

A case of Adams-Oliver syndrome associated with acrania, microcephaly, hemiplegia, epilepsy, and mental retardation

H. ÇAKSEN¹ and S. KURTOĞLU²

¹Department of Pediatrics, Yüzüncü Yıl University Faculty of Medicine,

²Department of Pediatrics, Erciyes University Faculty of Medicine, Kayseri, Turkey

Abstract

Adams-Oliver syndrome (AOS) is a rare congenital disorder, characterized by aplasia cutis congenita (ACC) of the scalp and variable degrees of terminal transverse limb defects. In this article, a newborn infant diagnosed as AOS for a large scalp defect, acrania, and finger malformations is presented. The patient was hospitalized and the scalp defect was successfully repaired with several surgical operations. During the hospitalization septicemia, meningitis, and convulsions developed, but they were successfully treated with appropriate antibiotics, antifungal, and anticonvulsive agents. He was discharged five months after admission to the hospital. Now, he is 3 years old, and has microcephaly, moderate mental retardation, left spastic hemiplegia, and epilepsy.

Key words : Adams-Oliver syndrome ; acrania ; hemiplegia ; epilepsy ; mental retardation.

Introduction

Adams-Oliver syndrome (AOS) is a rare congenital disorder, characterized by aplasia cutis congenita (ACC) of the scalp and variable degrees of terminal transverse limb defects (Adams and Oliver 1945 ; Savarirayan *et al.*, 1999 ; Mempel *et al.*, 1999). It was first characterized in 1945 by Adams and Oliver, who described eight members of one family in three generations. In later years, several patients with AOS have been described in the literature (Mempel *et al.*, 1999). A newborn infant, diagnosed as AOS for a large scalp defect, acrania, and finger malformations is presented.

Case report

A 7-day-old boy was admitted to our hospital for absence of the scalp and limb anomalies. The abnormal findings were noted at birth. He was the fourth baby of a 27-years-old mother, and the product of a full-term uncomplicated gestation and labor. No maternal use of medication or antepartum illnesses were reported. Family history was non-contributory, but the parents were relatives.

On physical examination, the weight was 3,700 g, the height was 50 cm and the head circumference was 35 cm. A scalp defect, 12 × 9 cm in diameter and extending from the anterior fontanel to the occipital region, was observed. He also had a cranial defect at the same site and the superior sagittal sinus was absent (Fig. 1). The middle and distal phalanges of the second, third, and fourth fingers were bilaterally short with rudimentary fingernails. The first, second, and third fingers were missing and the fourth and fifth toes were bilaterally short. In addition, cutis marmorata and peeling on the skin were noted. Other systemic findings were normal.

On laboratory investigation, routine urine and blood analyses were normal. Lateral craniography and cranial computerized tomography (CT) displayed the extent of the defect which included the frontal bone, the parietal bone, and the upper part of the occipital bones (Fig. 2). The X-ray films of upper and lower extremities demonstrated

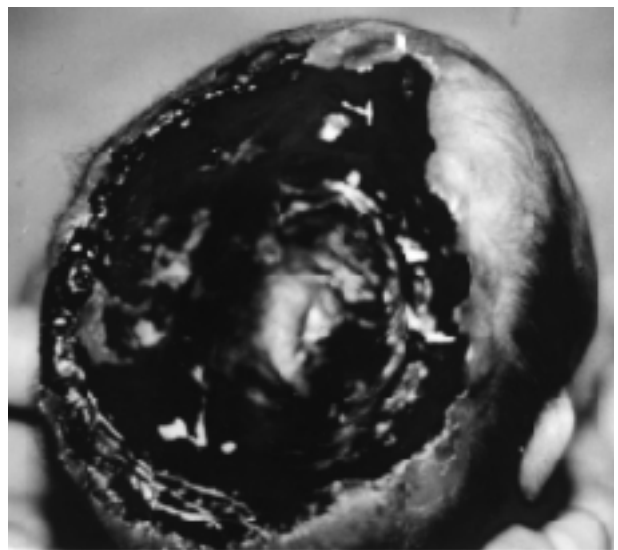


Fig. 1. — Acrania and the scalp defect, which is 12 × 9 cm in diameter and extends from the anterior fontanel to the occipital region.

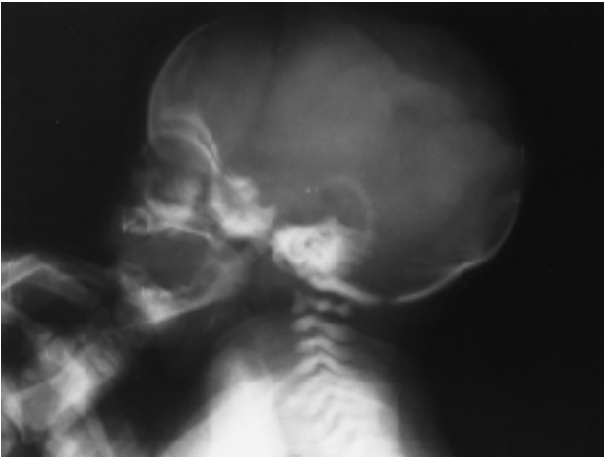


FIG. 2. — Lateral craniography shows the defect including almost all the membranous skull.

hypoplastic or missing digits. Ultrasonographic examination of the abdomen was normal. Foramen ovale was demonstrated with echocardiographic examination. Chromosomal analysis revealed 46 XY. When he was 9 months old, his cranial CT was reevaluated. Cerebrum, cerebellum, and cerebral hemispheres were normal, except for acrania.

The patient was hospitalized and the scalp defect was repaired on the 15th day of admission. After the first operation, two other surgical operations were performed (Fig. 3). During the hospitalization, septicemia and/or meningitis attacks, caused by enterobacter, enterococci, and candida, developed, but they were successfully treated with appropriate antibiotics and antifungal agents. In addition, generalized tonic-clonic convulsions, which were controlled with phenobarbital, developed during follow-up. He was discharged five months after admission to the hospital. Now, he is 3 years old, and has microcephal and moderate mental retardation, left spastic hemiplegia and epilepsy. His growth curve, except for the head circumference, is within normal limits. His weight is 13.5 kg (on the 25th percentile), length is 87 cm (between 3rd and 10th percentile) and head circumference is 45 cm (below 3rd percentile).

Discussion

Multiple hereditary patterns, such as autosomal dominant and recessive, have been described for AOS and sporadic cases have also been reported (Küster *et al.*, 1988 ; Orstavik *et al.*, 1995 ; Klinger and Merlob 1998 ; Romani *et al.*, 1998 ; Tekin *et al.*, 1999). The etiopathogenesis of this syndrome remains unclear (Swartz *et al.*, 1999). Various theories have been proposed to explain the pathogenesis of the observed defects seen in AOS. Early embryonic vascular disruption/insufficiency appears to be the most tenable of these theories (Savarirayan *et al.*, 1999 ; Swartz *et al.*, 1999).

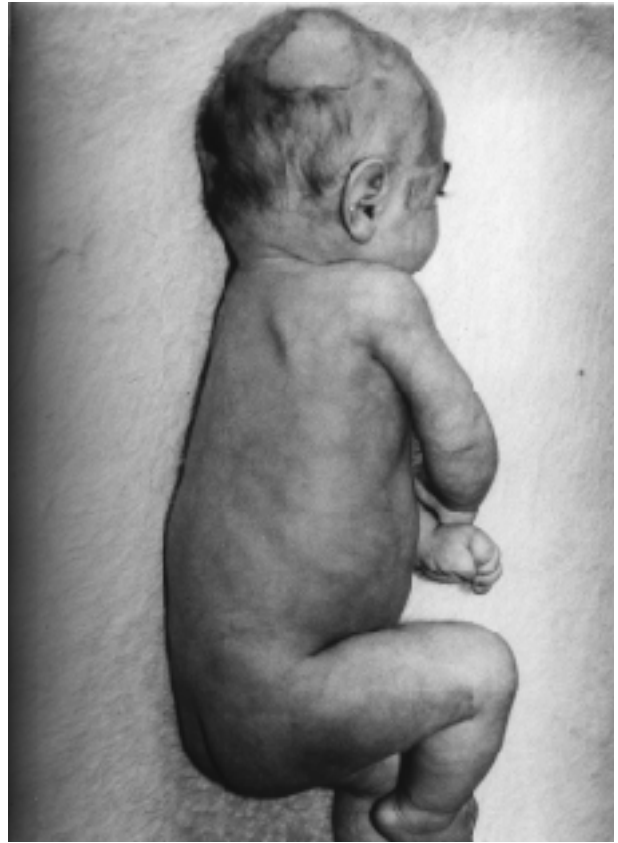


FIG. 3. — The general appearance of our patient after three surgical interventions.

Keymolen *et al.* (1999) reported that a possible pathogenetic mechanism could be the disruption of embryonic blood vessels which in some cases may be «fragile» due to a mutation in a gene playing a role in the vasculogenesis. Our patient was a sporadic case. Although we were not able to perform a carotid angiography, the absence of superior sagittal sinus was apparent in our patient. This abnormal finding supports the hypothesis that AOS results from early embryonic vascular disruption.

Aside from distal malformations of the limbs, many congenital anomalies/disorders concomitant with AOS have been reported. These include oligohydramnios, cutis marmorata, upper limb micromelia and brachypodia, palatine or auricular malformations, acrania, microcephaly, intracranial calcifications, arrhinencephaly, hydrocephaly, cerebral cortical dysplasia, spina bifida, epilepsy, mental retardation, anatomic bronchial anomalies, renal anomalies and cardiovascular malformations such as bicuspid aortic valve, atrial septal defect, Shone's complex, aortic valve stenosis, hypoplastic left heart syndrome, tetralogy of Fallot, double outlet right ventricle, portal hypertension and pulmonary hypertension (Chitayat *et al.*, 1992 ; Frank *et al.*, 1993 ; Bamforth *et al.*, 1994 ; Zapata *et al.*, 1995 ; Lin *et al.*, 1998 ; Romani *et al.*, 1998 ; Klinger and Merlob 1998 ; Swartz *et al.*, 1999 ; Savarirayan *et al.*, 1999). The intracranial abnor-

Table 1

Intracranial abnormalities and neurological findings in Adams-Oliver syndrome

Age	Sex	Intracranial abnormalities	Neurological findings	Authors
Died at 6 weeks	Female	Encephalocele	(-)	Küster <i>et al.</i> (1988)
10 years	Male	Acrania, abnormal intracerebral vasculature, absent of superior sagittal sinus, prominent ventricles	Convulsion, psychomotor retardation	Chitayat <i>et al.</i> (1992)
(3 months, 2 years, 22 years)	Three sisters	Microcephaly, communicating hydrocephalus, arrhinencephaly	Epilepsy, mental retardation	Bamfort <i>et al.</i> (1994)
18 years	Male	Large skull defect, hypoplasia of left hemisphere with porencephalic cyst, hypoplasia of left part of mesencephalon, pons, and medulla oblongata, focal periventricular and thalamic lesions, hypoplasia of the left middle cerebral artery	Motor retardation, right spastic hemiplegia	Fryns <i>et al.</i> (1996)
7 months	Male	Mild hypoplasia of the right hemisphere, slight dilatation of the right lateral ventricle cortical dysplasia in the right parietal lobe	Mild left hemiparesis, motor retardation	Savarirayan <i>et al.</i> (1999)
Died at 8 weeks	Male	Severe neuronal migration disorder, focal pachygyria, polymicrogyria	Central respiratory distress	Mempel <i>et al.</i> (1999)

malities which have been demonstrated via CT or MRI and neurological findings in Adams-Oliver syndrome are described in table 1 (Chitayat *et al.* 1992 ; Bamfort *et al.* 1994 ; Fryns *et al.* 1996 ; Küster *et al.* 1988 ; Savarirayan *et al.* 1999 ; Mempel *et al.* 1999). Aside from the mentioned findings in the table, intracranial calcification and cerebral hemorrhage have also been reported in AOS (Davis *et al.*, 1993 ; Zapata *et al.*, 1995, Romani *et al.*, 1998). In our patient, a large scalp defect and limb anomalies, acrania, foramen ovale and cutis marmorata were diagnosed. In addition, microcephaly, left spastic hemiplegia, epilepsy and mental retardation are encountered during follow-up. We think that these neurological disorders are complications, not primarily related to the syndrome. All of these findings were compatible with the earlier literature data.

Important differential diagnoses are the syndrome of scalp defect and postaxial polydactyly, the syndrome of scalp defect and split-hand defect, amniotic band sequence, and epidermolysis bullosa dystrophica Bart type (Küster *et al.*, 1988). Because the abnormal findings in our patient were extremely clear, the diagnosis of AOS could easily be established.

In AOS if the scalp defect is small, recovery is uneventful with gradual epithelialization and formation of a hairless atrophic scar over a period of several weeks (Arand *et al.*, 1991-92 ; Darmstadt 2000). Small bony defects usually close spontaneously during the first year of life. Large or multiple scalp defects may require excision and primary closure, if feasible ; rotation of a flap to fill the defect ; or the use of tissue expanders (Arand *et al.*, 1991-92 ; Darmstadt 2000). In patients with AOS, the major concern is an open scalp lesion which

presents the possibility for sepsis and/or meningitis ; this has been lethal in a number of cases. Some lesions appear to be highly vascular. Deep lesions rarely involve the sagittal sinus predisposing to episodes of spontaneous hemorrhage but this has been lethal and may complicate attempts at surgical care (Whitley and Gorlin, 1991). In our patient, the large scalp defect was successfully repaired with surgery. During the hospitalization, septicemia and meningitis as major complications developed, but they were treated with supportive therapy, appropriate antibiotics, and antifungal agents.

In conclusion our case represents the most severe form of AOS, which includes acrania, microcephaly, spastic hemiplegia, epilepsy, and mental retardation.

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H. ÇAKSEN, M.D.,
 Çağry sok. No : 13/4,
 Aydınlıkevler-Ankara/Türkiye.