Fracture Dislocation of the Thoracic Spine: A Peculiar Mode of Trauma

Corresponding Author:
Dr. Nipun Jindal,
Registrar, Orthopedics, GSMCH - India

Submitting Author:
Dr. Nipun Jindal,
Registrar, Orthopedics, GSMCH - India

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Fracture Dislocation of the Thoracic Spine: A Peculiar Mode of Trauma

Author(s): Jindal N, Sankhala S S

Abstract

Fractures and dislocations of the spine are a result of high energy impacts. The most common causes of spinal trauma are road traffic accidents and fall from height. The energy delivered to the spine and the magnitude and direction of forces that cause the injury determine the type of fracture that follows. We report a cause of non-osteoporotic young spine dislocated by a trivial trauma.

Introduction

Fractures of the lower thoracic and lumbar spine are on the rise secondary to increase in vehicular trauma. In developing countries, fall from height and industrial accidents continue to be the major causes of spinal trauma. All the cases of spinal injury are a result of high energy impacts. We describe an unusual mechanism of dislocation of the lower thoracic spine caused by camel strike.

Case Report(s)

An 18 year old male presented in the emergency room with a history of strike on the mid back by a camel’s forefoot. The patient immediately lost his motor control of the lower limbs and fell down. He was hemodynamically stable and had no concomitant thoracic or head injury. There was no extra spinal skeletal injury. He was an ASIA Impairment scale A. On examination a localized tender kyphotic deformity was evident in lower thoracic region. Radiographs were obtained which showed dislocation at the D10-D11 level (Fig 1). CT scans revealed a burst fracture of the body of D11 in addition to the dislocation (Fig 2). MRI showed edema in all the three columns of the spine signifying a pan-columnar insult (Fig 3).

The patient was operated within 2 days of his trauma by a posterior approach with a transpedicular screw and rod system (fig 4). He was mobilized in bed immediately with the help of a spinal brace which was continued for another 3 months. The duration of final follow up has been 15 months. There has been no incidence of implant failure or recurrence of deformity. He was ASIA Impairment Scale C at the time of final follow up.

Discussion

The most common causes for spinal trauma in developing countries are fall from height, Road traffic accidents and fall of objects on the back in that order. M Razak observed 69% of the thoracolumbar injuries were due to fall from height and rest due to motor vehicle accidents. Carl et al similarly found the cause of injury to be a fall from height in 58% cases as compared to 37% due to Road side accidents. The mechanism for these injuries has been well elucidated with the direction of force vectors well defined in a particular type of injury.

For a spinal burst or compression fracture to occur significant energy needs to transmitted to the column in an axial loading and flexion moment of force. For fracture dislocations to occur a significantly higher force at varying angles to the spinal column is required for the disruption of the column. The mechanics of force in the above foresaid case are unusual since the trauma of the magnitude of fracture dislocation is rare with a relatively trivial force.

On eliciting a meticulous history it was found out that the camel was not provoked. It is common for camels to scratch their bodies lifting their forefoot which is a low energy kick. The patient recalled standing behind a wall with his back towards the camel when he was struck. It was difficult to determine the exact site of camel strike or the level of the wall as there was no local skin changes in the form of contusion or abrasion. An attempt was then made to comprehend the mechanics of such a low energy force in causing a crippling spinal injury. In authors opinion one of the following four circumstances would have been responsible for the injury –

1) Had the victim been standing in open area and not constrained by anything, the push would have merely plunged the patient forward and at most would have resulted in a fall (fig 5a). This pure forward displacement would have been inadequate in causing spinal dislocation.

2) If the site of force from behind would have been below the level of wall, the forces would have been
distributed from the anterior abdominal wall. This would have possibly caused a blunt trauma abdomen or if the force vectors were efficiently distributed over a large area, no injury at all (fig 5b). This mechanism too fails to explain the dislocation.

3) Had the impact been at the level of wall, there would have been increase in the circumferential pressure and would have resulted in probably a rib fracture or at most blunt trauma chest (fig 5c).

4) The force from behind if above the level of the wall would have been countered by a similar reaction from the wall top. Since the two vectors were opposite in direction and not at same level, they would have resulted in a coupling force at the back between the levels of strike and the wall (fig 5d).

In our estimation the mechanism last described would have been the cause of the injury. The wall gave the force a flexion vector because of its rigid nature. The wall acting as a counter reaction to the forward directed force localized whole of the impact to the area between the point of camel strike and the top of the wall. This resulted in exponential increase in forces which resulted in injury of the magnitude of dislocation. The shear resulted in endplate fracture of the eleventh thoracic vertebra and brought whole of the spinal column above it in front causing a dislocation.

Concomitant injuries are common to the head, chest and musculoskeletal system in cases of fracture dislocation of spine. Nearly one third sustain injuries to one organ system in addition to the spinal injury; 10%-20% sustain injuries to two systems while 5% sustain injury to three or more system4. No associated trauma was encountered in this case because of the low energy impact. The damage to the neural elements was obvious in the pre operative MRI scans and at the time of final follow up the patient was ASIA impairment Scale C. Anderson et al5 found out that spinal injury was missed in 24% of their patients at the initial evaluation. This applies more to the low energy injuries where the surgeon is generally caught unawares and misses these crucial injuries.

Conclusion

This report aims to stress the importance of a complete clinical evaluation in trauma patients and attempts to explain the mechanism of injury in this particular low energy impact. With emergence of cases like this, it becomes imperative to examine the back in virtually all the cases of trauma. This especially applies to the spectrum of injuries where the mechanism is clubbed under the general constellation of ‘Road traffic accidents’. This is because the mechanics of force involved in high energy accidents are highly variable and unpredictable. Since the diagnosis of a spinal injury in the first assessment itself has a great bearing on the final outcome of injury, it becomes very important to suspect each trauma victim as having a spinal injury unless proven otherwise.

References

Illustrations

Illustration 1

Preoperative lateral radiograph showing dislocation at D10-D11 level

Illustration 2

Preoperative CT scan showing a shear fracture of the superior end plate of D11 vertebra
Illustration 3

Preoperative MRI sagittal cut T2W showing edema in all the three columns of the spine

Illustration 4

Postoperative radiograph showing the restoration of the spinal contours
Illustration 5

Figures depicting probable mechanism of injury (refer to text for detailed description)
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