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## The Effect of Pedicle Screw Instrumentation on Fractured Vertebrae in Unstable Thoracolumbar Burst Fractures with Canal Encroachment and Clinical Result

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### – Abstract –

**Study Design:** A retrospective study.

**Objectives:** To evaluate the canal encroachment of fractured bony fragments and neurological deficits of pedicle screw instrumentation for the treatment of unstable thoracolumbar burst fractures with pedicle screws inserted into the fractured vertebrae.

**Materials and Methods:** The authors evaluated 18 patients treated surgically with posterior fusions using pedicle screws for unstable thoracolumbar burst fractures, from March 2000 to September 2004. The ratios of the areas occupied by the fractured bony fragments in the canals were analyzed, before and after pedicle screw insertion, by computed tomography scans of the fractured vertebrae. The kyphotic angles, anterior vertebral heights, and neurological deficits were evaluated.

**Results:** The areas occupied by the fractured fragments in the canals were improved significantly after surgery and there were no neurological complications resulting from the placement of pedicle screws or fragment displacements. The kyphotic angles and anterior vertebral heights at the last follow-up visits were improved significantly compared with the preoperative radiographs. The neurological deficits were not aggravated after pedicle screw insertion.

**Conclusion:** Our results suggest that pedicle screw instrumentation in fractured vertebrae is safe and effective for the treatment of unstable thoracolumbar burst fractures.

**Key Words:** Pedicle screw instrumentation, Fractured vertebrae, Unstable thoracolumbar burst fractures, Canal encroachment

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CT (Fig. 1) CT CT

1) 가

2) 가 (kyphotic angle), (anterior vertebral height percent)

가 가 가

(Fig. 2).

3) 가 가

4) SPSS 13.0 p 0.05

1. 2000 3 2004 9 가

37 6

가 57.8 ± 11%

18 12 44.4 ± 11.2% 가

4 , 1 5 , 2 2 , 3 6 , (p<0.001) (Table 1).

4 1 14 , 4 가 가 1 37.1%

38 (25 ~57 )

2. 가

1) (canal encroachment) 가

2. 11.4 ± 14.0 ° -2.7 ± 9.7 °

PACS system INFINITT PiViewSTAR 5.0.5.2 program 가

( $p=0.0013$ ) (Table 2).

16.3%  $88.9 \pm 9.9\%$   $54.0 \pm$   
( $p<0.001$ ) (Table 3).

3.

3 가 3  
가

4) , 가 가 가

Roy-Camille King Boucher가

taxis),  
가

(annulotaxis)

(ligamento-

5-9),

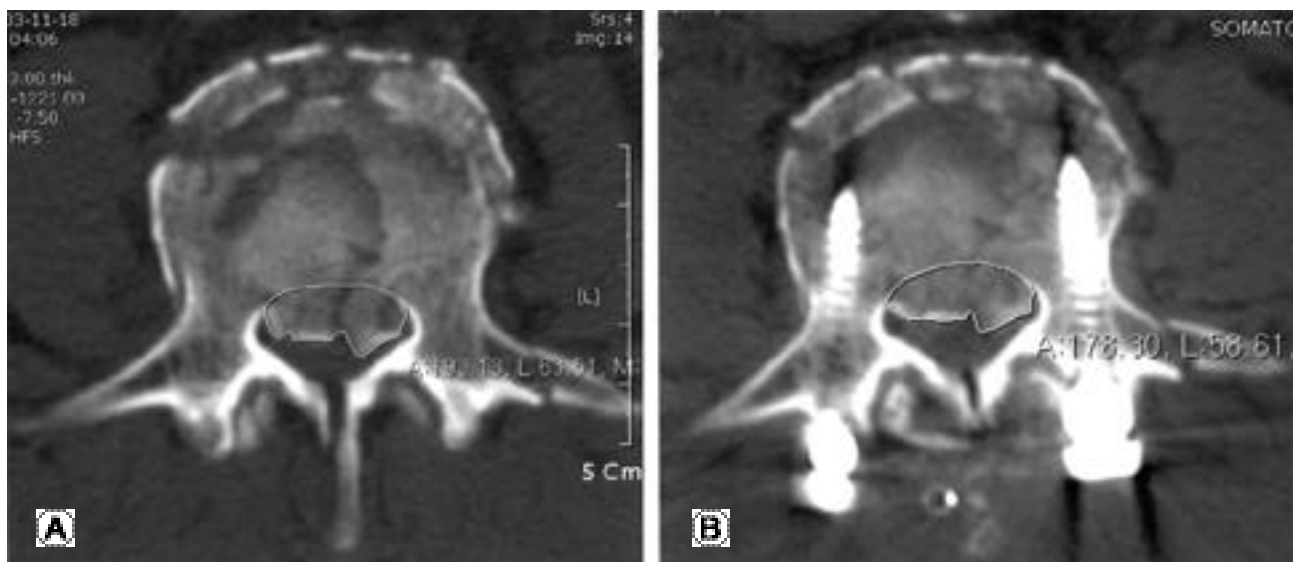
25%<sup>10)</sup>

11)

**Table 1.** Results of percentage of area occupied by the fractured fragment in the canal by computed tomography

	percentage of area (%)
preop	$57.8 \pm 11.0$
postop	$44.4 \pm 11.2$
p-value	$<0.001$

가 12,13) , 가



**Fig. 1.** CT scan images of fractured vertebra. The area occupied by the fractured fragment in the canal was analyzed before and after pedicle screw insertion by the computed tomography scan in the fractured vertebra. (A) preoperative (B) postoperative

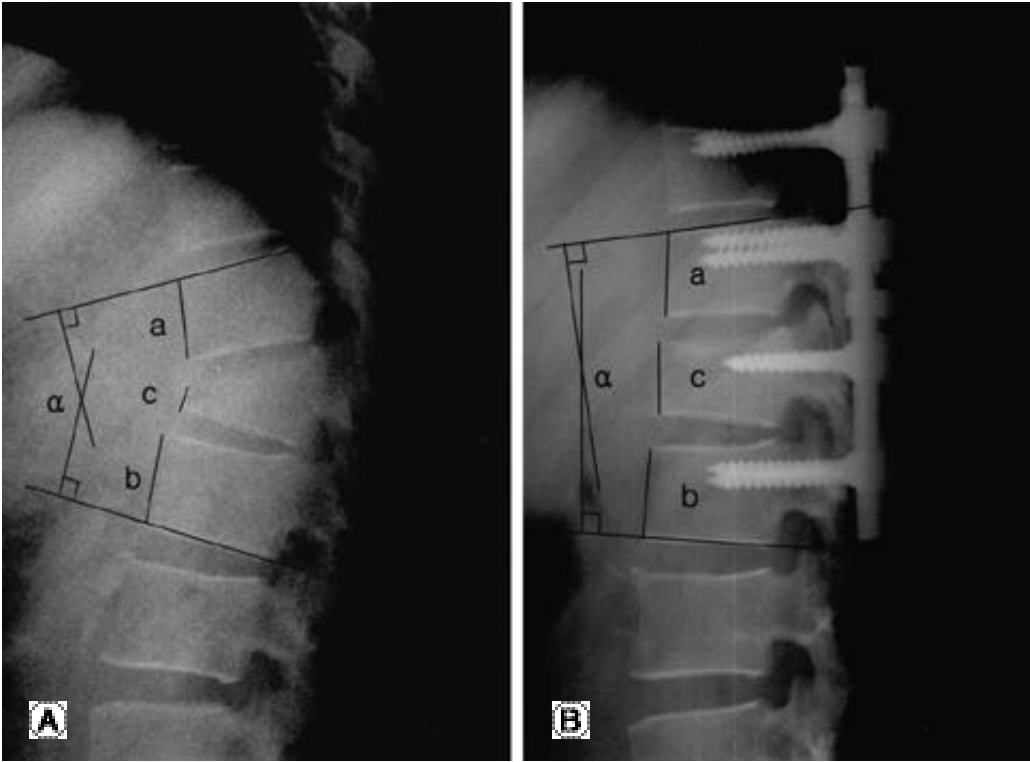
(major diameter or outer diameter) (minor diameter or root diameter) 가 , 1  
 (pull-out strength) (fatigue strength) 가 가  
 (endurance limit)가 .  
 가 14,15 가  
 16,17) , 가  
 가 가  
 가 가  
 가 가  
 가 가

**Table 2.** Results of kyphotic angle

	kyphotic angle ( ° )
preop	11.4 ± 14.0
postop	-2.7 ± 9.7
p-value	0.0013

**Table 3.** Results of percentage of anterior vertebral height of the fractured vertebra

	percentage of ant. vertebral ht. (%)
preop	54.0 ± 16.3
postop	88.9 ± 9.9
p-value	<0.001



**Fig. 2.** (A) Radiograph of measurement methods for anterior vertebral height(AVH) and kyphotic angle( ° ). AVH = c/(a+b)/2 (B) Postoperative radiograph shows improved anterior vertebral height and kyphotic angle compared with preoperative radiograph.

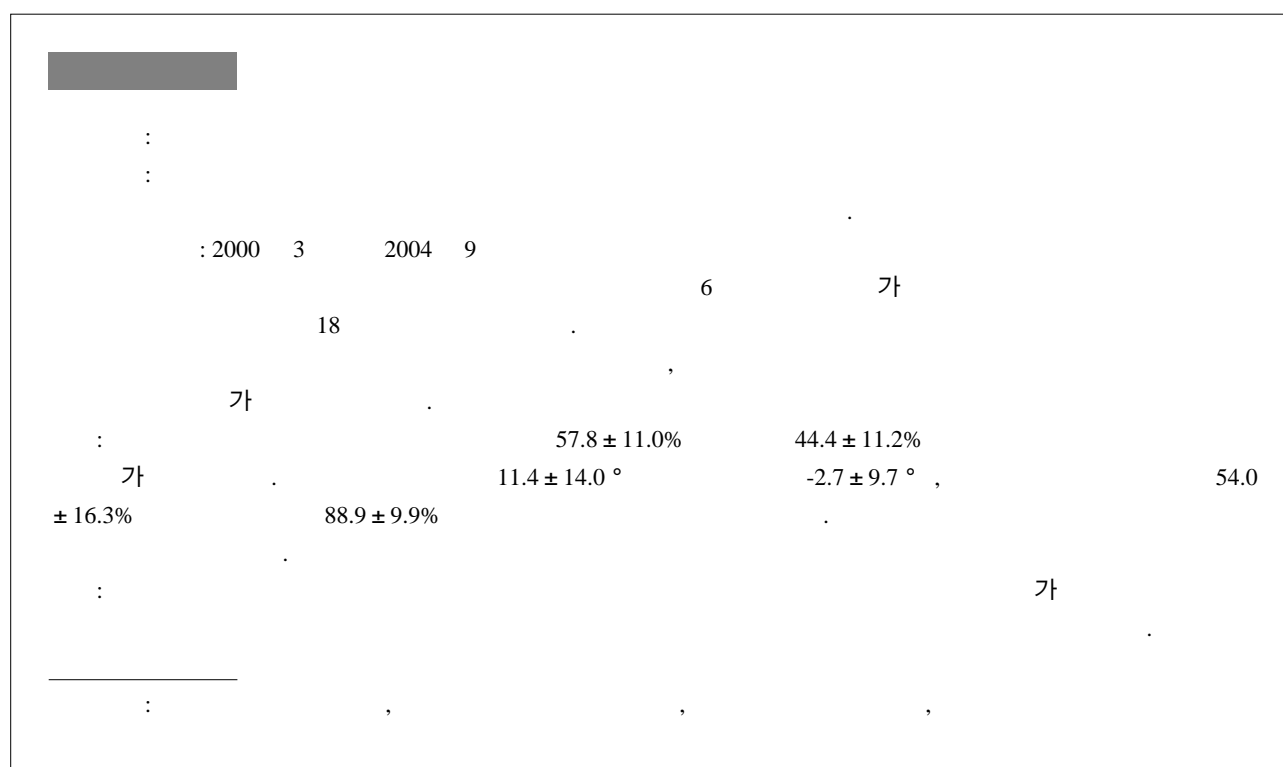
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