Open access Journal of
Neurology & Neurosurgery
ISSN: 2476-0501

Juniper Publishers
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Case Report
Volume 4 Issue 5 - July 2017
DOI: 10.19080/OAJNN.2017.04.555650

Open Access J Neurol Neurosurg

Thoracic Spine Fracture in 18 Month Old Child

Mohamed Elsebaey Elsayed*, Mohamed Okasha and Yasser M Elkhwalka

Department of Neurosurgery, Damanhour Medical National Institute, Egypt

Submission: May 01, 2017; **Published:** July 27, 2017

***Corresponding author:** Mohamed Elsebaey Elsayed, Department of Neurosurgery, Damanhour Medical National Institute, Damanhor, Egypt, Email: seba3y700025@gmail.com

Abstract

Background: Fracture spine is common among the children but not frequently encountered among the 1st two years especially the thoracic region.

Methods: We report case of 18 month old male patient with significant both lower limbs weakness after history of falling from height. Examination revealed full motor power of upper limbs while lower limbs paraplegia. CT thoracic spine showed compression fracture of the fifth and sixth thoracic vertebrae that augmented in diagnosis after the 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 lower limb movements started about 8 months after the insult.

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

Keywords: Thoracic spine; Pediatric; Fracture

Introduction

Nearly three fourths of all radiologically detected spinal injuries are located at the cervical spine. Fractures of the lumbar and thoracic region are rare [1]. Fracture spine is common insult after events of severe multiple trauma and falling from height but not common in the young pediatric age especially below age of 2 years, so many ER and neurosurgery doctors may miss these fractures as they do not expect their presence especially when the child has no neurological deficit and cannot express his back pain and usually accidentally discovered. Presence of neurological deficit and disappropiate motor power between the upper and lower limbs get the minds to go seriously into the full investigations of the brain and spine and according to the level of the deficit, the level of the injury is detected [2,3].

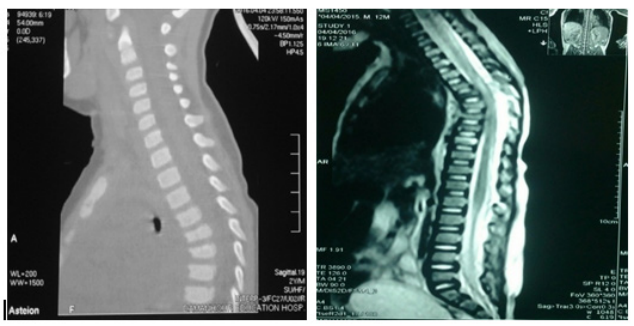
Case Report

An eighteen month old male child with no previously diagnosed chronic diseases consulted to neurosurgery department after admission into the emergency department after claiming history falling from height and presenting with abrasions on the face and upper limbs. The parents claimed that the baby was fallen from height from the second floor into the ground about 7 meters height.

The patient was admitted into the neurosurgery department for further evaluation and assessment. At the time of presentation the patient was drowsy with weak crying and glascow coma scale (GCS) was 14/15, vital signs were stable as blood pressure was 95/50mmHg, heart rate was 150beats/minute, respiratory rate was 23 bearth/minute and SPO_2 value was 98. On neurological examination: lower limbs strength was determined to be zero/5 for both sides according to the medical research council (MRC), but the upper limbs were 5/5 examination of the other systems were normal.

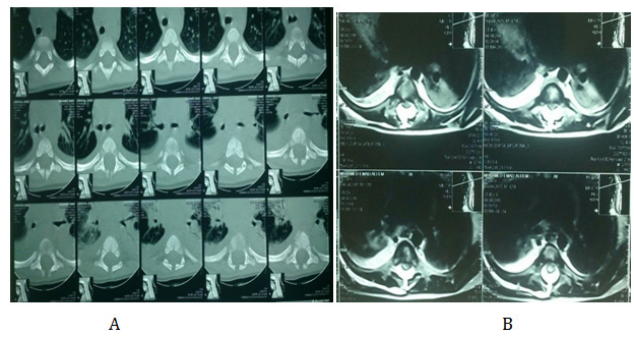
Laboratory values were within normal except hemoglobin was 8.00mg/dl. Radiological evaluation revealed multiple fissures on both forearm bones, normal computerized tomography (CT) of the brain, cervical spine X ray imaging and CT of cervical spine were normal while the thoracic spine CT revealed wedged fracture of the 6th thoracic vertebrae with kyphotic angle (Figure 1). Full spine magnetic resonance imaging (MRI) revealed spinal cord contusion infront of this

wedged vertebrae (hyperintense signal in T2, mild hypointense to isotense signal in T1) (Figure 2).



A B

Figure 1: A. CT sagittal view of cervicothoracicspine that showing compression fracture of the 5th and 6ththoracic vertebrae, B. MRI T2 sagittal view of thoracic spine showing the fracture level and central spinal cord contusion opposite and above the fracture level and marked pathological kyphotic angle.



A B

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.

The patient was examined and admitted into the neurosurgery department for further evaluation and management. The patient was treated in conservative way with custom made thoracic brace and bilateral forearm casts and medical drugs like antibiotics, anti-edematous agents (methyl prednisolone) and deficit and maintenance fluids, along with the pharmacological treatment, the patient started the physiotherapy program and continued it on outpatient basis.

Discussion

The developing pediatric spinal column and spinal cord deal with direct impact and indirect acceleration/deceleration or shear forces very different compared to adult patients [4]. High-speed, impact injuries and falling from height are usually the causes of the fracture spine in pediatrics [5]. Ocurrance of Spine fractures in children represent 1% to 3% of all pediatric fractures. Children <5 years and children >10 years old are showing large percentage of those who have spine fractures. Traumatic retropulsion of the thoracic spine with involvement of the NCS is possible in young age when exposed to a significant trauma [6]. 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. [7,8] 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 [4,9].

There are significant anatomical and biomechanical differences between the pediatric spine and its adult counterpart. Vertebral formation occurs in 3 stages: membranous proliferation, chondrification, and ossification. There are three ossification centres: the centrum of the vertebral body and the right and left centres in the posterior arch. Many of the anatomical differences explain the different injury patterns seen in various age groups. The infant spine, defined as that between 0 and 2 years of age, has tremendous mobility and elasticity due to underdevelopment of the neck muscles, incompletely calcified, wedge-shaped vertebrae, and shallow, horizontally oriented spine (facet) joints [10].

The elasticity of the pediatric spinal column probably allows some protection against spinal cord trauma that might cause fracture in older patients [7]. 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), but in this case the case showing compression fracture and significant cord contusion opposite this fracture [2,10].

Flexion, extension, rotation, axial (top) loading and distraction (pulling) have all been implicated among the patterns of pediatric spinal cord and spinal column injury [10,3]. 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 [11]. Lack of blood flow to the spinal cord either by compression or disruption has also been documented. Compression of the spinal cord from blood clots, fractured bones, bending or buckling of ligaments, and angulation of the spinal column have also described in many reports [12]. It is also possible that underlying diseases that the patient is either born with or develops may also contribute to the risk of spinal cord injury. 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 subluxation, 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 [13]. In addition to

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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 [1].

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 [14]. 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 pulpous. This patient experienced falling from height and resulted in wedged fracture of the 6th thoracic vertebrae with kyphotic angle and opposing spinal cord contusion [15].

Management

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

More recent studies have been used both to support and to oppose treatment of ASCI with steroids [13-15]. The collapse of the vertebral body in compression fractures occurs most often in the sagittal plane and often heals without surgical intervention [16]. Nonsurgical management with activity modification and thoraco lumbo sacralorthosis (TLSO) bracing is generally the management of choice for compression fractures. In single level compression fractures not close to the thora columbar junction, bracing is generally for comfort and may be avoided if the patient is comfortable without immobilization. Bracing is usually maintained for 6 to 8 week. [13,14] 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. The classic rule that that the stable fracture can be treated conservatively while unstable fractures require surgical stabilization [17]. Conservative management and applying immobilization device like the thoraco lumbar brace was applied for 3 months at least associated with continuous sets of physiotherapy [8,1] (Figure 3).

Conclusion

Suspecting vertebral column injury should be in mind in those young children, 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, here we report occurrence of this spinal cord injury that associated with compression fracture thoracic spine in 18 month old child to get this our mind.

Conflict of Interest

All authors declare no conflicting interests and none of them are supported/funded by any drug company.

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