Is it safe the posterior pedicle screw fixation after spinal canal decompression in Magerl type A3 thoracolumbar burst fractures with neurologic deficit?

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Introduction

- **Thoracolumbar burst fracture without neurologic deficit and stable fracture**
  - Nonoperative treatment was considered as choice

- **Recent studies, surgical therapy can offer**
  - Immediate spinal stability
  - Early mobilization
  - Decompression of neural elements
  - Reliable correction of kyphosis

- **Surgical strategy**
  - Anterior surgery with fusion
  - Posterior surgery without fusion
  - Combine surgery

  ➔ **Still controversy**
Surgical Method (Anterior or posterior or combine)
**Materials and methods (1)**

- **Patient Population**
  - Between 2008 and 2013
  - Single level thoracolumbar burst fracture (T11-L2)
    - with neurologic deficit and the intracanal bone fragments confirmed by CT

**Exclusion**
- pathological fracture, multiple level fracture, polytraumatized patients
- history of previous spine surgery, preexisting neurological deficit
Materials and methods (2)

• Outcome measures
  - Neurologic deficit (Frankel’s grade)
  - Radiologic examination
    - kyphotic angle (vertebral angle, cobb angle)
    - compression ratio (vertebral body height)
    - canal encroachment
  - Operation time, estimated blood loss, length of hospital stay, complication

• Surgical technique
  - Conventional laminectomy
  - Reduction of the retropulsed bone fragment was conducted
  - Short segment pedicle instrumentation was fixed (percutaneous or open)

• Patients were monitored at least 12 month
40/F, L2 Burst Fx, motor Gr. IV

Cobb angle : 14.2
Compression : 48.1%
Encroachment : 55%
LBOS : 54

Pre op

Post op

F/U 12 month
43/M, L1 Burst Fx, motor Gr. III

Cobb angle : 13.7
Compression : 49%
Encroachment : 45%
LBOS : 45

F/U 12 month
Posterior short-segment pedicle screw fixation after Decompression in T-L (T11-L2) burst fractures

• The mean operative time: **129 min** (range 60-210 min)
• Intraoperative blood loss (mean): **243 mL** → not need blood transfusion
• No major complication
  – Death
  – CSF leakage
  – Epidural hematoma

• Patients were monitored: 12-25 month
• No implant failure (broken screw and rods)
## Posterior short-segment pedicle screw fixation after Decompression in T-L (T11-L2) burst fractures

<table>
<thead>
<tr>
<th>Level of Fx</th>
<th>Preop</th>
<th>Last</th>
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<tbody>
<tr>
<td>T11</td>
<td>0</td>
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<tr>
<td>T12</td>
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<tr>
<td>L1</td>
<td>12</td>
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<td>L2</td>
<td>6</td>
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<td>TLICS score</td>
<td>4.2 ± 1.3</td>
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<tr>
<td>LSC score</td>
<td>6.6 ± 1.4</td>
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<tr>
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<th>Preop compression ratio (%)</th>
<th>Cobb angle</th>
<th>Encroachment</th>
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<tr>
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<td>38.4 ± 11.5</td>
<td>12.3 ± 5.9</td>
<td>48 ± 8.2</td>
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<td></td>
<td>15.3 ± 8.4</td>
<td>6.4 ± 6.7</td>
<td>27.2 ± 7.2</td>
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<th>Post</th>
<th>A</th>
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<td>Pre</td>
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- **Green** : improve
- **Gray** : no change
Lack of bony fusion

Several reports about favorable outcomes without Fusion in T-L BurstFx

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Journal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short segment fixation of thoracolumbar burst fractures without fusion</td>
<td>Sanderson et al.</td>
<td>Eur Spine J 1999</td>
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<tr>
<td>➢ Denis type B and LSC &lt;6 : PL bone grafting → unnecessary</td>
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<tr>
<td>Nonfusion Method in Thoracolumbar and Lumbar Spinal Fractures</td>
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<td>➢ Implant removal at 9.7 mo</td>
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Inability to achieve direct spinal canal decompression

Maintain the reduction

In our study
- Decrease of canal encroachment
  ← through indirect decom laminectomy & canal remodeling
- Decrease of kyphotic angle → maintained at last follow up
- Vertebral body height was significantly restored

Anterior versus posterior approach for treatment of thoracolumbar burst fractures: a meta-analysis

Ant. app. provides better decompression (canal remodeling), compared to the post app.
But, no evident association between the canal decompression and neurologic symptom
Posterior short-segment pedicle screw fixation after Decompression in T-L burst fractures

- Clinical efficacy is similar with conventional anterior open surgery → good alternative to open technique

- With advantages
  - Less invasive, less blood loss, less complications
  - Shorted op time
  - Less postop. pain
  - Early ambulation