of skull bones. The inter parietal bone could be interpreted wrongly as fractured occipital bone. This has particular significance in cases of murder and child abuse. The presence of this variation may be useful in the identification of unknown or lost person by comparing it with the previous records.

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