

Thoracic Spine Fracture in 18 Month Old Child; Case Report

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Abstract

Background Data: Spinal column trauma is relatively uncommon in pediatric patient and not frequently encountered among the 1st two years especially in the thoracic region.

Purpose: To describe a rare presentation of thoracic spine fracture within the first 2 years of age.

Study Design: A case report.

Patients and Methods: We report case of 18 month old male patient with significant both lower limbs weakness after history of falling from height. Examination revealed paraplegia while full motor power of both upper limbs. Computed Tomography (CT) thoracic spine showed compression fracture of the sixth thoracic vertebrae. This has been confirmed by magnetic resonance imaging (MRI) that showed significant central cord contusion opposed this fracture. Conservative treatment was selected with custom made spine brace associated with physiotherapy sessions.

Results: Spontaneous volitional lower limb movements have been reported within 8 months after the insult.

Conclusion: The neurologic deficit is still the key for the examiner to suspect the presence of spinal cord insult that can be associated spine fracture especially in this young age. (2016ESJ120)

Keywords: Thoracic spine, pediatric, trauma

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Introduction

Spine fractures in children represent about 2% of all pediatric fractures (since birth till about 18 years) and most of these injuries involve the cervical spine. Incidence of multilevel spine injury ranges from 6% to 50 % in pediatric patients with spine injury.^{12,13} Spine fractures are common after polytrauma and falling from height but not common in pediatrics especially below age of 2 years, so emergency physicians and neurosurgeons may miss these fractures as they do not expect their occurrence especially when the patient is neurologically intact.¹² Presence of a neurological deficit alarms minds to investigate the brain and spine and according to the level of the deficit, the level of the injury is detected.^{7,15}

Case Report:

Eighteen-month-old male toddler was admitted to the emergency department with history of falling from height and presented with multiple abrasions all over face and upper limbs then referred for neurosurgical consultation. The parents claimed that the baby had fallen from the second floor onto ground at about 7 meters height.

The child was admitted to the neurosurgery department for further evaluation and assessment one day after coming to the emergency department. At the time of presentation the child was drowsy with weak cry and Glasgow coma scale (GCS) of 14/15, stable vital signs (blood pressure was 95/50 mmHg, heart rate was 150 beats/minute, respiratory rate was 23 breaths/minute) and 98% SPO2 value.

On neurological examination: Motor power was grade 0/5 on both lower limbs, with intact power on upper limbs (5/5) with preserved sensation of pain. Examination and radiological investigations of the respiratory, cardiovascular and musculoskeletal systems were fair except presence of mild free intraperitoneal collection and multiple fissures on both forearm bones. CT-scan of the brain, cervical spine X-ray imaging and CT-scan of cervical spine were normal while the thoracic spine CT-scan revealed wedged fracture of the 6th thoracic vertebrae (Figure 1). Full spine magnetic resonance imaging (MRI) revealed spinal cord contusion opposite this wedged vertebrae (hyperintense signal in T2, mild hypointense to isotense signal in T1) (Figure 2).

Conservative management was applied with custom made thoracic spine brace that was instructed for wearing for about three months. Bilateral forearm casts and medications like antibiotics, analgesics plus fluids maintenance, as the pediatric surgery team recommended. The child started the physiotherapy program and continued it on outpatient basis.

After about 14 days, the patient was discharged on basis of close outpatient follow-up protocol with the pediatric surgery and Neurosurgery. Continuous sessions of physiotherapy were done while admission and after discharge from hospital. Within 8 months, the lower limbs showed spontaneous volitional movements and motor power improved till functional neurological recovery happened. This improvement has been reported after strict course of physiotherapy including joint mobilization, manipulation, electrotherapy and rehabilitation programs.

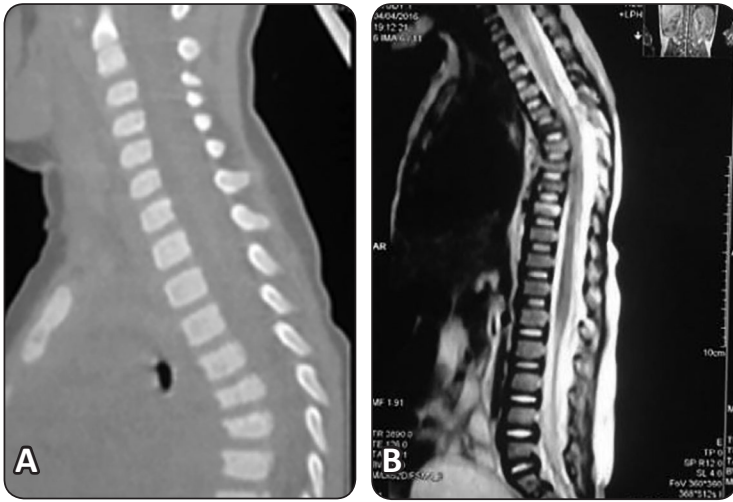


Figure 1.

(A) CT sagittal view of cervicothoracic spine that showing compression fracture of the 6th thoracic vertebrae, (B) MRI T2 sagittal view of thoracic spine showing the fracture level and central spinal cord contusion opposite and above the fracture level.

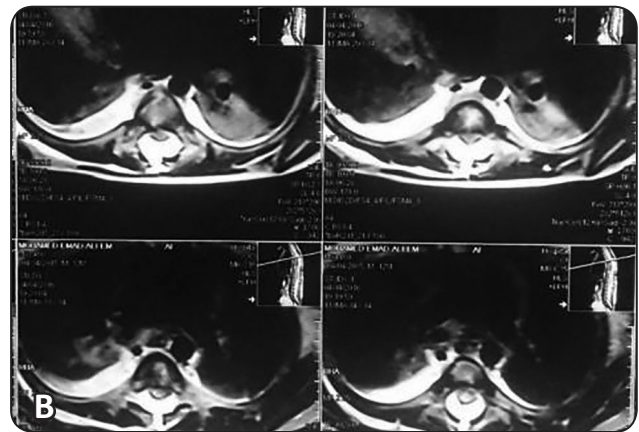
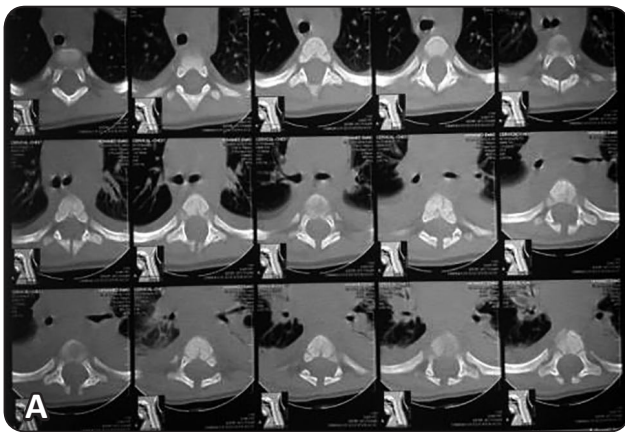


Figure 2. (A) CT axial view of thoracic spine that showing multiple fissure fractures of the 6th thoracic vertebrae, (B) MRI T2 axial view of thoracic spine showing the central spinal cord contusion opposite and above the fracture level.



Figure 3. The child after applying the custom made thoracolumbar brace.



Figure 4. Thoracic spine X-ray lateral view showing the fractured vertebrae 6 months after the trauma.

Discussion

Pediatric spinal column and spinal cord deal with direct impact and indirect acceleration/ deceleration or shear forces differently compared to adult patients.⁸ High-speed, impact injuries and falling from height are usually the causes of fracture spine in pediatrics.¹⁶ Occurrence of spine fractures in children represent 1% to 3% of all pediatric fractures. Children less than 5 years old and children more than 10 years old represent a large percentage of those who have spine fractures. Traumatic retropulsion of the thoracic spine with spinal cord injury is possible in young age when exposed to a significant trauma.⁵ Compression fractures are characterized by a wedge shaped deformity of the involved vertebral body with interruption/fracture of the anterior vertebral contour. Compression fractures are typically stable if they involve only the anterior column of the vertebral column.^{1,2} Magnetic resonance imaging is more sensitive for disco-ligamentous and spinal cord injuries. Fractures occur less frequently in the thoracic spine because of the stabilizing effects of the rib cage.^{8,9}

The elasticity of the pediatric spinal column probably allows some protection against spinal cord trauma that might cause fracture in older patients.¹ This mobility and elasticity in the infant spine explains the relatively low incidence of spinal column injuries and the proportionately high incidence of spinal cord injuries without radiographic abnormalities (SCIWORA).^{3,7} However; in our case a compression fracture along with an opposite cord contusion were encountered.

Flexion, extension, rotation, axial (top) loading and distraction (pulling) have all been implicated among the patterns of pediatric spinal cord and spinal column injury.^{3,15} The most frequent mechanism of injury is traumatism,

with a predominance of traffic accidents (being more frequent among young people). Falls and SCI with a medical etiology are more usual in older people.⁹ Interruption of blood flow to the spinal cord either by compression or disruption has also been documented.⁵ Compression of the spinal cord by blood clots, fractured bones, bending or buckling of ligaments, and angulation of the spinal column have also described in many reports.⁵ It is also possible that various underlying congenital and acquired diseases may also contribute to the risk of spinal cord injury.⁹

There is a wide variety of fracture types, ranging from simple linear fractures affecting the vertebral bodies or posterior portion of the spine, to complex fractures involving several elements of the spine or possibly several vertebral levels. A fracture may or may not make the spinal column unstable, depending on its type and severity. In addition, a fracture may or may not compress the spinal cord and cause spinal cord injury. A dislocation, otherwise known as spondylolisthesis, refers to abnormal position and motion between vertebral levels in the spine.

Typically, dislocations are caused by injuries of the ligaments that traverse between each vertebral level.¹² In addition to ligamentous injuries, disruption of the intervertebral disks may also contribute to spinal dislocation. Obviously, fractures and dislocations may exist either independently or in combination with each other.

Complex fracture/dislocations are typically the worst type of vertebral column injury and imply both bony and ligamentous disruption. These patients usually have the most severe neurological injuries as well. Spinal cord injury in the pediatric age group is usually accompanied by a traumatic insult and varying degrees of

neurological deficit occur. The deficit may range from an incomplete spinal cord injury where partial loss of function in the arms or legs is present to complete spinal cord injuries where all function below the level of injury is lost.¹³

Fracture spine may be symptomatic or asymptomatic and much care must be provided not to miss any fracture spine especially in the pediatric age. According to the deficit, the level of injury can be localized especially if associated with lower limbs deficits.¹⁰ Spinal cord injuries are ranged from non-radiological detected ones to contusions to cord compression and cord transection that usually resulted from minor to severe trauma, fractures or herniated nucleus pulposus. This patient experienced falling from height and resulted in wedged fracture of the 6th thoracic vertebrae with spinal cord contusion.¹¹

Collapse of the vertebral body in compression fractures occurs most often in the sagittal plane and often heals without surgical intervention.⁶ Nonsurgical management with activity modification and thoracolumbosacral orthosis (TLSO) bracing is generally the management of choice for compression fractures.¹⁴ In single level compression fractures not close to the thoracolumbar junction, bracing is generally for comfort and may be avoided if the patient is comfortable without immobilization.¹⁰ Bracing is usually maintained for 6 to 8 week.^{10,14} Mechanism of injury, neurological status, and integrity of the posterior ligamentous complex (PLC) are the main items that suggest the operative versus the non-operative way.^{4,6,13} In our case, conservative management and applying immobilization device like the thoracolumbar brace was applied for 3 months associated with continuous sets of physiotherapy. (Figures 3, 4)

Conclusion

Suspecting vertebral column injury should be in mind, not only for who are elder than 2 year old, but also who are younger than this, and presence of neurological deficit is still the key landmark that highly suggestive for occurrence of different types spinal cord injuries. Those injuries may be associated with fracture spine but with less percentage in those young age children.

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الملخص العربي

كسر الفقرات الصدرية لطفل عمرة ثمانية عشر شهرا

البيانات الخلفية: تعتبر الكسور بالعمود الفقري من أكثر الأصابات شيوعا فى حالات الطوارئ والأصابات الشديدة ولا سيما فى تخصص جراحه المخ والأعصاب, ولكن معدل ونسبة حدوثها فى سن مبكرة يقللا كلما صغرت السن وحدث مثل تلك الكسور فى سن أصغر من سنتين أمر نادر الحوث جدا, كما هو وارد فى الأدبيات والمراجع الدورية.
الغرض: عرض لحالة كسر بالفقرات الصدرية فى عمر أقل من سنتين.

تصميم الدراسة: تقرير حالة

المرضى والطرق: عرض لحالة مريض عمره ثمانية عشر شهرا أصيب بفقدان الحركة بالطرفين السفليين بشكل مفاجيء بعد سقوطه من أعلى , أدى الى الذهاب للطوارئ وعمل الفحوصات اللازمة على الصدرو البطن والحوض وتم عمل أشعة مقطعية ورنين مغناطيسى على العمودى الفقري والذى أوضح وجود أصابة بالجل الشوكى مقابلة لوجود كسر منضغط بالفقرة السادسة الصدرية وتم استكمال الفحوصات المعملية والتصويرية للتشخيص والمتابعة.

النتائج: فى تلك الحالة تم أتخاذ طريقة العلاج التحفظى وتصميم حزام داعم للفقرات الصدرية القطنية العجزية وارتدائه لمدة لا تقل عن ثمانية أسابيع وتم عمل متابعة دورية بالفحص الأكلينيكي وأشعة اكس على الفقرات الصدرية. مع المواظبة بانتظام على جلسات العلاج الطبيعى والتأهيل تم حدوث تحسن ملحوظ فى القوة الحركية للطرفين السفليين بعد ما يقرب من ثمانية أشهر.

الاستنتاج: تلك الورقة البحثية تعرض وتوثق امكانية حدوث كسر بالفقرات الصدرية فى عمر أقل من سنتين.