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“Spontaneous” ping-pong fracture in newborns: case report and review of the literature

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Abstract

“Ping-pong” fractures (PPF) are depressed skull fractures typical of newborns. PPF usually result from head injury and, rarely, may cause severe long-term neurological sequelae. The management of PPF is still controversial. The goal of this paper is to present a case of “spontaneous” ping-pong fracture and to review the pertinent literature of the last 20 years. We report on a newborn who presented with a “spontaneous” parietal depressed skull fracture at birth. Preoperative computed tomography (CT) scan confirmed the PPF and excluded brain injuries. Neurosurgical intervention was performed on day 3 with immediate lifting of the fracture; the postoperative course was uneventful.

During the last 20 years, 22 cases of “spontaneous ping-pong” fractures in newborn have been reported, with different clinical pictures and management but, generally, with a good outcome.

“Ping-pong” fractures can occur in uneventful pregnancies and after uncomplicated vaginal or cesarean deliveries. CT scan, with low-dose protocol for infants, is the gold standard examination to evaluate the fracture and any associated brain lesions. Treatment is selected according to fracture characteristics.

Key words: ping-pong fracture, newborns, CT scan, delivery, neurosurgery

Introduction

“Ping-pong” fractures are depressed skull fractures typically occurring in newborns and infants because of their bone malleability. (1) They usually result from head injuries during complicated deliveries in which instruments or obstetrical maneuvers are necessary or from maternal abdominal trauma during pregnancy. (2) However, in rare cases, these fractures are found in neonates born after an uneventful pregnancy and non-traumatic delivery (vaginal or cesarean), so that they are defined as “spontaneous”. (3) Although infrequently, depressed skull fractures may cause severe long-term neurological sequelae; (4) therefore, it is important to treat them appropriately to avoid complications. The management of ping-pong fractures is not standardized, ranging from neurosurgical correction to conservative treatment (observation). (2)

Herein, we describe the case of a newborn with a spontaneous “ping-pong” fracture and we review all the similar cases described in the literature over the last 20 years.

Case report

This normal-weight female infant was born at term after an elective and uncomplicated cesarean section, performed on the mother’s request. Pregnancy was uneventful and all fetal ultrasound exams were normal. Apgar score was 9 both at one and five minutes from the birth. Birth weight was 3350 g. Physical examination of the newborn was unremarkable except for a 4 x 5 cm depression of the skull in the right temporo-parietal region without skin signs of head injury (figure 1e). The fontanels were soft. Neurological examination was normal.

A computed tomography (CT) scan of the head was planned to assess the characteristics of the fracture and, mainly, to exclude possible underlying brain hemorrhages. CT scan confirmed the depressed fracture involving the right frontal, temporal and parietal bones with moderate compression on the brain and mild diastasis/dislocation of its supero-posterior aspect (figure 1a-d). No intracranial hemorrhage was detected.

The baby underwent neurosurgery because of the extent of the skull depression.

The operation was carried out on day 3 after the birth under general anesthesia. The skull fracture was elevated by using an umber 4 Penfield dissector, introduced in the epidural space through a posterior parietal small burr hole, as the lever. The postoperative course was uneventful and the child was discharged after 24 hours. No neurological problems were detected at 6 months follow-up.

Discussion

Although generally related to traumatic injuries, ping-pong fractures can also occur in uneventful pregnancies and after uncomplicated vaginal or cesarean deliveries. (3) Over the last twenty years, 22 cases of "spontaneous" depressed skull fractures have been reported in the literature (table 1). Probably, these "spontaneous" ping-pong fractures result from continual intrauterine mechanical stresses upon the fetal skull caused by bony structures, such as lumbal L5 vertebra, sacral promontory, pubic symphysis, ischial bone, or by an asymmetric or contracted pelvis, and/or uterine fibromas. (5) Usually, these factors are unpredictable and not related to demographic or obstetric characteristics. Between our and other reported cases, there were not significant differences in maternal age, parity, gestational age, type of delivery, and infant weight.

Almost all the aforementioned 22 neonates underwent CT of the head to define the fracture and detect any associated brain lesions (table 1). In one case, cerebral ultrasounds and X-rays of the skull were used; in another case, CT scans were completed with 3D reconstructions and magnetic resonance imaging (MRI) of the brain. In every newborn, the fracture was unilateral and was not associated with brain injuries. In the baby who underwent MRI to complete imaging, a small lenticular area of hyperintensity overlying the site of fracture was detected, and this finding was most consistent with a subgaleal hematoma; furthermore, a left deviation of the sagittal suture and sinus was found and was thought to suggest a chronic in utero process. (5) CT scan, with low-dose protocol for infants, is the gold standard examination for evaluating the extent and the shape of the fracture and to rule out associated lesions. 3D reconstructions are not strictly necessary and should be avoided if they increase the radiation dose. MRI is usually limited to cases showing doubtful or incidental intracranial findings.

In all reported cases, no early neurological deficits or other clinical associated problems were observed. However, it should be noted that the prognosis for this

kind of fracture depends on the associated lesions, such as cerebral contusions or hemorrhages: immediate neurological consequences and long-term deficits or epilepsy have been reported in the literature, mostly related to traumatic ping-pong fractures; therefore, the prompt recognition of this kind of lesion is important for the long term outcome of newborns. (3,4,6)

The management of depressed skull fractures is variable. (2) Neurosurgery is the traditional treatment; it requires general anesthesia but permits rapid, complete and effective resolution. Some alternatives to neurosurgery have been proposed, such as the use of a breast milk extractor or vacuum extractor. (1) In some cases, even spontaneous resolution has been observed, (7) but there are no specific and clear waiting times. In the present case, a surgical operation was performed because of the extent of the skull depression, partially involving 3 cranial bones, and because of the moderate brain compression the onset of which could not be established. We obtained excellent outcomes, both in the postoperative course and the follow-up period, without any neurological problems detected 6 months after discharge.

In conclusion, although these fractures are rare and without further neurological consequences, their prompt recognition in newborns is essential to establish fast and adequate treatment, mainly related to controlling clinically associated problems, such as seizures.

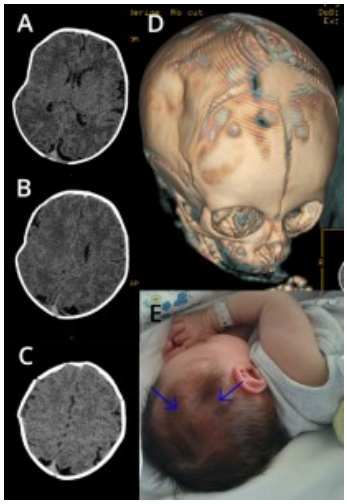
Table 1. Reports in literature.

Reference	N.of cases	Maternal Age (MA) Pregnancy (single/twin) Delivery	Gestational age (GA)Neonatal weight (NW)Apgar scores	Fractured bone	Diagnostic work-up	Associated brain lesions	Treatment	Follow-up and outcome
Mastrapa TL et al. (1)	1	Cesarean section	Not reported	Not reported	Cerebral ultrasoundsand X-Rays of the skull	None	Breast milk extractor after 48 hours of observation	Clinical evaluation weekly for 2 weeks, then monthly until 1 year of

							age; EEG at 6 months
Dupuis O et al. (3)	18	MA 31.16 ± 5.95 yearsAll singleElective cesarean (5) Cesarean during labor (5) Vaginal (8)	GA 39.15 ± 2.28 weeksNW 3154.7 ± 648.93 g	Mainly unilateral	Brain CT scan	None	Not reported	52 months follow-upGood outcome
Aliabadi H et al. (5)	1	MA 36SingleUrgent Cesarean	GA 39 weeksNW 4190 gApgar 9-9	Right parietal	Brain 3D CT scan andMRI	Lenticular shaped blood collection on MRI, leftward deviation of the sagittal suture and sinus on CT scan	Watchful waiting, then surgically corrected at one month of age	Not reported
Basaldella L et al. (7)	2	Cesarean section	Not reported	Not reported	Brain CT scan	None	Spontaneous resolution	Clinical evaluation at 6 and 12 months
Present case	1	MA 34SingleCesarean section	GA 39NW 3350Apgar 9-9	Right temporo-parietal	Brain CT scan	None	Surgical correction	Clinical evaluation at 1 and 6 months; 8-month follow-up; good outcome

Figure 1. Preoperative computed tomography scan, axial cuts (a,b,c) e 3D reconstruction (d) showing the depressed skull frature involving temporal, frontal

and parietale bones (d), and its compression on the brain revealed by the reduction/disappearance of the underlying subarachnoid spaces (a,b). A diastasis of the superior edges of the fractures is appreciable (c). Picture of the newborn showing a right sided 4 x 5 cm depression of the skull (e).



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