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Os parietale partitum: Exploring the prevalence of this trait in four contemporary populations

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ABSTRACT

Os parietale partitum is a variable segmentation of the parietal bone. This manifests as a parietal division in the anteroposterior or superoinferior planes that is separated by an unusual suture and can be complete or incomplete. The existence of parietal divisions was observed and documented more than 260 years ago. The main objectives of this paper are to record the incidence of this rare trait in four modern populations with no previous records of it and provide a review of the literature. Four contemporary skeletal collections from Crete (Greece), Limassol (Cyprus), Coimbra (Portugal) and Salvador (Brazil) were assessed by the authors of this paper for non-metric cranial traits. Out of 711 skulls, only three cases of parietal division were found and all three originated from the Cypriot collection. These three cases were anatomically analyzed, showing that all three cases were adult females and showed unilateral expression of the trait. Two skulls showed superoinferior division, and the third case showed anteroposterior division. Numerous other cranial non-metric traits were found in these three skulls.

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Based on the cemetery archives, there seems to be no genetic link between the individuals bearing this trait. Further genetic analysis is suggested in order to verify this conclusion.

Introduction

Accessory sutures are normal variants found in human and other mammal skulls as a result of disturbed embryological development leading to changed ossification. They occur in the parietal and occipital bones, most likely because of their multiple ossification centers (Bhatt et al., 2014; Sanchez et al., 2010). These traits constitute a rare variant (Hrdlička, 1903; Shapiro, 1972); yet, the knowledge of their existence is of extreme importance to pediatric patients as they can be misdiagnosed as craniocerebral trauma. These traits are also very important for identification purposes in forensic anthropology. Herein, we report three cases of *os parietale partitum* found in a modern Greek-Cypriot sample and present a review of all reported cases found in the literature.

Anatomy of the parietal bones

The two parietal bones form the part of a lateral wall and the roof of a cranial vault of a skull; their square and flat shape has four borders, four angles, and external and internal surfaces. The coronal suture separates the frontal and parietal bones and the lambdoidal suture separates the parietal bones from the occipital bone. On the external surface temporal lines resulting from temporal fascia and muscles can be observed. The internal surface presents meningeal grooves, arachnoid foveae, and the sagittal and sigmoid sulci. Associated with the parietal bones are several non-metric traits, such as sutural ossicles (coronal ossicle, sagittal ossicle, lambdoid ossicle, ossicle at *bregma*, ossicle at *lambda*, ossicle at *asterion*, ossicle at *pterion*, squamous ossicle, parietal notch bone), parietal foramina, symmetrical thinness, an inferior parietal foramen, parietal process of the temporal squama, and bipartite parietal bones.

Embryological development of parietal bones

The embryological development of parietal bones, in general includes two ossification centers that fuse around 7–8 prenatal weeks and by month 6 the margins and angles are well-defined. "In the region of the parietal foramina, there is often an un-ossified section between the foramen and the superior border of the bone, which, when joined across the medial plane, forms the sagittal fontanelle. Its position is highly variable, but it rarely exists after the third prenatal trimester." (Scheuer and Black, 2000:100).

On some occasions the parietal bones do not fuse. *Os parietale partitum* bone is also called a divided parietal bone, *os parietale bipartitum* or double parietal bone, *sutura parietalis transversa*, *sutura parietalis anostosis*, and *os parietale divisum* (Hauser and De Stefano, 1989).

Parietal accessory sutures can be bilateral or unilateral and merge with adjacent sutures or remain incomplete. They may show a horizontal course between the coronal and lambdoidal sutures, a vertical course between the sagittal and squamosal sutures, or an oblique course isolating one or another angle of the parietal bone (Shapiro, 1972). They exhibit, as normal sutures, well-defined sclerotic borders without signs of diastasis (Bhatt et al., 2014; Sanchez et al., 2010). They are often associated with slight to pronounced skull asymmetry, plagiocephaly, hydrocephaly, metopic sutures, and sutural ossicles (Abdel-Salam et al., 2013; Becker et al., 2005; Berry, 1910; Bessell-Browne and Thonell, 2004; Fenton et al., 2000; Hrdlička, 1903; Shapiro, 1972).