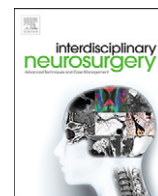




Contents lists available at ScienceDirect

Interdisciplinary Neurosurgery: Advanced Techniques and Case Management

journal homepage: www.inat-journal.com

Technical Note & Surgical Techniques

Thoracolumbar fractures: Three column stabilization through posterior only approach



Deepak Kumar Singh, MCh^{a,*}, Neha Singh, MD^b, Rakesh Kumar, MCh^a,
Deepak Mewara, MCh^a, Deepak Malviya, MD^c

^a Department of Neurosurgery, Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, India

^b Department of Radiodiagnosis & Imaging, King George's Medical University, Lucknow, India

^c Department of Anesthesiology, Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, India

ARTICLE INFO

Article history:

Received 29 December 2015

Accepted 25 January 2016

Keywords:

Spine

Thoraco-lumbar fracture

Three column stabilization

Expandable cage: spinal trauma

ABSTRACT

Introduction: The combination of anterior and posterior approaches when indicated in unstable thoracolumbar fractures provides the most stable reconstruction. However, the use of both approaches on a trauma patient is associated with significant morbidity. We evaluated the clinical outcome, morbidity and feasibility of single stage posterior midline approach for decompression and three column stabilization using expandable cage and pedicle screws.

Methods: The cases of fifteen patients with severe traumatic thoracolumbar fractures/dislocations that were managed with single-stage decompression, reconstruction and three column stabilization using an expandable cage via an entirely posterior approach were included in this study. Data on age, sex, mechanism of injury neurological status, surgical technique, radiological and clinical outcome were reviewed retrospectively.

Observation: There was no difference between the preoperative and immediate postoperative neurological status of the patients. The average blood loss was 580 ml and average operating time was 4 h 30 minutes. Adequate decompression, fixation and anterior column correction were achieved in all the patients. After a mean follow up period of 21.4 months, no patient complained of local pain and no significant loss of corrections or hardware failure was observed.

Conclusion: Our experience proves that single stage posterior approach using pedicle screws and an expandable cage is a safe and biomechanically reliable method for treating thoracolumbar fractures.

© 2016 Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Burst thoracolumbar fractures are caused by axial compressive forces and characterized by failure of anterior and middle spinal columns. Transverse and rotational loading may disrupt all the three columns. The majority can be treated successfully without an operation. When deemed necessary, however, numerous surgical techniques have been described, though the best treatment for thoracolumbar fractures is still elusive.

For these unstable neurologically involved fractures, a combination of anterior decompression, reconstruction and posterior instrumentation is often suggested for optimal stability [1]. However, the extensive surgical measures, including the anterior approach increase the morbidity, especially with traumatized thoracic or peritoneal cavities [2,3,4].

Theoretically, stabilization of both columns through a posterior approach would avoid these risks, shortcomings and facilitate rehabilitation.

We have described a transpedicular technique, which was originally designed for severe scoliosis and kyphoscoliosis [5] to perform a column resection by a posterior only approach and applied this for anterior decompression and anterior column reconstruction in patients of thoracolumbar fractures. Additional three column transpedicular fixation was achieved in all the patients. Data on age, sex, mechanism of injury neurological status, surgical technique, radiological and clinical outcome were reviewed retrospectively.

2. Materials and methods

Between September 2012 and October 2013, 15 patients with thoracolumbar injuries were operated in our department.

Neurological deficits were assessed using the American Spinal Injury Association (ASIA) impairment scale (Table 1). Pain was evaluated on a visual analog scale (VAS). Antero-posterior and lateral x-rays of all patients were taken pre and postoperatively and at the last follow-up evaluation. Three-dimensional (3D) computed tomography (CT) or

* Corresponding author at: Department of Neurosurgery, Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, 226010, UP, India. Tel.: +91 9984014649 (Mobile).

E-mail address: gkp.deepak@gmail.com (D.K. Singh).

Table 1
ASIA Impairment Scale (AIS).

| Grade | Description |
|-------|---|
| A | Complete: No sensory or motor function is preserved |
| B | Sensory incomplete: sensory but not motor function is preserved below the neurological level and includes the sacral segments S4–5 (light touch or pin prick at S4–5 or deep anal pressure) AND no motor function is preserved more than three levels below the motor level on either side of the body. |
| C | Motor incomplete: motor function is preserved below the neurological level ^a , and more than half of key muscle functions below the neurological level of injury (NLI) have a muscle grade less than 3 (grades 0–2). |
| D | Motor incomplete: motor function is preserved below the neurological level ^a , and at least half (half or more) of key muscle functions below the NLI have a muscle grade >3. |
| E | Normal: normal and motor function |

NOTE: When assessing the extent of motor sparing below the level for distinguishing between AIS B and C, the motor level on each side is used; whereas to differentiate between AIS C and D (based on proportion of key muscle functions with strength grade 3 or greater) the neurological level of injury is used.

^a For an individual to receive a grade of C or D, i.e. motor incomplete status, they must have either (1) voluntary anal sphincter contraction or (2) sacral sensory sparing with sparing of motor function more than three levels below the motor level for that side of the body. The international standards at this time allows even non-key muscle function more than 3 levels below the motor level to be used in determining motor incomplete status (AIS B versus C).

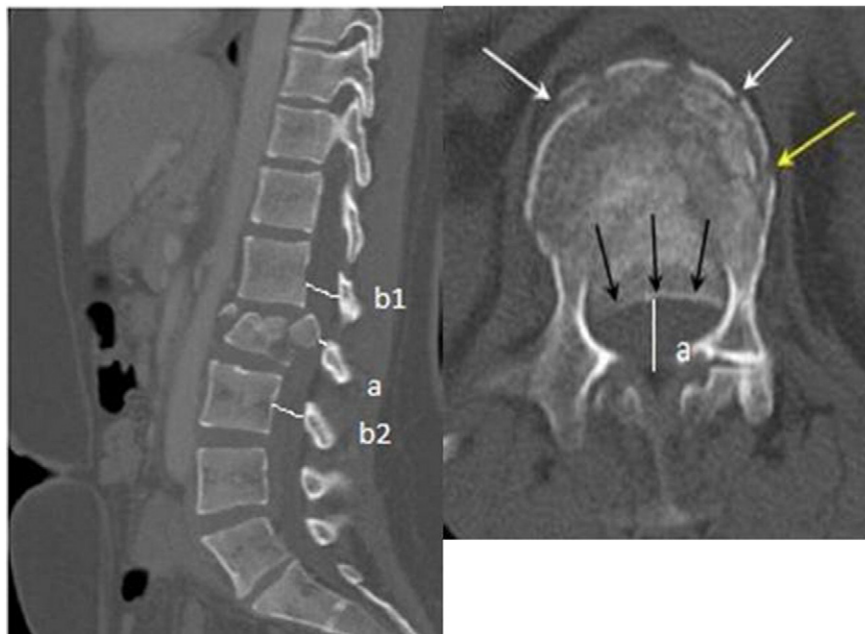


Fig. 1. The percentage of the canal compromise $x = (1 - a/b) \times 100$, where x is the percentage of canal compromise, a is the narrowest mid-sagittal diameter of the spinal canal at the level of injury, and b is the average mid-sagittal diameter of the spinal canal at one level above and below the injured segment ($b = b1 + b2/2$).

Table 2
Preoperative radiology findings.

| Serial no. | Fracture site | Canal compromise (%) | Sagittal index | Inter vertebral disc migration | PLL | ALL | Posterior column involvement |
|------------|---------------|----------------------|----------------|--------------------------------|----------|--------|------------------------------|
| 1 | L1 | 65 | 8 | Present | Ruptured | Intact | Present |
| 2 | L1 | 35 | 4 | Absent | Intact | Intact | Present |
| 3 | D12 | 90 | 31 | Present | Ruptured | Intact | Present |
| 4 | L1 | 70 | 16 | Present | Ruptured | Intact | Present |
| 5 | L2 | 35 | 6 | Absent | Intact | Intact | Present |
| 6 | D12 | 45 | 6 | Absent | Intact | Intact | Present |
| 7 | D12 | 35 | 4 | Absent | Intact | Intact | Present |
| 8 | L1 | 45 | 10 | Absent | Intact | Intact | Present |
| 9 | L1 | 62 | 10 | Present | Ruptured | Intact | Present |
| 10 | L1 | 66 | 20 | Present | Ruptured | Intact | Present |
| 11 | L1 | 62 | 18 | Present | Ruptured | Intact | Present |
| 12 | D12 | 72 | 26 | Absent | Ruptured | Intact | Present |
| 13 | L2 | 60 | 11 | Present | Ruptured | Intact | Present |
| 14 | L1 | 60 | 20 | Absent | Ruptured | Intact | Present |
| 15 | L1 | 65 | 30 | Present | Ruptured | Intact | Present |

magnetic resonance imaging (MRI) was performed preoperatively. Rupture of anterior and posterior longitudinal ligament was documented on MRI images.

The percentage of the canal compromise was determined using the formula $x = (1 - a/b) \times 100$, where x is the percentage of canal compromise, a is the narrowest mid-sagittal diameter of the spinal

Download English Version:

<https://daneshyari.com/en/article/3057729>

Download Persian Version:

<https://daneshyari.com/article/3057729>

[Daneshyari.com](https://daneshyari.com)