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CASE REPORT

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Spontaneous ping-pong fracture in a full-term neonate—a case report

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Abstract

Background Non-traumatic depressed skull fracture in a neonate delivered by cesarean section is a rare phenomenon. The incidence reported in literature varies between 1 and 2.5 in every 10,000 live births. The skull is transformed from its normal convex shape to a more concave form due to easy malleability. This is secondary to the lack of complete ossification in the neonatal period. Hence, it is commonly known as ping-pong fracture. The clinical presentation may vary depending on the severity of the fracture and underlying parenchymal injury. Most cases reported in literature have been managed conservatively. However, surgical elevation and the use of medical devices may be advised in severe cases.

Case presentation We report the presentation, course, and management of a term female neonate with a spontaneous ping-pong fracture. The neonate had no history suggestive of antenatal insult, difficult labor, or trauma due to instrumentation during delivery. The infant was thoroughly investigated for underlying parenchymal injury, observed for neurological abnormality, and managed conservatively.

Conclusion Thus, ping-pong fractures or spontaneous neonatal skull fractures are rare but can be encountered in clinical practice. A thorough clinical examination and neurological assessment can aid management decisions.

Keywords Ping-Pong fracture, Neonatal fracture, Congenital skull depression

Background

Depressed skull fractures (DSF) are commonly associated with traumatic or instrumental delivery. Non-traumatic or spontaneous skull fractures are rare with an incidence of 1–2/10,000 births [1, 2]. They are also referred to as ping-pong or greenstick fractures as the skull is transformed from its normal convex shape to a more concave form due to easy malleability and lack of complete ossification [3].

The etiopathogenesis and optimal management of DSF is still controversial and the exact cause is unknown. However, many theories of the origin of these fractures have been proposed. The possible causes include cartilaginous nature and easy malleability of the fetal skull, compression by fetal limbs, compression of the fetal head by the maternal sacral promontory, trauma to the maternal abdomen, and instrumental deliveries [4]. It is, in fact, an inward buckling of the calvarial bones and no fracture line can be found. Thus they are not true fractures but congenital molding depressions [1, 4, 5]. A depression of more than 5 mm may impinge on the cerebral cortex resulting in cerebral edema and may lead to decreased blood flow [6]. About 25% of the cases are associated with cortical lacerations [5].

The diagnosis is usually clinical, based on an examination of the skull. An X-ray may aid in defining the degree of deformation. Advanced imaging may be required to exclude intracranial hemorrhage or cerebral edema [2]. The management is controversial. Small lesions are mostly managed conservatively. Larger lesions (> 3 cm)

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and lesions with a mass effect leading to midline shift often require corrective surgery [7].

Case presentation

We report the case of a full-term female neonate, born at 38 weeks of gestation by elective C-section to a 30-year-old primigravida mother. The antenatal scans were normal and there was no history of trauma or fall during the antenatal period. The neonate was vertex in presentation and the amniotic fluid was clear. The C-section was uneventful, there no was a history of instrumentation before or during delivery. The infant was appropriate for gestational age with a birth weight of 3050 g, length 46 cm, and head circumference 34 cm. The Apgar scores were 9, 10, and 10 at 1, 5, and 10 min, respectively. The newborn was admitted to the NICU for transient tachypnea.

On examination, it was noted that the neonate had a depression on the right temporoparietal region measuring 5.5 × 3 cm, not associated with scalp swelling, bruising, or laceration (Fig. 1).

The neurological examination and sensorium of the neonate were normal. There were no other anomalies noted. The infant required respiratory support with a humidified high-flow nasal cannula for 6 h after which it was tapered. She was started on direct breastfeeding at 6 h of life.

The infant was investigated with an x-ray skull. It showed a focal area of increased lucency in the right temporal region (Fig. 2). Brain ultrasound showed a depressed fracture in the right temporoparietal bone without a fracture line (Fig. 3), and computed tomography (CT) and three-dimensional computed tomography (3D CT) were performed which confirmed the fracture and revealed no underlying intracerebral bleed or mass effect (Fig. 4). The case was discussed with the neurosurgeon, and conservative management was advised. She was observed for 72 h and discharged with neuro-surgical and neonatal follow-up.

Fig. 1 Picture of the newborn showing a right-sided 3 × 5.5 cm depression of the skull

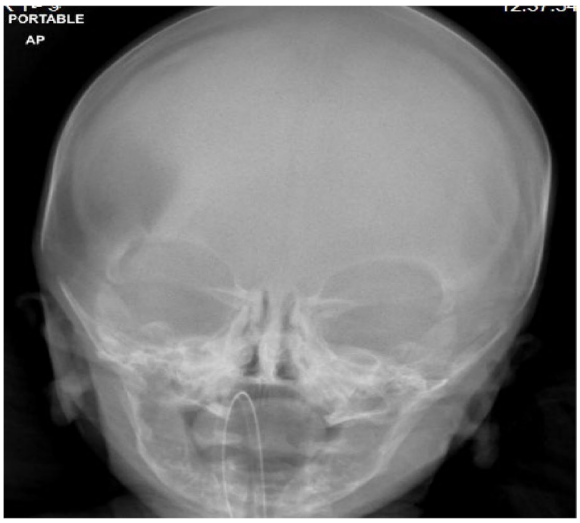

Fig. 2 Skull x-ray showing a focal area of increased lucency in the right temporal region

Discussion

With the advances in neonatal and obstetric care, neonatal fractures and birth injuries are rare. In most cases, they are caused by trauma during instrumental delivery or during obstetric maneuvers in a difficult delivery [6, 8,

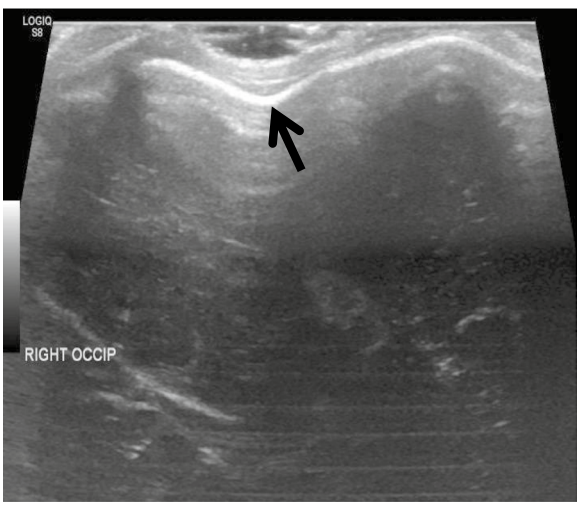

Fig. 3 Head US: ping-pong fracture in a transcranial scan (arrow)

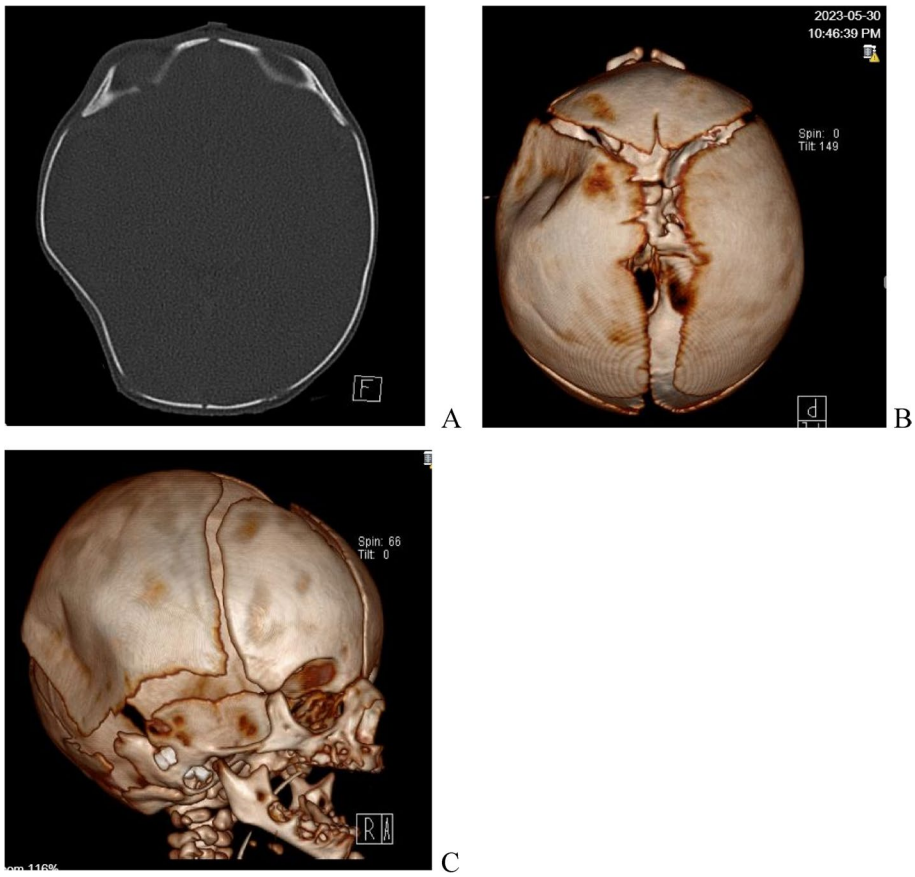

Fig. 4 CT scan **A** and 3D computed tomography scan reconstruction **B**, **C** showing the depressed skull fracture involving right temporoparietal bones

9]. Although associated parenchymal injuries are rare, if they occur, can have long-standing consequences.

Bhat et al. [10] in their study on neonatal fractures during delivery reported an incidence of 1 in 1000 neonates. Depressed skull fractures accounted for 11.4% of these. Dupuis et al. in their retrospective case–control analysis in France compared spontaneous and instrumental obstetric depressed skull fractures over a decade. They reported 75 cases of depressed skull fracture at an incidence of approximately 1 in every 26,000 deliveries. Of the 68 cases that were further analyzed, 18 were spontaneous and 50 were instrumental deliveries [11]. Thus, spontaneous skull fractures in neonates are not very common, and published literature on this subject is limited.

Ben-Ari et al. classified the skull depression into two types—depression without a fracture and depression with a fracture line. The difference between these types is whether the cause is related to trauma or a direct pressure effect of an external structure on the developing.

Skull. The first type has also been described as "faulty fetal packing" or congenital vault depression [12]. Some authors compared skull depressions to a 'greenstick' fracture found in the long bones of children [2, 11]. Another review described three types of skull fractures in newborns-linear, depressed or "ping-pong" and occipital osteodiastasis [9, 13, 14]. The parietal bones are reported to be most commonly affected followed by the frontal bones [9, 15].

There is no clear consensus on the ideal treatment modality. Previously, most ping-pong fractures in neonates were managed surgically. However, recently there has been a trend towards conservative management [13]. However, there is no definite parameter to predict which fractures will elevate spontaneously. Parental anxiety is common and cosmetic concerns may influence management [3, 7, 16].

Conclusion

Ping-pong fractures or spontaneous neonatal skull fractures are rare, but can be encountered in clinical practice. A detailed natal history and postnatal clinical and neurological assessment can help differentiate between "spontaneous" and "instrument-associated" skull fractures.

Radiological imaging seldom provides sufficient information to differentiate between the two etiologies. Prognosis is good in spontaneous cases, as they are rarely associated with intracranial injuries, resolving spontaneously within 6 months.

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Authors' contributions
WA collected the details and images. SU was responsible for the manuscript and consents.

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Availability of data and materials
Data were collected from medical files and are not publicly available due to patient confidentiality but are available through the corresponding author under clearly justified academic requests.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Written informed consent was obtained from the parents of the newborn for publication of this case and the accompanying Images. A copy of the written consent is available for review.

Competing interests
The authors declare that they have no competing interests.

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