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Occipital osteodiastasis: presentation of four cases and review of the literature

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Abstract  Background. Occipital osteodiastasis (OOD) is a form of birth injury characterized by a tear along the innominate (posterior occipital or supraoccipital-exoccipital) synchondrosis with separation of the occipital squama from the lateral or condylar parts of the occipital bone. The condition, frequently mentioned in the older literature as relatively common and invariably fatal, has been attributed to excessive pressure exerted over the subocciput during delivery, resulting in a forward and upward displacement of the anterior margin of the occipital squama into the posterior cranial fossa, with posterior fossa hemorrhage and other intracranial complications. Most likely as the result of improved obstetric techniques, this severe form of OOD has become quite rare or non-existent. A less severe form compatible with survival has been suggested, but so far only one case has been reported in some detail.

Materials and methods. This paper reports the occurrence of this less severe form of OOD diagnosed roentgenographically in two infants who survived: a newborn and a 3-month-old child. Two additional cases of a similar lesion but of postnatal onset are also described: a 3-month-old infant with the diagnosis of child abuse who also survived and a 2-year-old girl who was involved in a fatal motor-pedestrian collision.

Results. Based on cases in the literature and the present material, three forms of OOD can be considered: a classic, fatal form; a less severe variant compatible with survival; and OOD of postnatal onset. The diagnosis can be made on lateral skull or cervical spine roentgenograms showing specific changes in the area of the innominate synchondrosis.

Introduction

The occipital bone at birth is composed of four ossified parts arranged around the foramen magnum (shown in Fig.1) including: a squamous part or squama; two lateral, condylar or exoccipital parts; and a basilar part or basioccipit. The squama is divided by the mendosal sutures into a proximal or interparietal portion, which is preformed in membrane, and an inferior or supraoccipital part which, together with the condylar and the basioccipital parts, is preformed in cartilage. The squamous and the lateral parts of the occipital bone are separated by a strip of cartilage variously called innominate, posterior occipital, posterior intraoccipital, and supraoccipital-exoccipital synchondrosis. Ossification of this synchondrosis is complete during the 4th or 5th year of life. This synchondrosis is particularly vulnerable as a point of injury during delivery. A tear along this synchondrosis with separation of the occipital squama from the condylar parts during delivery is generally referred to as “occipital osteodiastasis” (OOD), a term first used by Hemsath [1] in 1934. Following is the report of two cases of OOD owing to birth trauma diagnosed roentgeno-
graphically who survived and two additional patients in whom a similar lesion developed postnatally. In this paper the term OOD is used both for the lesion occurring during delivery and for the variant that develops postnatally.

**Case reports**

**Case 1**

M.E., a male infant, was born at term to a 26-year-old para 2. His birth weight was 3,900 g. Pregnancy was uneventful and the maternal pelvis was thought to be adequate. The delivery was complicated by breech presentation and a prolonged vaginal breech extraction, requiring 5 min to deliver the after-coming head with forceps. The child was apneic for the first minute, but responded to ventilation by O₂ tube and bag with a good cry. He breathed spontaneously after extubation at 30 min of life. At 2–3 h of age he was noted to have a generalized increase in muscle tone and was transferred to this children’s hospital.

On admission the skull showed moulding with forceps marks. The anterior fontanelle was flat. A soft tissue mass suggestive of a hematoma was observed in the nuchal region. A right Erb's palsy and a partial facial nerve palsy were diagnosed. Roentgenograms of the skull, cervical spine, chest, and abdomen were obtained. The skull showed a disruption of the innominate synchondrosis with overriding of the anterior margin of the occipital squama over the condylar parts of the occipital bone (Fig. 2a). The cranial vault was normal. The films of the cervical spine revealed some fullness of the nuchal soft tissues without other abnormalities. The chest and abdomen were unremarkable except for an elevation of the right hemidiaphragm consistent with right phrenic nerve paralysis.

The child was immobilized in the midline position with the neck slightly extended and was kept under observation for 2 weeks with gradual improvement, followed by a complete clearing of the nuchal mass, facial nerve paralysis, and Erb's palsy. Skull roentgenograms in the 14th hospital day showed some new bone formation in the region of the innominate synchondrosis with normal position and alignment of the cranial bones locally (Fig. 2b). Inspiration and expiration films of the chest showed normal diaphragmatic motions bilaterally. He was discharged the following day. A lateral roentgenogram at 1 month of age showed early callus formation bridging the innominate synchondrosis (Fig. 3c). At 11 years of age the patient was described as clinically normal.

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**Fig. 1a, b** Diagram of the occipital bone at birth, frontal view in a and lateral view in b, showing the four parts of the occipital bone at this stage, including a squamous part or squama (A), two lateral or condylar parts (B), and a basilar part or basiocciput (C). The short arrows point to the mendosal sutures, and the longer arrows point to the innominate synchondroses.