

Cloverleaf skull syndrome: case report*

Síndrome do crânio em folha de trevo: relato de caso

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Abstract The present report is aimed at describing a rare case of cranial malformation – cloverleaf skull syndrome –, whose presence was noticed after the birth of a child with signs of abnormality. Imaging diagnosis methods such as computed tomography and conventional radiography were used to characterize the syndrome.

Keywords: Syndrome; Malformation; Computed tomography.

Resumo O objetivo deste relato é apresentar um caso raro de malformação craniana – a síndrome do crânio em folha de trevo –, cuja característica foi percebida após o nascimento de uma criança com os sinais da anomalia. Métodos de diagnóstico por imagem, como tomografia computadorizada e radiografia convencional, foram utilizados para a caracterização da síndrome.

Unitermos: Síndrome; Malformação; Tomografia computadorizada.

INTRODUCTION

Cloverleaf skull syndrome is an abnormal configuration of the calvaria classified as craniosynostosis, consisting of premature ossification of cranial sutures. It is a deformity characterized by a remarkable enlargement of the head, with a trilobed configuration of the frontal view, resembling a three-leaved clover⁽¹⁾. This abnormality occurs as a result from a severe alteration in the development of the skull, with premature synostosis of some cranial sutures⁽¹⁾, most commonly the coronal and lambdoid sutures⁽²⁾, in association with hydrocephalus, leading to a marked bulging of the head in the region of the anterior fontanel and laterally in the temporal regions, with the typical appearance of a “cloverleaf”⁽¹⁾. Syndromic and nonsyndromic presentations have been reported. Because of the anomalies both in the calvaria and in the skull base and face, this is one of the craniosynostoses currently requiring the most complex multidisciplinary approach⁽¹⁾.

The first report about such a syndrome in the literature occurred in 1973 and, over the years only some tens of cases have been documented worldwide⁽³⁾. The present report describes a case of a severe craniofacial condition that is known as “cloverleaf skull syndrome”.

CASE REPORT

A female patient born from Cesarean section on January 4, 2011, weighting 3,815 g and Apgar 7 and 8 at the first and

fifth minute of life, respectively. At physical examination multiple malformations were observed, with altered craniofacial configuration, low ear implantation, hypertelorism, exophthalmos, omphalocele and polydactyly (Figure 1). Chest radiography demonstrated dextrocardia (Figure 2), and computed tomography demonstrated abnormal configuration of the calvaria, with the typical trilobed “cloverleaf” aspect, bulging of the middle cranial fossae and dilatation of the ventricular system. Signs of closure of sagittal, coronal and lambdoid sutures were also observed (Figure 3). The patient presented cardiorespiratory arrest episodes, progressing to death on January 7, 2011.

DISCUSSION

Cloverleaf skull syndrome is a rare presentation of craniosynostosis with clinical features consisting in trilobed skull, exophthalmos, low ear implantation and upper airway. Hydrocephalus is also a common finding, despite the multifactorial nature of such an abnormality⁽⁴⁾.

It is a congenital anomaly that may be present as an isolated defect, but generally is classified as dysostotic syn-



Figure 1. A: Demonstration of typical craniofacial alterations. **B:** Syndactyly (arrow).

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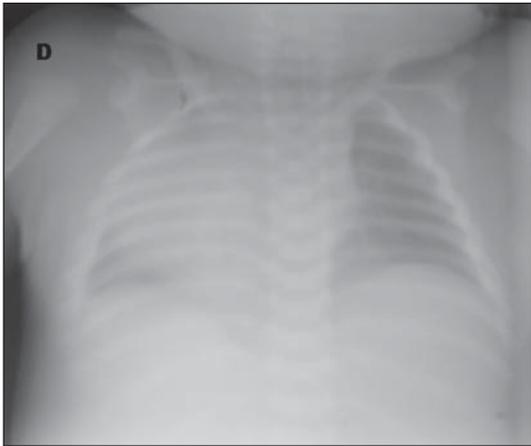


Figure 2. Chest radiography demonstrating dextrocardia.

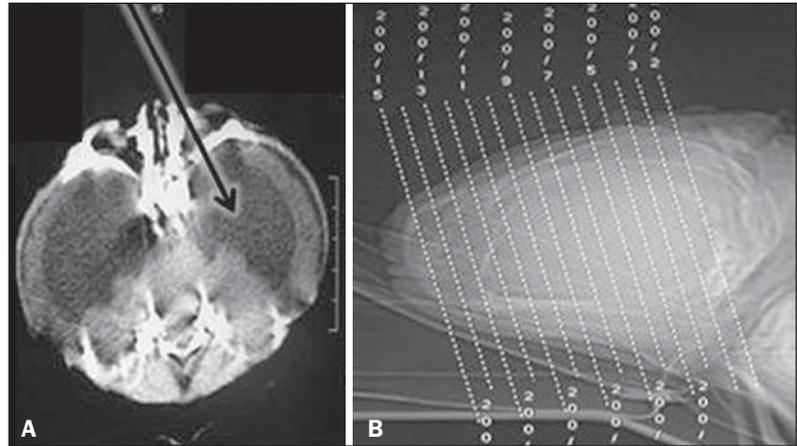


Figure 3. A: Trilobed aspect of the skull, with hydrocephalus and bulging of the middle fossae (arrow). **B:** Scout demonstrating a marked enlargement of the skull in the region of the anterior fontanel.

dromes such as achondroplasia, craniofacial dysostosis (Crouzon syndrome), Apert or Pfeiffer syndromes⁽²⁾. Until 1981, only 30 cases had been published in the literature, the first of them in 1973, in the ophthalmic literature⁽³⁾.

The precise etiopathogenesis of this syndrome is still to be completely known⁽³⁾, with theories involving altered membranous-osseous and/or endochondral ossification, generalized chondrodysplastic process⁽²⁾, and a possible vascular origin associated with the abnormal osteoclastic resorption⁽⁵⁾. Recently, genetic investigations have contributed to advances in the understanding of the molecular basis of some craniosynostosis syndromes, highlighting mutations in the genes *FGFR1*, *FGFR2*, *FGFR3*, *TWIST* and *MSX2*⁽⁶⁾.

The diagnosis of such a syndrome can be made in the prenatal period by means of ultrasonography, which detects the altered cranial morphology and hydrocephalus. Traditionally, the diagnosis occurs during routine prenatal follow-up at the second gestational trimester. However, with the increasing use of obstetric ultrasonography at the first gestational trimester, such alterations may be detected increasingly earlier over the gestation⁽⁷⁾.

After birth, as an abnormal configuration of the calvaria is detected, a radiological evaluation is required to characterize the deformity and guide the corrective surgical procedure. There is a significant improvement in the prognosis of affected children in cases where the diagnosis and the surgical intervention occur as early as possible. Computed tomography with three-dimensional reconstruction contributes to the assessment of craniofacial bone deformities and associated intracranial alterations, demonstrating to be a useful tool to define the prognosis and for the surgical planning⁽⁸⁾.

The present case was not classified into any specific syndrome category, and the cardiorespiratory instability hindered

the attempts of surgical intervention. The early death of the infant demonstrates how the association with malformations may worsen the prognosis of this condition.

Despite the unfavorable outcome of many cases, advances in surgical, anesthetic and intensive care techniques have transformed a condition previously considered untreatable into a potentially treatable condition, with acceptable neurological and aesthetic results⁽²⁾.

The relevance of the imaging diagnosis and characterization of this syndrome, particularly in the prenatal period, is highlighted in order to allow for the planning and institution of the treatment as earlier as possible.

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