

## Offset Sublaminar Hook

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### The Posterior Fixation of Thoracolumbar Burst Fracture using Pedicle Screws and Caudal Offset Sublaminar Hooks

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#### – Abstract –

**Study Design:** A retrospective study

**Objectives:** We analyzed the clinical results of thoracolumbar burst fractures, managed by posterior fixation of 2 segments above and 1 segment below, using an offset sublaminar hook.

**Summary of Literature Review:** Mono-segment fixation above and below the injured vertebra, using posterior pedicle screw fixation, has the benefit of saving the uninjured mobile lumbar segment in thoracolumbar junction burst fracture patients. However, in a severely comminuted vertebral body, mono-segment fixation may not prevent loss of correction and metal failure. Options for such cases are additional anterior column support or long segment fixation, including 2 segments above and 1 below the injured vertebra. Instead of fixing 2 segments below the fracture level, fixation of one segment below, using the offset sublaminar hook, can save the uninjured segment, especially in the upper lumbar segment, with greater fixation strength than mono-segmental screws only.

**Material and Method:** The study included eleven patients with a thoracolumbar junction burst fracture, which underwent posterior fixation using pedicle screws in 2 segments above and 1 segment below, aided by an offset sublaminar hook. The mean follow-up period was 30.7 months (range, 24 to 58 months). Radiographs taken at follow-up were evaluated for implant loosening, correction loss, change in pedicle screw angle, and loss of vertebral height, adjacent segment instability and junctional degenerative change. The clinical results were collected in out-patient department.

**Results:** No implant loosening was noted. No case showed adjacent instability, acceleration of junctional degenerative change at the lower end of lumbar segment or hook dislodgement. Also, there were no junctional area related symptoms.

**Conclusion:** For posterior surgery of thoracolumbar burst fractures, this construct, fixing 2 segments above and 1 segment below injured vertebra, aided by an offset sublaminar hook, was satisfactory in maintaining fracture reduction, and showed no instability or acceleration of degeneration on adjacent segments.

**Key Words:** Thoracolumbar, Burst fracture, Posterior fixation, Pedicle screw, Offset sublaminar hook.

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ing classification<sup>7)</sup>

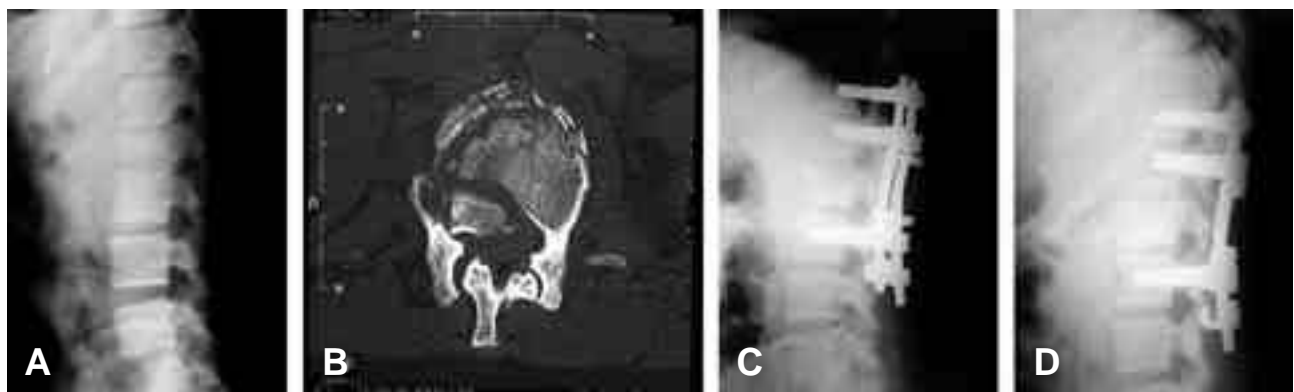
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**Table 1.** Pre-operative diagnosis summary

		No. of pts	%
Fracture level	T12	1	9.1
	L1	3	27.3
	L2	7	63.6
Load Sharing Classification Score	9	2	18.2
	8	4	36.3
	7	3	27.3
	6	2	18.2



**Fig. 1.** (A) Radiographs showing initial findings. Initial radiograph shows burst fracture of L2 vertebral body with severe kyphotic deformity. (B) Initial CT scan shows gross comminution of vertebral body. Load sharing classification score was 9. (C) Radiographs showing immediate post-op findings. Immediate post-op radiographs show nearly complete reduction of L2 vertebral body with restoration of normal vertebral body height. (D) Radiographs showing 24 months follow-up findings. 24 months follow-up radiographs show well maintained reduction and vertebral body height. Clinically, patient showed no mid or lower back pain.

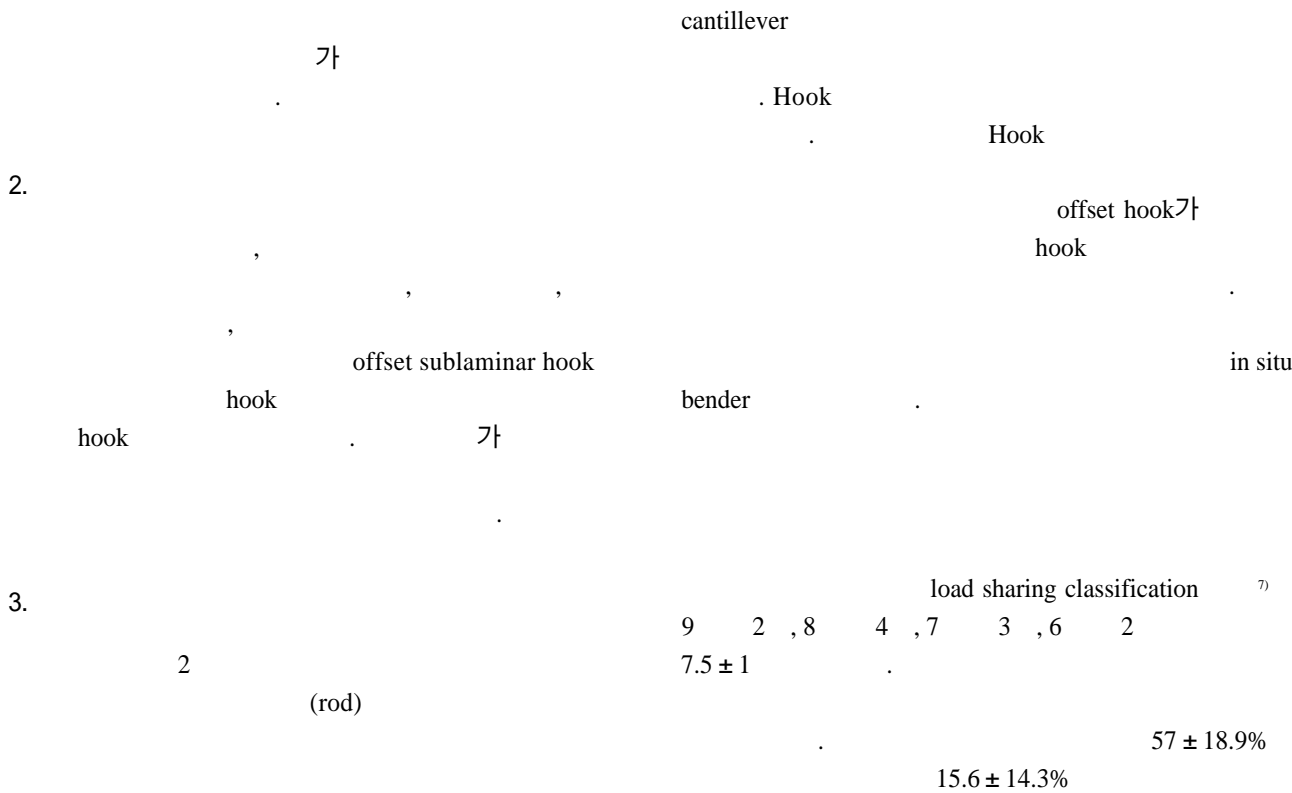


Table 2. Results of Radiologic Evaluation

	Pre op	Post-op	Follow up
Mean Kyphosis Angle	12.6 ± 5.9 °	6.9 ± 6.3 °	8 ± 6.1 °
Mean Compression Angle	15 ± 6.2 °	7.9 ± 4.5 °	9.2 ± 5.5 °
Mean Screw Angle		4.3 ± 5.3 °	5.3 ± 5.3 °
Mean Fracture Vertebral Height	65.4 ± 8.3%	105.4 ± 7.9%	100 ± 9.5%

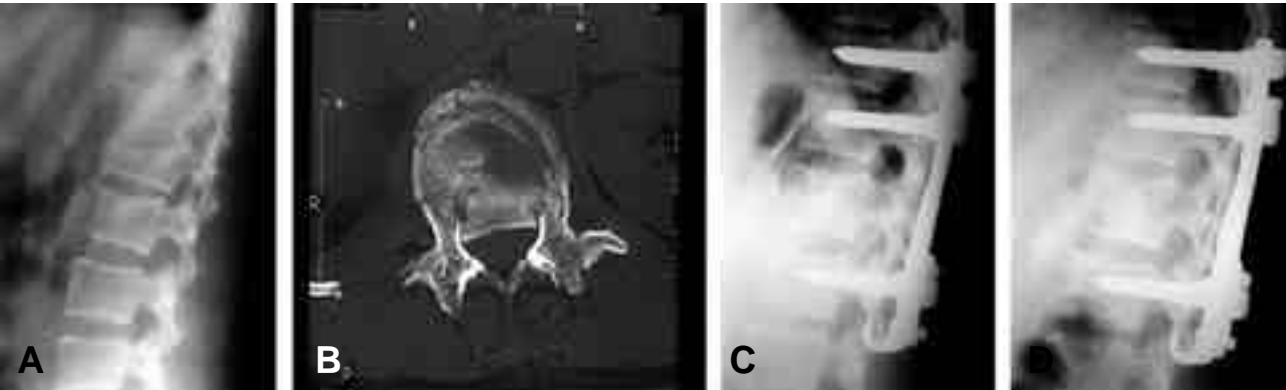


Fig. 2. (A) Radiographs showing initial findings. Initial radiograph shows burst fracture of L1 vertebral body with severe kyphotic deformity. (B) Initial CT scan shows gross comminution of vertebral body. Load sharing classification score was 8. (C) Radiographs showing immediate post-op findings. Immediate post-op radiograph shows nearly complete reduction of L1 vertebral body with restoration of normal vertebral body height. (D) Radiographs showing 28 months follow-up findings. 28 months follow-up radiograph shows well maintained reduction and vertebral body height.

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. Dickson <sup>8)</sup>

Cobb

$12.6 \pm 5.9^\circ$   $6.9 \pm 6.3^\circ$  2

$8 \pm 6.1^\circ$   $1.1 \pm 1.4^\circ$  가 가

5° 1 가 가

Cobb  $15 \pm 6.2^\circ$  가 가

$7.9 \pm 4.5^\circ$   $7.1 \pm 5.3^\circ$  가 가

$9.2 \pm 5.5^\circ$   $1.3 \pm 1.9^\circ$  가 가

Cobb 가

$4.3 \pm 5.3^\circ$   $5.3 \pm 5.3^\circ$   $1 \pm 0^\circ$

$65.4 \pm 8.3\%$  T11-12, T12-L1, L1-2가 12°; L2-3가 14°; L3-4가 15°

$105.4 \pm 7.9\%$ ,  $100 \pm 9.5\%$  가 L1 L3

(Table 2).

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|------|------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 가    | 1                      | 가                 | 10:218-223.                                                                                                                                                                                                         |
|      |                        | 가                 | 4) <b>McBride GG</b> : <i>Cotrel-Dubousset rods in surgical stabilization of spinal fractures. Spine 1993; 18:466-473.</i>                                                                                          |
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 : 11 load sharing classification  $7.5 \pm 1$   
 . ,  $12.6 \pm 5.9^\circ$   $6.9 \pm 6.3^\circ$   $8 \pm 6.1^\circ$   $1.1 \pm$   
 $1.4^\circ$   $15 \pm 6.2^\circ$   $7.9 \pm 4.5^\circ$   $9.2 \pm 5.5^\circ$   $1.3 \pm 1.9^\circ$   
 $4.3 \pm 5.3^\circ$   $5.3 \pm 5.3^\circ$   $1 \pm 0^\circ$  .  
 $65.4 \pm 8.3\%$   $105.4 \pm 7.9\%$   $100 \pm 9.5\%$  .  
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