Trauma Mon. 2016 February; 21(1): e19841. doi: 10.5812/traumamon.19841

Published online 2016 February 6. **Case Report**

Missed Traumatic Thoracic Spondyloptosis With no Neurological Deficit: A Case Report and Literature Review

Kamran Farooque,[1] Kavin Khatri,[2,*] and Ankit Gupta[1]

[1]Department of Orthopaedics, Jai Prakash Narayan Apex Trauma Centre All India Institute of Medical Sciences, Safdarjung Enclave New Delhi, Delhi, India
[2]Department of Orthopaedics, GGS Medical College, Faridkot, India

*Corresponding author: Kavin Khatri, Department of Orthopaedics, GGS Medical College, Pin-151203, Faridkot, India. Tel: +91-7837540662, E-mail: kavinkhatri84@gmail.com

Received 2014 April 30; **Revised** 2014 October 7; **Accepted** 2015 January 10.

Abstract

Introduction: Traumatic thoracic spondyloptosis is caused by high energy trauma and is usually associated with severe neurological deficit. Cases presenting without any neurological deficit can be difficult to diagnose and manage.

Case Presentation: We reported a four-week spondyloptosis of the ninth thoracic vertebra over the tenth thoracic vertebra, in a 20-year-old male without any neurological deficit. The patient had associated chest injuries. The spine injury was managed surgically with in-situ posterior instrumentation and fusion. The patient tolerated the operation well and postoperatively there was no neurological deterioration or surgical complication.

Conclusions: Patients presenting with spondyloptosis with no neurological deficit can be managed with in-situ fusion via pedicle screws, especially when presenting late and with minimal kyphosis.

Keywords: Spondyloptosis, Traumatic, Thoracic

1. Introduction

Fracture dislocations, especially spondyloptosis in the thoracic spine are generally associated with neurological deficit (1). The narrow spinal canal in the dorsal spine predisposes cord injury. This type of spinal injury is easily recognized at initial presentation, however when there is no neurological involvement, this might be unrecognizable. Very few cases of thoracic spondyloptosis with no neurological deficit have been reported in the literature. We shall discuss the problems in diagnosis and management of such cases.

2. Case Presentation

We presented a 20-year-old male patient, who fell from a height of about 30 feet. He was initially managed at a nearby community hospital where he was diagnosed to have multiple rib fractures on both sides, with bilateral hemopneumothorax. The primary management of patient was performed with bilateral intercostal chest drains and positive pressure ventilation for lung contusion. The patient had no neurological deficit at initial presentation. He was then referred to our center after four weeks for further management.

On examination, there was tenderness over the tenth thoracic vertebrae with mild knuckle deformity. There was no motor or sensory deficit at any level. Superficial and deep tendon reflexes were normal. Radiographs and computerized tomography showed a fracture dislocation with spondyloptosis of the ninth thoracic vertebra (T9) over the tenth thoracic vertebra (T10) with vertebral body fracture of the eight vertebral body (Figure 1A - C). The pedicles of both T9 and T10 vertebrae were fractured bilaterally, thus separating the posterior elements from their respective vertebral bodies. There was complete spondyloptosis of T9 over T10 vertebral body and both T9 and T10 vertebral bodies could be seen in a single transverse section of computerized tomography (Figure 1D). The patient was scheduled for surgery after improvement in general and lung condition. The spine was approached through standard posterior midline incision. There was no significant kyphosis seen and the posterior elements of the eighth and ninth thoracic vertebrae were lying almost in place with undisplaced fractures in the lamina of respective vertebra. The pedicle screws were inserted in the fifth, sixth and seventh thoracic vertebrae proximally and the tenth, eleventh and twelfth vertebrae distally (Figure 2A - D). An in-situ posterior instrumentation with laminectomy of T8 and T9 vertebrae and posterolateral fusion from the fifth to twelfth thoracic vertebrae was performed.

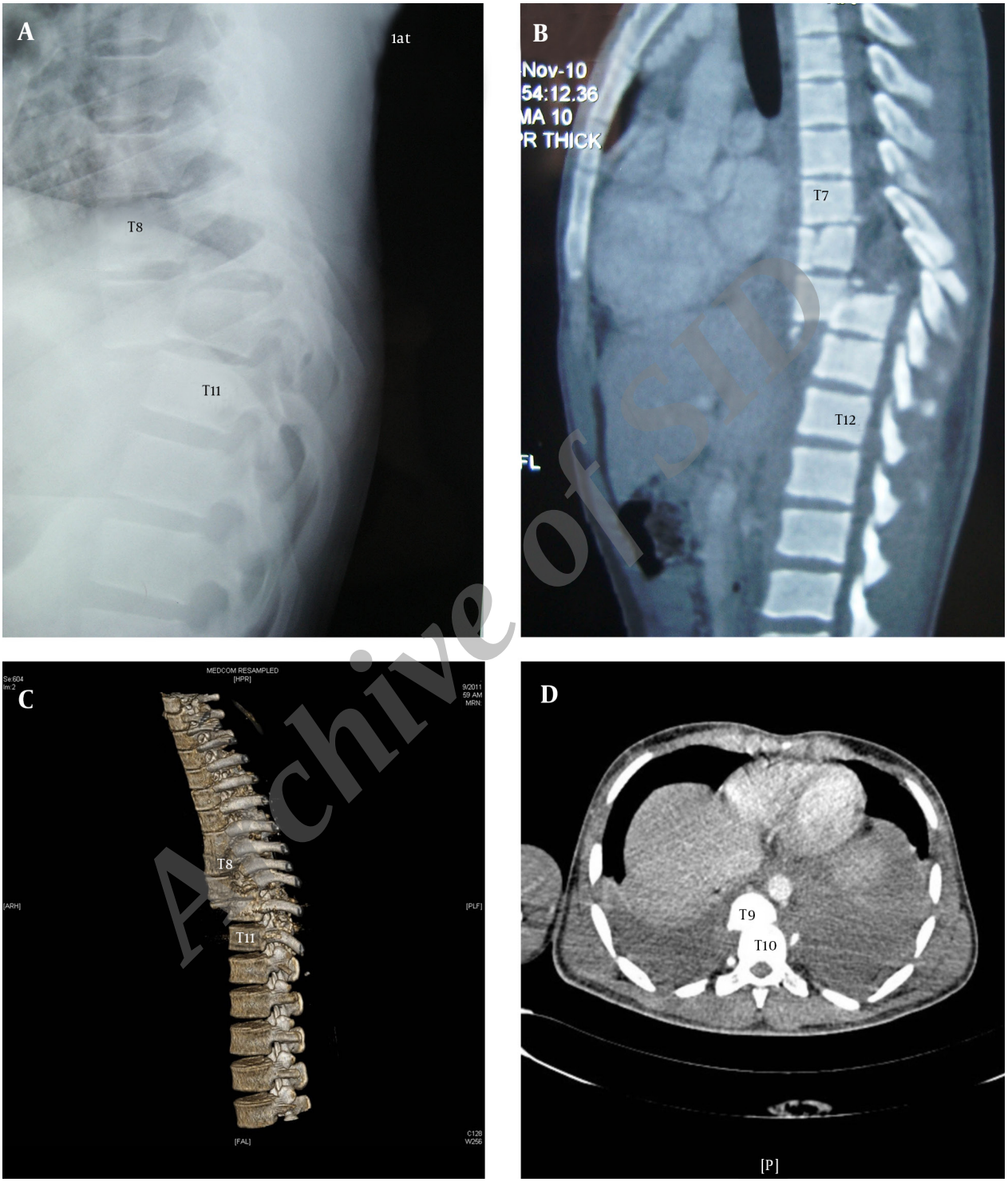

Figure 1. A) Radiograph showing spondyloptosis of the ninth thoracic vertebrae over the tenth thoracic vertebrae, B) Computerized Tomography (CT) confirming the dislocation and vertebral body fracture of the ninth vertebrae, C) Virtual reconstruction computerized tomography of the fracture dislocation, D) Transverse section of computerized tomography showing the ninth thoracic vertebra ahead of the tenth thoracic vertebrae.

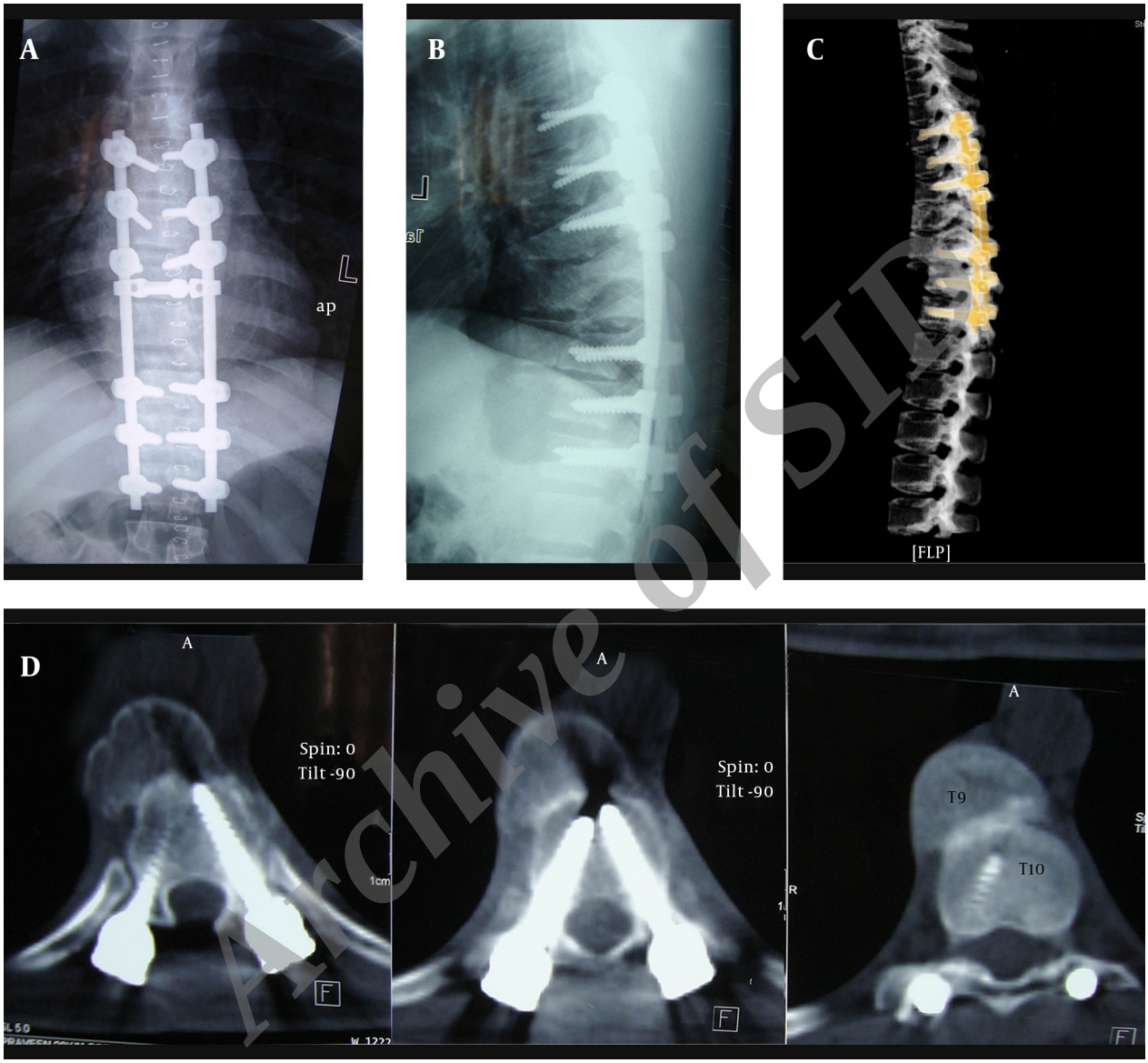

Figure 2. A) Anteroposterior radiograph of thoracic spine showing pedicle screw fixation at six levels (T5 to T7 and T10 to T12), B) Lateral radiograph showing in situ pedicle screw fixation with spondyloptosis of T9 over T10, C) Computerized tomography reconstructed image showing pedicle screw fixation at different levels, D) Transverse sections of computerized tomography showing in situ pedicle screw fixation.

No attempt was made to reduce spondyloptosis of T9 over the T10 vertebrae. The patient tolerated the operation well and there was no postoperative neurological deterioration. He was mobilized with the help of customized dorsolumbar rigid orthosis on fifth postoperative day. He was followed up at monthly intervals and radiographs along with computerized tomography showed satisfactory in situ fusion between T9 and T10 vertebral bodies (Figure 3). The patient returned to his previous occupation.

Figure 3. Follow-up Computerized Tomography, Sagittal Section Showing Bony Formation Between Tenth and Ninth Thoracic Vertebrae

3. Discussion

The thoracic spine is surrounded by the rib cage and strong muscles, which gives it an inherent stability. The anterior and posterior longitudinal ligaments, ligamentum flavum and facet joint orientation also contribute to stability. A significant amount of force is required to cause injury to the thoracic spine. Rotational and shear forces are required to produce complete disruption at the thoracic spine (2-6). Most thoracic fracture dislocations are associated with some form of neurological deficit (7). One of the major factors that determines whether a cord lesion is complete is the size of bony spinal canal with respect to the spinal cord (8). The reason why our patient was neurologically intact can be explained by separation of vertebral bodies from the posterior elements, due to bilateral pedicle fracture at two levels (T9 and T10). This resulted in pseudo-widening of the spinal canal, thus sparing the spinal cord from traumatic injury and consequent neurological deficit.

A screening chest radiograph, in polytrauma patients, usually obscures the dorsal spine and can miss the dorsal spine injury. Dorr et al. (7) reported that presence of a haemothorax is a telltale sign for any associated spinal injury, as 36% of patients with thoracic rotational or shear fractures had haemothorax. In our patient, the primary management was focused on the hemopneumothorax and dorsal spine injury was missed in initial surveys.

There is disruption of all the three columns of spine in these types of rotational injuries leading to instability (2). Therefore, operative intervention is necessary to stabilize the spinal column and prevent spinal cord injury. Simpson et al. (9) reported three cases of thoracic spine translocation without neurological deficit, one was treated operatively with a Harrington rod and postop casting and the remaining two were treated conservatively due to delay in diagnosis and general condition of the patient, but the author recommended operative stabilization as the treatment of choice. Sasson and Mozes (10) reported a similar case in which they did surgical reduction and stabilization with double Harrington rods; the result was satisfactory at two year follow-up.

Both anterior and posterior approaches have been used to manage this type of injury, and in some cases a combination of the two has been contemplated. Shapiro et al. (11) performed anterior instrumentation in 20% of cases treated with internal fixation and reported good results. Weber et al. (12) and Yang et al. (13) in a similar case performed anterior operation for reduction and fixation with plates followed by posterior instrumentation with sublaminar wiring and rods. While, Gitelman et al. (14) and Lee et al. (15) experienced good results with posterior instrumentation with no anterior intervention. Therefore, the appropriate approach in these cases is still debatable; however, most cases were managed via a posterior approach in the literature. A posterior in-situ fixation was preferred in our patient, as he had just recovered from a bilateral chest injury and an additional anterior surgery could have further compromised his chest condition.

Although a half of cases from the literature review performed by Gitelman et al. (14) underwent vertebral body reduction, we did not attempt a vertebral body reduction in our case. There were multiple reasons for this; the foremost being, that there was no neurological deficit and overall thoracic kyphosis was also in acceptable range. The time lag of five weeks between injury and surgery could have made the reduction difficult. Shapiro et al. (11) reported a risk of neurological deterioration when anatomical reduction was attempted in cases of spondyloptosis with no neurological deficit.

Thoracic spondyloptosis with an intact neurology is a

rare entity. A chest radiograph with hemothorax should alert physician to conduct a careful spine examination (both clinically and radiologically), especially in polytrauma patients. Posterior instrumentation and in situ fusion without reduction of vertebral body listhesis is a good option in treatment of cases with intact neurology and minimal kyphosis.

Footnote

Authors' Contribution: Study concept and design: Kamran Farooque, Kavin Khatri; analysis and interpretation of data: Kamran Farooque, Kavin Khatri and Ankit Gupta; drafting of the manuscript: Kamran Farooque, Kavin Khatri and Ankit Gupta; critical revision of the manuscript for important intellectual content: Kavin Khatri and Ankit Gupta; manuscript editing: Kamran Farooque, Kavin Khatri and Ankit Gupta; guarantor: Kavin Khatri.

References

1. Bohlman HH, Freehafer A, Dejak J. The results of treatment of acute injuries of the upper thoracic spine with paralysis. *J Bone Joint Surg Am.* 1985;**67**(3):360–9. [PubMed: 3972862]
2. Denis F. The three column spine and its significance in the classification of acute thoracolumbar spinal injuries. *Spine (Phila Pa 1976).* 1983;**8**(8):817–31. [PubMed: 6670016]
3. el-Khoury GY, Whitten CG. Trauma to the upper thoracic spine: anatomy, biomechanics, and unique imaging features. *AJR Am J Roentgenol.* 1993;**160**(1):95–102. doi: 10.2214/ajr.160.1.8416656. [PubMed: 8416656]
4. Hanley Jr EN, Eskay ML. Thoracic spine fractures. *Orthopedics.* 1989;**12**(5):689–96. [PubMed: 2657681]
5. Holdsworth F. Fractures, dislocations, and fracture-dislocations of the spine. *J Bone Joint Surg Am.* 1970;**52**(8):1534–51. [PubMed: 5483077]
6. Jackson RH, Quisling RG, Day AL. Fracture and complete dislocation of the thoracic or lumbosacral spine: report of three cases. *Neurosurgery.* 1979;**5**(2):250–3. [PubMed: 481729]
7. Dorr LD, Harvey Jr JP, Nickel VL. Clinical review of the early stability of spine injuries. *Spine (Phila Pa 1976).* 1982;**7**(6):545–50. [PubMed: 7167826]
8. El Masri WS, Silver JR. Traumatic spondyloptosis of the dorsal spine with incomplete neurological deficit. *Injury.* 1983;**15**(1):35–7. [PubMed: 6885144]
9. Simpson AH, Williamson DM, Golding SJ, Houghton GR. Thoracic spine translocation without cord injury. *J Bone Joint Surg Br.* 1990;**72**(1):80–3. [PubMed: 2298800]
10. Sasson A, Mozes G. Complete fracture-dislocation of the thoracic spine without neurologic deficit. A case report. *Spine (Phila Pa 1976).* 1987;**12**(1):67–70. [PubMed: 3576360]
11. Shapiro S, Abel T, Rodgers RB. Traumatic thoracic spinal fracture dislocation with minimal or no cord injury. Report of four cases and review of the literature. *J Neurosurg.* 2002;**96**(3 Suppl):333–7. [PubMed: 11990843]
12. Weber SC, Sutherland GH. An unusual rotational fracture-dislocation of the thoracic spine without neurologic sequelae internally fixed with a combined anterior and posterior approach. *J Trauma.* 1986;**26**(5):474–9. [PubMed: 3701899]
13. Yang SC, Yu SW, Chen YJ, Chen WJ. Surgical treatment for thoracic spine fracture-dislocation without neurological deficit. *J Formos Med Assoc.* 2003;**102**(8):581–5. [PubMed: 14569326]
14. Gitelman A, Most MJ, Stephen M. Traumatic thoracic spondyloptosis without neurologic deficit, and treatment with in situ fusion. *Am J Orthop (Belle Mead NJ).* 2009;**38**(10):E162–5. [PubMed: 20011746]
15. Lee CW, Sun Hwang SC, Im SB, Bun TK, Shin WH, Lee. Traumatic Thoracic Spondyloptosis: a Case Report. *J Korean Neurosurg Soc .* 2004;**35**(6):624.