RADIOGRAPHIC QUIZ From pages 14-15

Brief overview of this condition
In neurologic emergencies in children, neuroimaging is very often needed because of the limitations in gathering an accurate history as well as difficulties with performing the neurologic examination. In such a situation, the challenge for the physician is in deciding if an imaging test is required emergently and what is the most appropriate imaging test.

CT is considered the modality of choice in situations when determination of etiology needs to be done emergently, because of deteriorating neurologic status secondary to suspected hemorrhage during trauma, and in uncooperative patients. CT is also very useful for detection of calcifications, bony structures, and before a lumbar puncture to rule out a mass or bleeding. MRI imaging is superior to CT in the evaluation of epilepsy, known tumors, white matter pathology, and infection/inflammation in the brain.

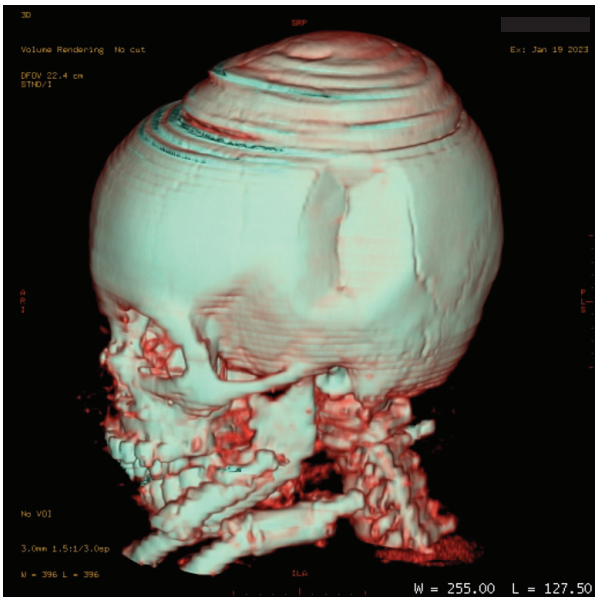
The diagnosis of pediatric head trauma requires a multidisciplinary approach, and the use of neurologic imaging plays a crucial role for diagnosis. The initial imaging study is often a head CT because of its high sensitivity in detecting acute hemorrhages and fractures. However, CT is not always ideal because it requires children to be exposed to radiation. MRI imaging has an increased sensitivity and can be performed without radiation; however, it takes much longer time and may require sedation.

■ ACCIDENTAL INJURY

Calvarial fractures are a common cause of pediatric emergencies and can be seen in accidental as well as nonaccidental trauma. About 20% of skull fractures occur at the skull base, they are the most fatal, and are reported to be found in 80% of autopsies of head trauma patients. About 75% to 90% of depressed fractures are open fractures.

A noncontrast CT can demonstrate linear, depressed or elevated, skull-base, temporal bone, and growing skull fractures. True acute calvarial fracture demonstrate a linear course with overlying soft tissue swelling. They lack well-defined sclerotic borders and most commonly present unilaterally and asymmetrically. It is important to distinguish normal sutures, accessory sutures, and Wormian bones in children from a calvarial fracture. Normal sutures have a zigzag appearance and sclerotic borders, and are symmetric.

It can be classified into two main categories; congenital and acquired. Congenital fracture occurs either antenatally due to in utero pressure of the limbs on the skull surface, or during birth due to pressure from the mother's sacral promontory or symphysis pubis against the skull. Acquired



fractures are usually related to obstetric intervention or postnatal trauma. Clinically, the fracture appears as a deformity of the surface of the skull usually without associated symptoms unless there is associated intracranial injury. Plain X-ray may show focal skull deformity with inward indentation.

This can be treated conservatively or surgically depending upon the severity of depression and presence of associated intracranial injury. Small fractures and those diagnosed at birth may resolve spontaneously. However, large fractures (>3 cm) and those which occur following head injury are unlikely to resolve spontaneously and usually require intervention. There are many nonsurgical reduction techniques used to elevate the depressed fracture using digital manipulation and vacuum devices such as an obstetrical vacuum extractor. Complicated fractures require corrective surgery or minimally invasive borehole technique for reduction.

■ DESCRIPTION OF THE IMAGES

Depressed left parietal skull fracture (ping pong fracture) by inner bulking of the calvarium accompanied by small epidural hematoma and subgaleal hematoma with a visible line of fracture. The depressed fragment is 5 mm inward.

By definition ping pong skull fracture or pond fracture is inward buckling of the calvarium that occurs in neonates and young children due to direct trauma to the skull. This is equivalent to a greenstick fracture of the long bones, and the fracture line is not visualized radiologically, usually without associated symptoms; however, in rare occasions, fracture and associated brain injury, like intraparenchymal hematoma, subdural or epidural hematomas could be associated as in the case presented due to high impact to the cranium.

Answer to Radiographic Quiz

■ REFERENCES

1. Saigal G, Ezuddin NS, Vega G. Neurologic Emergencies in Pediatric Patients Including Accidental and Nonaccidental Trauma. Neuroimaging Clin N Am. 2018; 28(3): 453-470. DOI: 10.1016/j.nic.2018.03.007

2. Zia Z, Morris AM, Paw R. Ping-pong fracture. Emerg Med J. 2007; 24(10): 731. DOI:10.1136/emj.2006.043570

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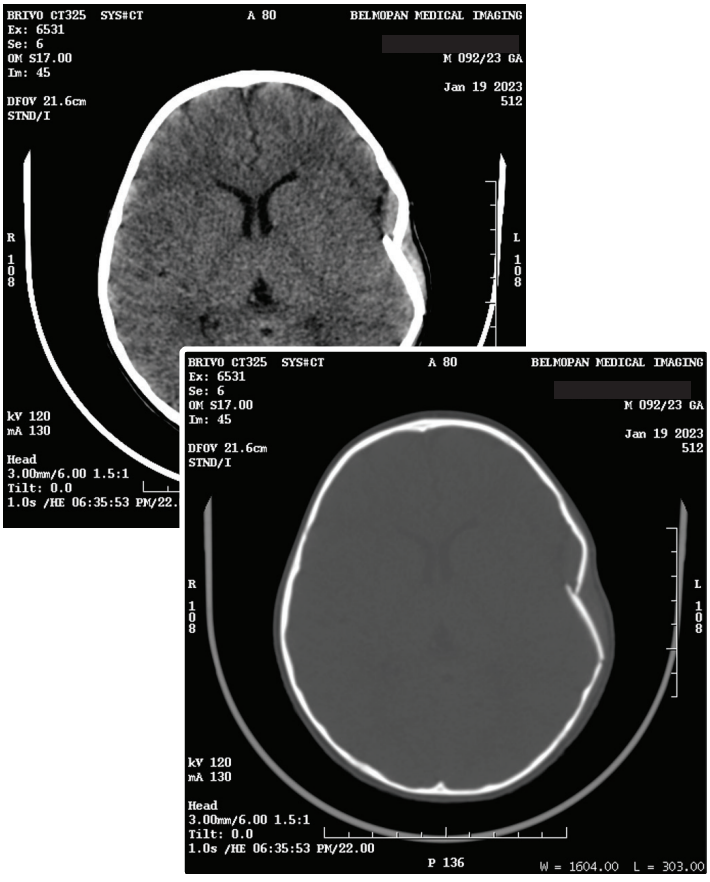

Please, respond False or True

__T__ *There is an abnormal epidural collection*
__T__ *There is a depressed fracture*
__T__ *There is a subgaleal hematoma*
__F__ *There is a subarachnoid hemorrhage*
__T__ *This fracture could be considered as a ping pong fracture*

What is the most likely diagnosis?

__X__ *Left parietal depressed fracture associated with an epidural and subgaleal hematoma*
_____ *Left parietal linear fracture associated with an epidural hematoma*
_____ *Left parietal depressed fracture associated with venous thrombosis*

What is the first most appropriate imaging test in children with head trauma?

_____ *Skull X ray*
__X__ *Plain brain CT*
_____ *Brain MRI*

Respond True or False regarding to infant head trauma

__T__ *The initial imaging study is often a head CT because of its high sensitivity in detecting acute hemorrhages and fractures.*
__T__ *MR imaging has an increased sensitivity and can be performed without radiation; however, it takes a much longer time and may require sedation.*
__T__ *CT angiography study may be warranted to evaluate for suspected vascular injuries*
__T__ *Multiplanar and 3D reconstructions increase the sensibility to detect fractures and small hemorrhages*
__T__ *Include the cervical spine at least to C2 in patients less than 8 years is recommended*
__T__ *Depressed fracture usually requires surgery if the depression is larger than 5 mm*