Case Report

Pediatric Neurosurgery

Pediatr Neurosurg 2012;48:324–326
DOI: 10.1159/000351412

Received: February 13, 2013
Accepted after revision: April 16, 2013
Published online: June 18, 2013

Spontaneous Elevation of a Ping-Pong Fracture: Case Report and Review of the Literature

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Key Words
Head trauma · Infant · Ping-pong fracture · Spontaneous elevation

Abstract
Depressed skull fractures compromise 7–10% of the children admitted to hospital with a head injury. Depressed skull fractures that occur in children younger than 1 year are different from those found in older children. In neonates and infants, a depressed fracture forms an inward buckling of the bones forming a 'cup shape', termed a 'ping-pong fracture'. In neonates, spontaneous elevation of a ping-pong fracture after birth trauma is well documented. However, in infants, spontaneous elevation of a ping-pong fracture following head injury is extremely rare. Here, we present the case of an 11-month-old child, in whom a ping-pong fracture was spontaneously elevated within 2 h. In addition, the relevant literature is reviewed and discussed.

Introduction

Depressed skull fractures compromise 7–10% of the children admitted to hospital with a head injury [1]. Depressed skull fractures that occur in children younger than 1 year are different from those found in older children. In neonates and infants, a depressed fracture forms an inward buckling of the bones forming a 'cup shape', termed a 'ping-pong fracture' [2].

In newborns, the main cause of the depressed fractures is birth trauma, which includes various perinatal factors such as sacral promontory, uterine fibroids, exostosis of the lumbar vertebra, symphysis pubis, and ischial spine [3, 4]. However, in the postnatal period, the main cause is head trauma.

The spontaneous elevation of depressed fractures in neonates is rare but also well documented [5, 6]. After the neonate period, spontaneous elevation of a ping-pong fracture is extremely rare. Here, we present an 11-month-old child, in whom a ping-pong fracture was spontaneously elevated within 2 h.

Case Report

An 11-month-old girl was admitted to the hospital because of blunt head trauma. Her initial neurological examination was completely normal except that a depressed fracture was palpated in her right parietal region. Computed tomography (CT) of the head revealed a ping-pong fracture in the right parietal bone (fig. 1a, b). As the depression was greater than the thickness of the calvaria, a surgical intervention was indicated and discussed with the family. The family refused the option of the surgery and the patient was put on follow-up. Two hours after the event, the depressed fracture was

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1016–2291/12/0485–0324$38.00/0

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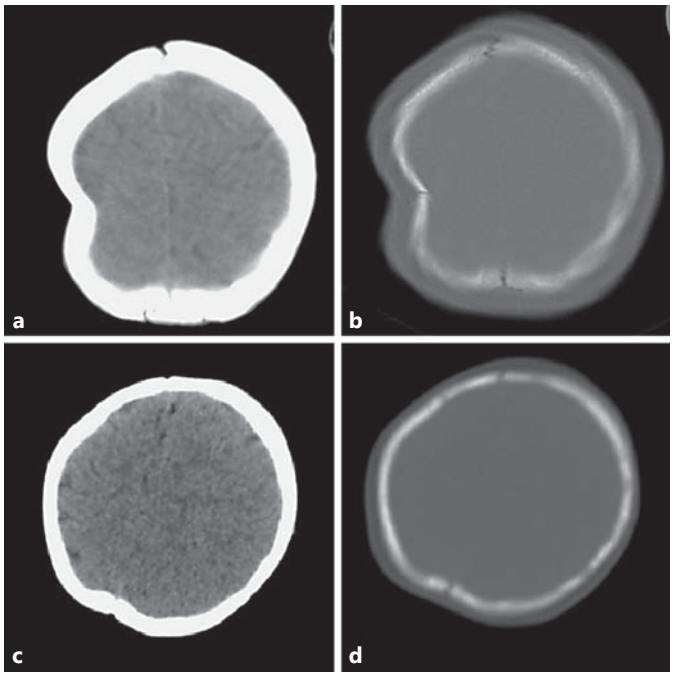

Fig. 1. Initial CT of the head revealing a right parietal ping-pong fracture (**a**, **b**). Two hours after trauma, a control CT of the head revealed the spontaneous elevation of the ping-pong fracture (**c**, **d**).

Table 1. Published cases with spontaneous elevation of the traumatic ping-pong fractures in children younger than 1 year

Authors and year	Age months	Initial examination	Outcome	Spontaneous elevation time h
Ross [6], 1975	3	Intact	Perfect	4
Cohen et al. [12], 2011	6	Intact	Perfect	2
Present case	11	Intact	Perfect	2

noticed to be nonpalpable. Due to intractable vomiting, a control CT scan was made and revealed that the ping-pong fracture was elevated spontaneously (fig. 1c, d). The follow-up period was uneventful, and the patient was discharged home 24 h after trauma.

Discussion

The depressed skull fractures in children younger than 1 year differ from the depressed fractures of older ages. This is due to the relative plasticity of the skull, which is not yet fully ossified. These fractures are referred to as 'ping-pong fractures' because of the resemblance to an indented ping-pong ball [4]. In the past, the classic recommendation for a simple depressed fracture was to surgically elevate it on the basis of concerns regarding the cosmetic effect, possible underlying pathological features, and epileptogenicity [7]. Since the 1960s, several studies have shown that for children without evidence of neurological or radiographic intracranial lesions, there were no differences between surgically treated and nonsurgically treated patients in terms of future neurological sequels or in the occurrence of seizures [5, 8].

Surgical treatment is required in cases where the fragments are depressed to the depth of at least one thickness of the skull, and in those with intracranial hematoma, cerebrospinal fluid leak, cosmetically deforming defects, gross wound contamination, and established wound infection [8, 9].

Spontaneous elevation of the depressed skull fractures has been occasionally reported in neonates following birth traumas. During difficult delivery, congenital factors, perinatal factors and obstetric maneuvers may cause depressed skull fractures in neonates [2]. Loeser et al. [5] reported the spontaneous correction of depressed skull fractures for 3 neonates within 1 day to 3.5 months from the time of injury. Lim et al. [10] reported an infant with congenital skull depression that spontaneously resolved within 6 weeks after birth. Hung et al. [11] reported a series of 8 infants with depressed fractures; all resolved spontaneously within 6 months.

After the neonatal period, spontaneous elevation of a ping-pong fracture is an uncommon condition. To our existing knowledge, only 2 cases had been published in the English literature [6, 12] (table 1). Ross [6] reported the spontaneous elevation of a ping-pong fracture in an infant within 4 h after head trauma. Cohen et al. [12] recently reported a 6-month-old infant, whose depressed fracture was spontaneously elevated after a second head injury. Here we present an 11-month-old patient with spontaneous elevation of a ping-pong fracture.

In neonates and infants, the membranous sutures, the fontanelles, and the low level of calcium content in the fetal skull facilitate a great deal of plasticity and allow molding during the passage of the fetus in the process of delivery. Also these features and relatively thin and flexible skull bones facilitate spontaneous elevation for depressed skull fractures in this period of life. We thought that frequent crying with the resulting increase in intracranial pressure caused the elevation of skull fractures. Despite the fact that cerebral edema had been presumed to result in the spontaneous elevation of depressed fractures [13], no such condition was evident in our case.

Neurosurgeons must be aware of the possibility of the spontaneous elevation of depressed skull fractures even in older children. If the patient is neurologically stable, adequate time may be given to the follow-up before surgical intervention, in order to see whether the fracture will spontaneously elevate or not.

Disclosure Statement

None.

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