

## Posterior Correction of Idiopathic Scoliosis With using Transpedicular Screw Fixation

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### – Abstract –

**Study design:** This is a retrospective study.

**Objectives:** We wanted to determine the effectiveness of performing transpedicular screw fixation in idiopathic scoliosis surgery by evaluating the radiological results.

**Literature Review Summary:** Deformity correction using pedicle screw fixation in scoliosis surgery is one of the most effective methods of treatment. However, the extent of correction and the complication rate are quite variable.

**Materials and Methods:** We evaluated the radiological results of performing posterior correction with using transpedicular screws in sixty patients who were suffering with idiopathic scoliosis. The follow-up duration was 39 months (range: 12 to 91 months). The changes of the coronal and sagittal geometry in the major and compensatory curves were measured according to the Cobb method with using the anteroposterior and lateral radiographs in the standing and lateral bending positions before the surgery and at the final follow-up.

**Results:** In the coronal plane, the average correction rate of the major curve was 77% and that of the compensatory curve was 72% on the immediate postoperative radiographs. In the sagittal plane, the Cobb angle in those patients who had a hypokyphosis under 15 ° was improved from 9.0 ° to 21.2 °. The angle between the lowest instrumented vertebra and T10, and also the lumbar lordosis did not change significantly. The correction rate of the rotational deformity of the apical vertebra was 55%, and that of the translation degree was 68%. The correction rate of the translation of the lowest instrumented vertebra was 54% and that of the tilting angle was 77%. No patients had a significant loss of correction in the coronal or sagittal plane at the latest follow-up.

**Conclusions:** Posterior correction using transpedicular screws was an effective method for treating idiopathic scoliosis, and it resulted in a high correction rate at the major curve and the compensatory curve even with short segment fixation, and it reduced the loss of the correction angle.

**Key Words:** Idiopathic scoliosis, Posterior correction, Transpedicular screws, Radiological results

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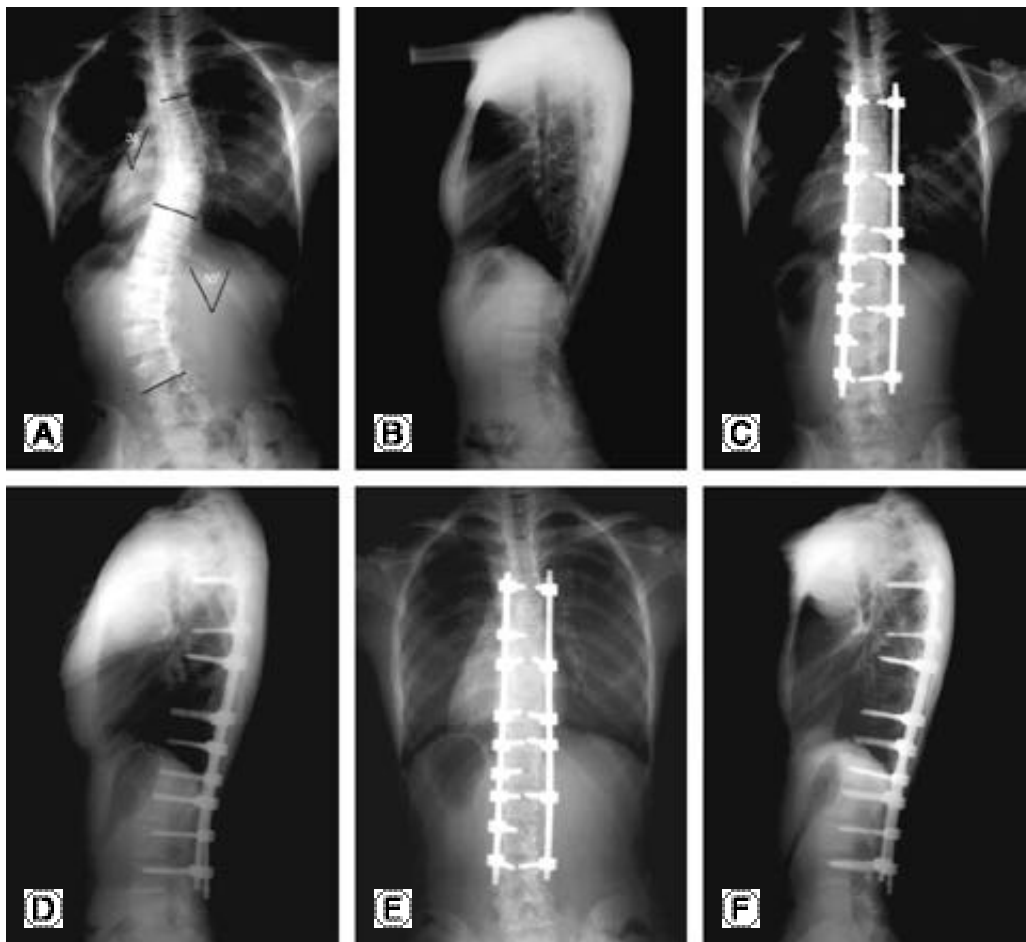
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16 (10 44)

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**Fig. 1.** Fourteen-year-old girl with adolescent idiopathic scoliosis (King type I, Lenke type 6 C -). (A, B) Preoperative radiographs show 38 ° of thoracic and 50 ° of lumbar curve. Translation of the apical vertebra L1 is 35 mm, and tilt angle of the end vertebra L3 is 24 °. (C, D) Postoperative radiographs show that thoracic curve corrected to 8 ° and lumbar curve corrected to 5 °. The apical vertebral translation is improved to 8 mm, and end vertebral tilt angle to 0 °. (E, F) At 3 years follow-up radiographs, sagittal and coronal alignment has been well maintained.

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가 75) 27.6 48%  
, 11.9 (3 20) 77%  
. 14.3 (5 23) 2.4  
, 30.1 (8 48),  
, 12.6 58%  
Cobb Cobb ( 5-12 , 8.3 (2 20) 72%  
1-5 , 10 - 10.4 (2 26) 2.2 (Table 1).  
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Perdriolle 20.6  
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**Table 1.** Correction of the primary and compensatory curve

	Preop	Postop	Correction	Follow-up	Correction	Loss of correction
Primary curve	52.0 (36 75)	11.9 (3 20)	77%	14.3 (5 23)	72%	2.4
Compensatory curve	30.1 (8 48)	8.3 (2 20)	72%	10.4 (2 26)	65%	2.2

**Table 2.** Correction of sagittal parameters

	Preop.	Postop.	Follow-up
T-kypnosis	19.0 ( 0 48)	22.2 ( 5 37)	25.2 ( 5 38)
T10-LIV*	1.7 (-25 28)	0.2 (-27 18)	2.3 (-23 20)
L-lordosis	38.1 ( 10 58)	36.5 ( 18 60)	37.6 ( 14 60)

\* LIV : the lowest instrumented vertebra

CT 5 4% (p<0.05),  
 Perdriolle  
 (Fig. 2). 38.6 mm(8 82)  
 12.3 mm(1 38) 68% 3)  
 14.6 mm(1 40) 2.3 mm  
 (Table 3). 16.1 mm(1 37) 7.4 mm(0 23) 54.1%

**Table 3.** Correction of parameters in apical vertebra

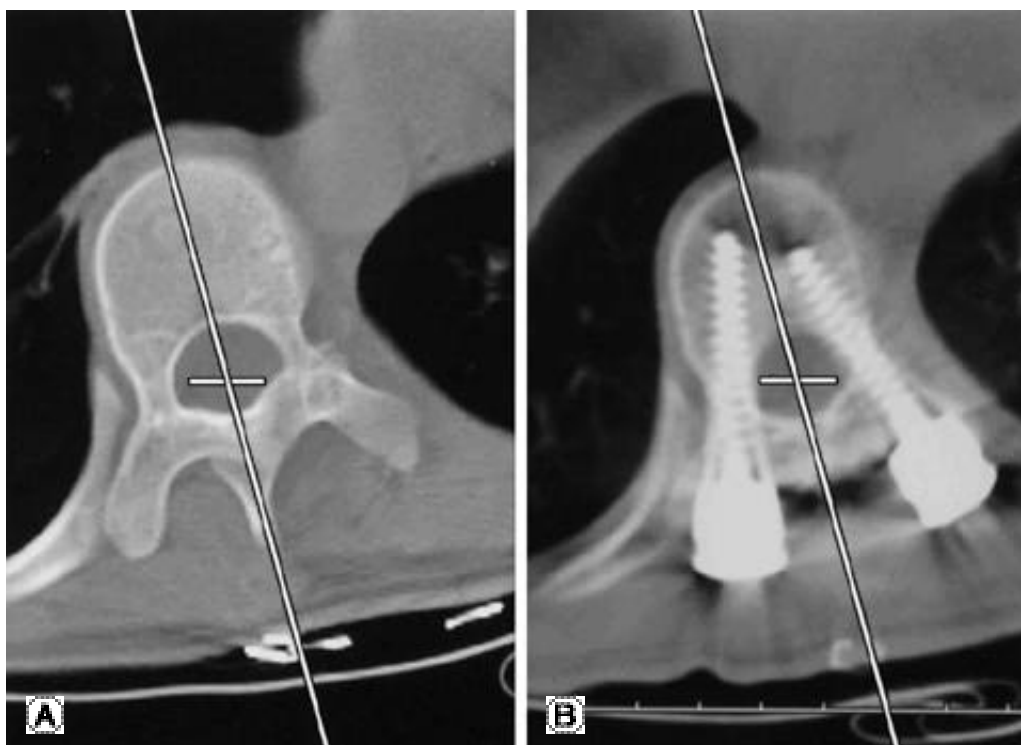
	Preop	Postop	Correction	Follow-up	Correction	Loss of correction
Rotation (degree)	20.6	9.5	55%	10.6	48%	1.1
AVT*	38.6	12.3		14.6		
(mm)	(8 82)	(1 38)	68%	(1 40)	62%	2.3

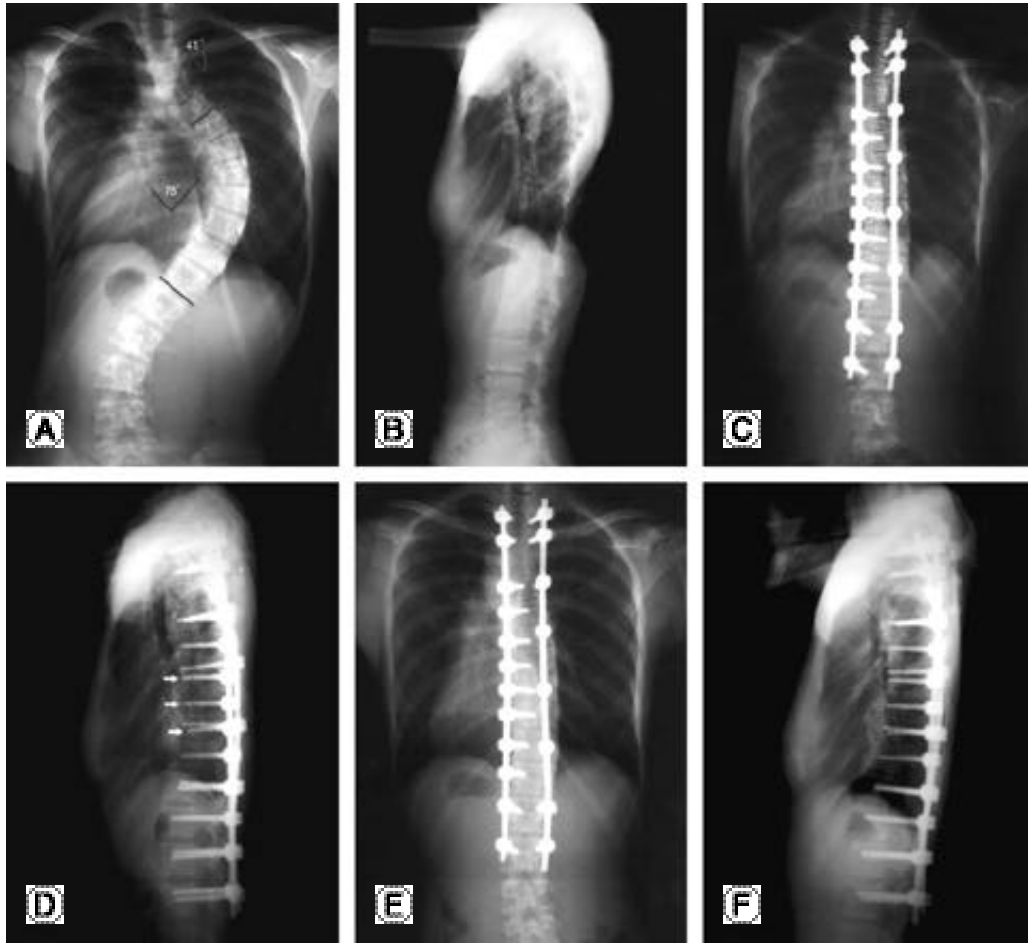
\* AVT: Apical vertebra translation

**Table 4.** Correction of other coronal parameters in the lowest instrumented vertebra

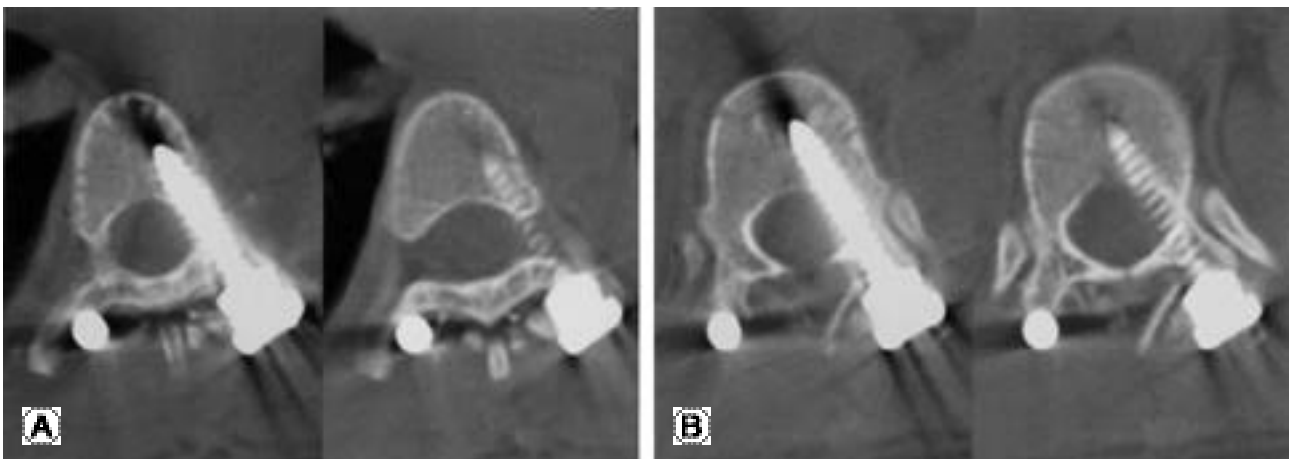
	Preop.	Postop.	Correction	Follow-up	Correction	Loss of correction
Tilt of LIV	19.8	4.6		5.3		
(degrees)	(4 31)	(0 16)	77%	(0 18)	73%	0.7
Translation of LIV	16.1	7.4		8.4		
(mm)	(1 37)	(0 23)	54%	(1 35)	48%	1.0

\* LIV : the lowest instrumented vertebra

**Fig. 2.** Preoperative (A) and postoperative (B) computed tomographs show minimal correction of apical vertebral rotation from 16 °to 15 °.



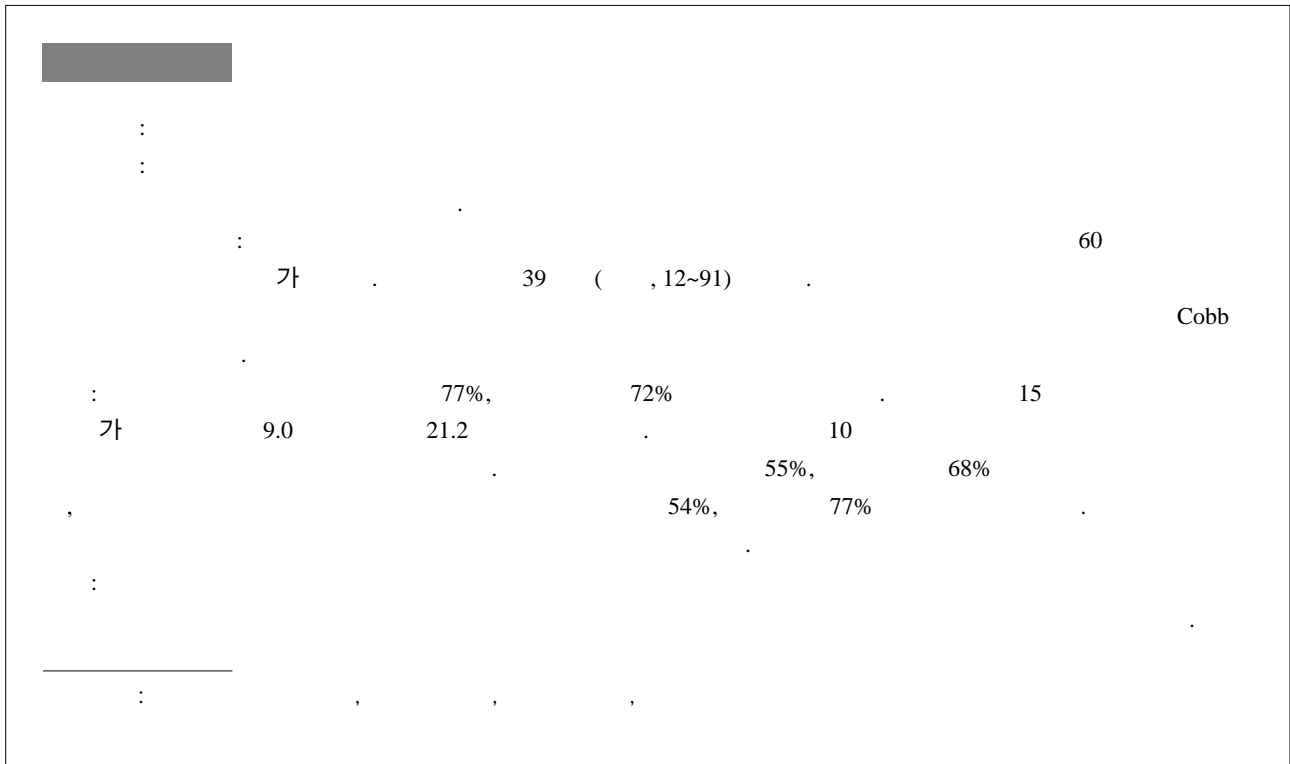
**Fig. 3.** A fifteen-year-old girl with adolescent idiopathic scoliosis (King type V, Lenke type 2 B -). (A, B) Preoperative radiographs show 41 ° of upper thoracic curve and 78 ° of lower thoracic curve with 75 mm translation of apical vertebra T9. (C, D) Postoperative radiographs show inferior malposition of three pedicle screws (arrows). (E, F) Despite malposition of pedicle screws, radiographs at 2 years follow-up show no loss of correction in sagittal and coronal planes.



**Fig. 4.** Each two consecutive axial images of postoperative CT scan show inferior malposition of pedicle screw (A) and perforation of medial wall of pedicle (B), but neurological complications didn't occur.

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