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Case Report

Atypical accessory intraparietal sutures mimicking complex fractures in a neonate☆

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ABSTRACT

Partial or complete division of the parietal bones resulting in anomalous cranial sutures is a rare entity and may raise concern for fracture and potential abuse when identified on radiological examination in young children. We present a case of a 4-week-old male found to have anomalous intraparietal sutures originally interpreted as fractures during a comprehensive evaluation for nonaccidental trauma. Our goal is to raise awareness of a complex branching pattern of accessory intraparietal sutures, which has not been previously described. Additionally, we will review the characteristics that aid in the radiologic differentiation of accessory cranial sutures and fractures.

1. Introduction

Partial or complete division of the parietal bones resulting in the formation of anomalous cranial sutures is an exceedingly rare event. The etiology of the condition is not well understood but may result from failure of fusion of the two primary ossification centers within the parietal bone [1]. Atypical cranial sutures are most commonly identified on radiological examination where they may raise concern for fracture and potential abuse. We present a case of a 4-week-old male found to have anomalous intraparietal sutures originally suggestive of fractures during a comprehensive evaluation for nonaccidental trauma and we review the characteristics that aid in the radiologic differentiation of accessory cranial sutures and fractures. This case is unique due to the complex pattern of branching lucencies associated with the accessory sutures, which overlaps with findings of fracture and has not been previously described.

2. Case report

A 4-week-old previously healthy male presented to our hospital on transfer from a referring institution after resuscitation from an episode of cardiac arrest. A relative of the patient stated that the mother had been found asleep with the infant in her lap and the mother appeared to be unintentionally suffocating the infant. Obtained histories were inconsistent, however, and an investigation was initiated by Child Protective Services.

Upon physical examination of the patient, facial petechiae and ecchymosis were present, supporting a diagnosis of asphyxia. The patient had no purposeful movement following return of spontaneous circulation, and an initial unenhanced computed tomography (CT) of the head was obtained. The study revealed linear lucencies within the parietal bones along with a small amount of overlying soft tissue swelling on the right. No evidence of intracranial hemorrhage was present. Three-dimensional CT reconstructions showed symmetric, sharp, branching lucencies in the bilateral parietal bones, interpreted as complex fractures (Fig. 1). CT of the cervical spine was concomitantly acquired, demonstrating a healing fracture of the left first rib. Findings were reported as concerning for nonaccidental trauma.

Complete skeletal survey showed the branching parietal lucencies seen previously on CT, but it was otherwise normal. The left first rib fracture was not seen radiographically. Due to the possibility of asphyxiation and presence of altered mental status, a brain magnetic resonance imaging study was ordered. Symmetric restricted diffusion was present involving the bilateral corticospinal tracts consistent with hypoxic–ischemic injury. Of note, fundoscopic examination was negative for retinal hemorrhage.

The child continued to deteriorate and eventually expired secondary to severe hypoxic–ischemic encephalopathy with intractable seizure activity. Given the concern for nonaccidental trauma, an autopsy was

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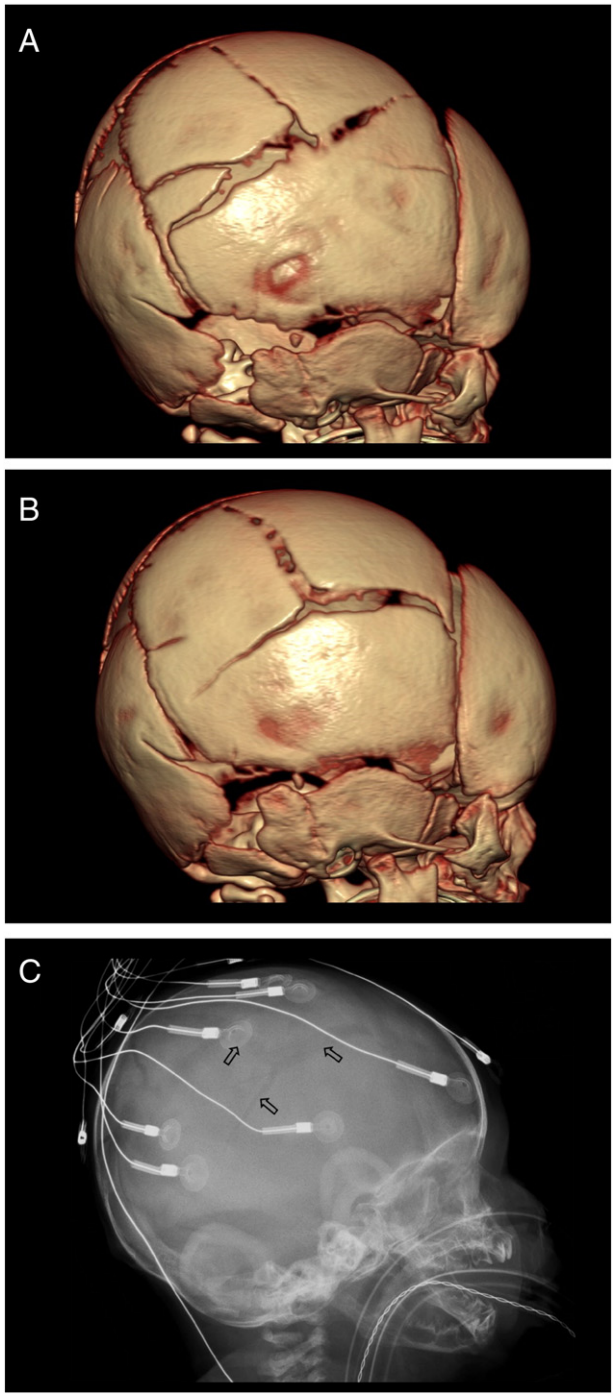

Fig. 1. Reformatted three-dimensional CT images of the skull reveal a stellate pattern of linear lucencies joined centrally in the right parietal bone (**A**) and three orthogonally oriented lucencies joined centrally in the left parietal bone (**B**). Lateral radiograph of the skull from the skeletal survey (**C**) also shows the branching lucencies (arrows), which correspond to the CT findings and ultimate diagnosis of anomalous intraparietal sutures. Figs. 1 and 2 reprinted with kind permission from Springer Science + Business Media: Pediatric Radiology, SPR 2015, Volume 45, 2015, S159, Eklund M, Taylor M, Riemer E, Hill J, and Stalcup S.

ordered by the coroner. At autopsy, the healing fracture of the posterior left first rib was confirmed, but degree of healing was consistent with a more remote injury that would have likely occurred prior to the presenting event, concerning for a prior incidence of nonaccidental trauma. Histopathological examination of the skull showed bland fibrous connective tissue bridging between the cranial bones in the areas of radiographic lucency, consistent with findings of normal cranial sutures [2]. Multiple microscopic sections of these areas were reviewed in conjunction with sections of sagittal suture as normal control, and each section showed identical histology. No hematoma, osteoblasts, granulation tissue, or disruption of bony matrix was identified in any of the sections, and no bony callous formation, hemorrhage, or bony disruption was observed grossly. The final histologic diagnosis was therefore confirmed as accessory intraparietal sutures.

3. Discussion

Division of the parietal bone by accessory sutures is a rare occurrence, with few case reports published in the medical literature. In one series by Shapiro, accessory parietal sutures were present in only 3 of 25,000 skulls examined by cranial radiograph [1]. The etiology of anomalous parietal sutures is not well understood. Embryologically, the parietal bones are mesodermally derived structures that develop from one or two primary ossification centers that ossify in a radial manner from the center to the periphery of the bone. It is reasonable to hypothesize that the accessory parietal sutures form due to failure of fusion of primary ossification centers, and several different patterns are recognized. Shapiro described three patterns of accessory sutures (depicted in Fig. 3): a horizontal course between the coronal and lambdoid sutures, a vertical course between the sagittal and squamosal sutures, or an oblique course that isolates a corner of the parietal bone [1]. Accessory sutures can be complete or incomplete.

In recent years, there have been several reports of accessory intraparietal sutures that follow the above patterns. Weir et al. described

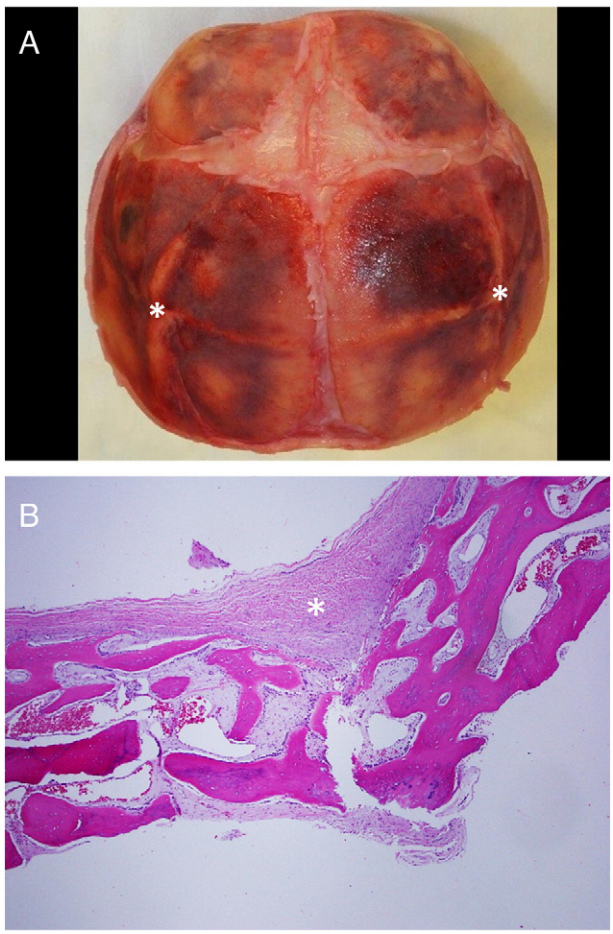

Fig. 2. Gross (**A**) and microscopic (**B**) histopathological evaluation of the skull confirms that the radiographic lucencies correspond to bland fibrous connective tissue of accessory cranial sutures (asterisks), without findings of acute or healing fracture. Figs. 1 and 2 reprinted with kind permission from Springer Science + Business Media: Pediatric Radiology, SPR 2015, Volume 45, 2015, S159, Eklund M, Taylor M, Riemer E, Hill J, and Stalcup S.