

Rod Fracture After Pedicle Subtraction Osteotomy Using a Side-Tightening Pedicle Screw System in Consecutive cases

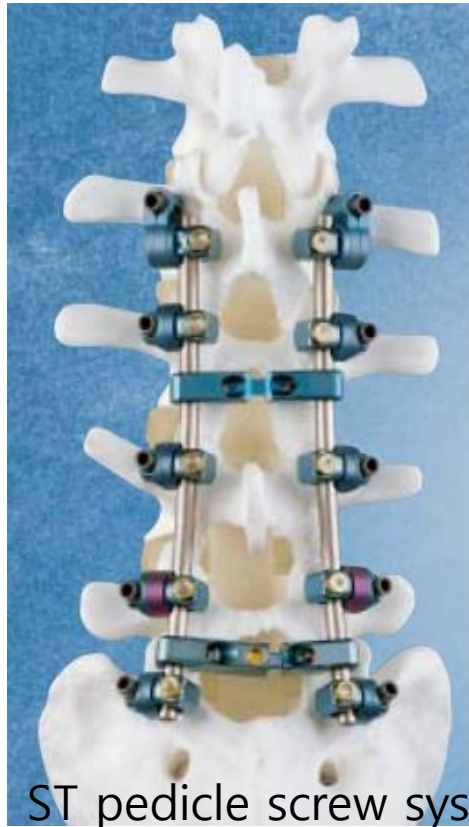
Sang-II Kim, Hoon-Seok Sung

Department of Orthopedic Surgery, Seoul St. Mary's Hospital,
College of Medicine,
The Catholic University of Korea, Seoul, Korea



Abstract

- The objective of this study was to investigate the incidence and risk factors of rod fractures (RF) after a single-level lumbar pedicle subtraction osteotomy (PSO) using a side-tightening (ST) pedicle screw system.



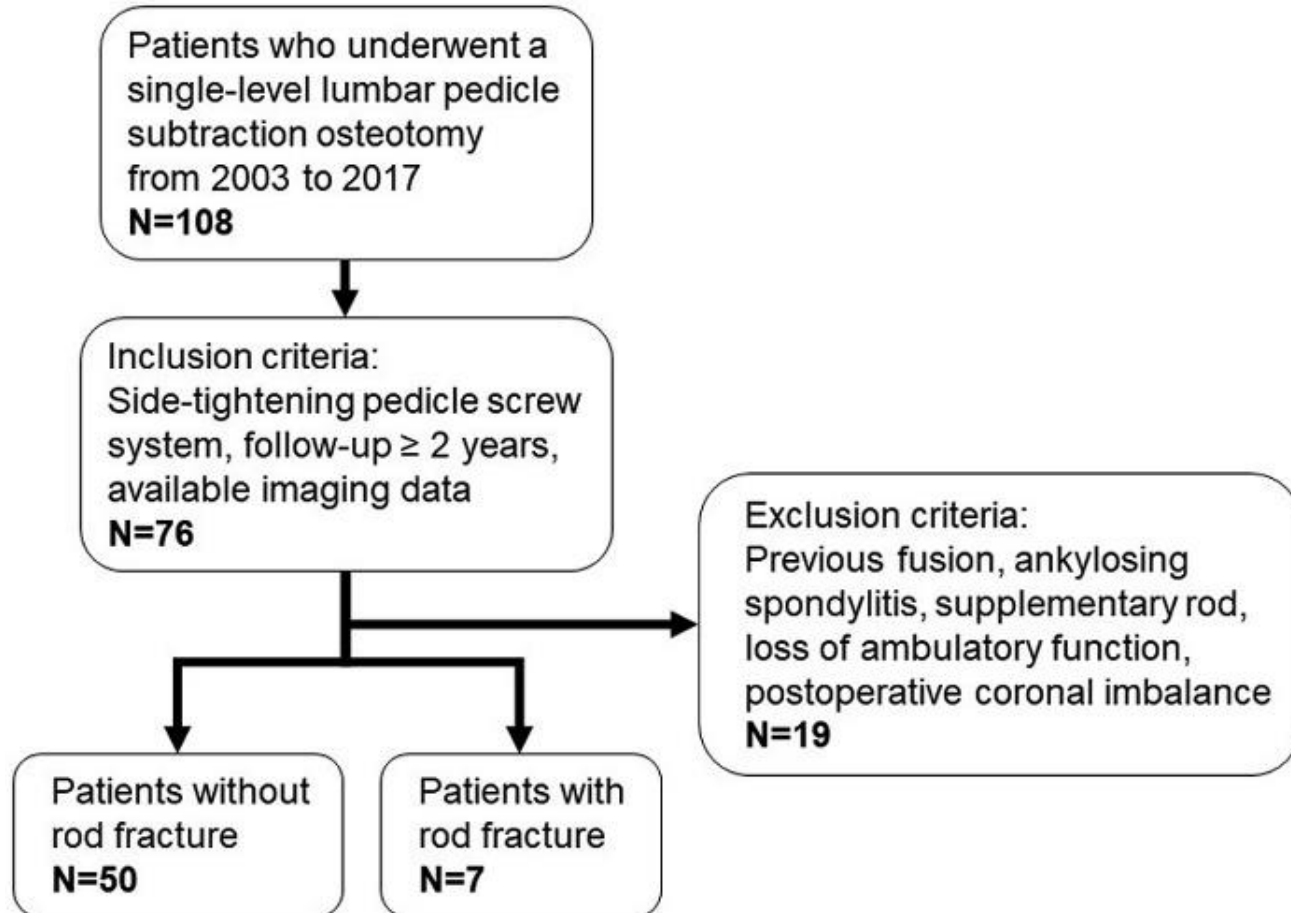
ST pedicle screw system



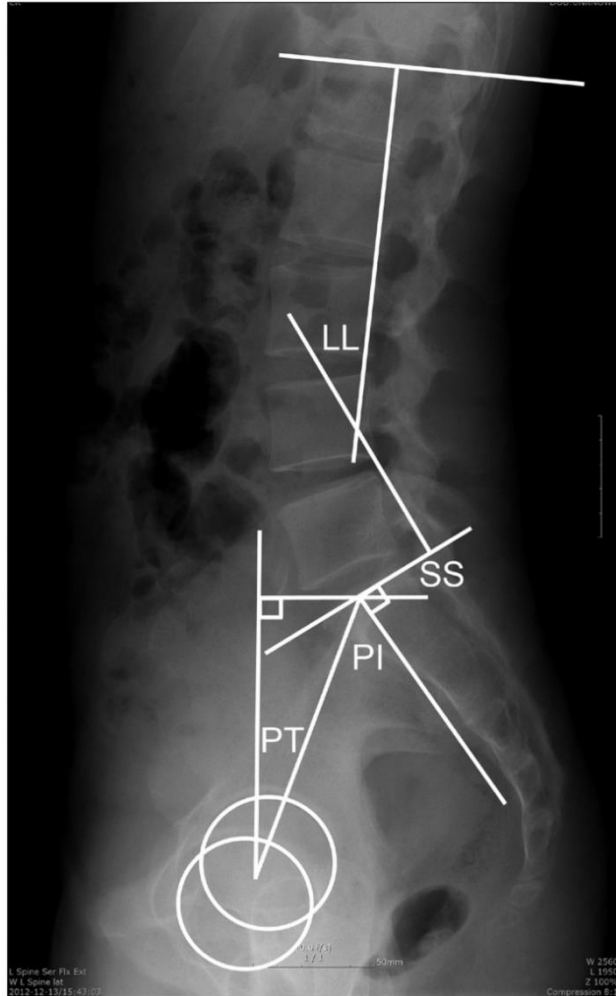
TT pedicle screw system



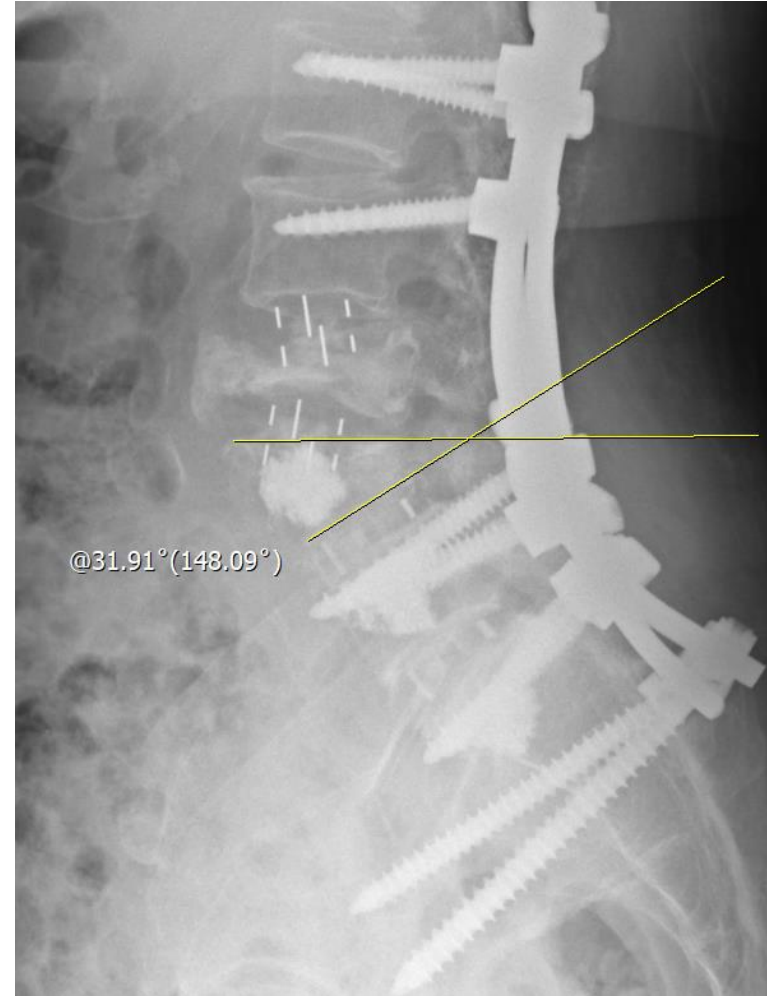
Method



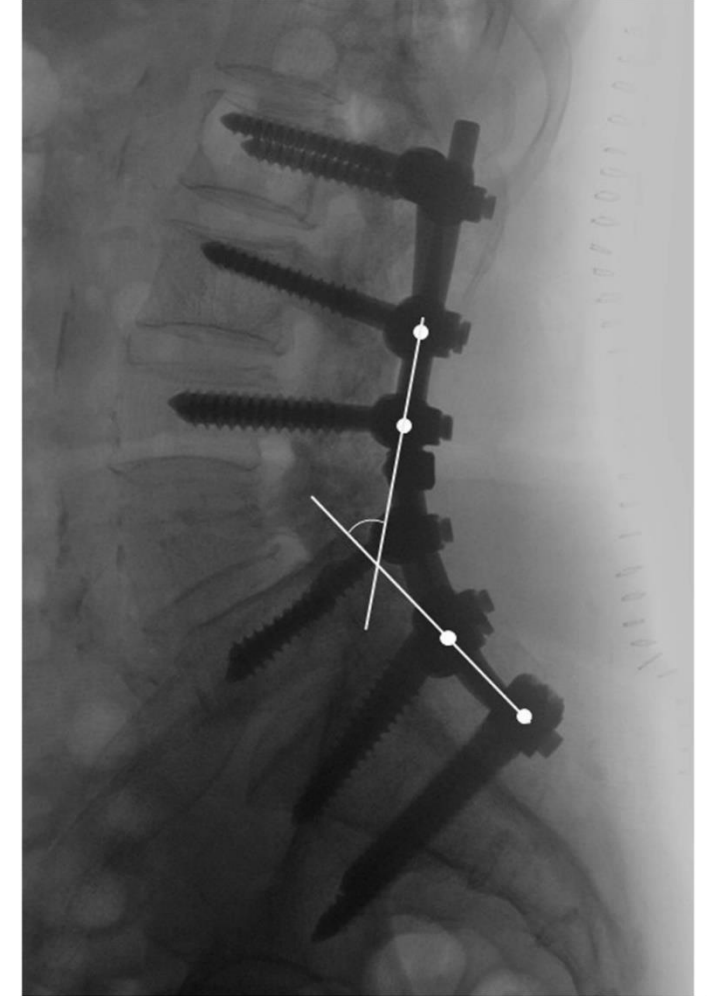
Radiologic measurements



Pelvic parameter



Segmental angle of the PSO segment



Rod contour angle (RCA)



Comparison of Demographic and Surgical Data Between the without-Rod Fracture Group and the with-Rod Fracture Group

Table 1.

	Without RF (n = 50)	With RF (n = 7)	P
Age	69.0 ± 6.0	64.9 ± 6.0	NS*
Gender (male:female)	7:43	1:6	NS†
BMI (kg/m ²)	24.9 ± 3.4	25.2 ± 3.0	NS*
Fusion length	5.5 ± 1.7	5.6 ± 1.7	NS*
PSO level (L3:L4)	13:37	2:5	NS†
Crosslink (n, %)	42 (84.0)	5 (71.4)	NS†
Iliac screw fixation (n, %)	41 (82.0)	6 (85.7)	NS†
Adjacent interbody cage (n, %)	37 (74.0)	1 (16.7)	0.004†

RF, rod fracture; BMI, body mass index; PSO, pedicle subtraction osteotomy.



Comparison of Radiographic Measurements Between the without-Rod Fracture Group and the with-Rod Fracture Group

	Without RF (n = 50)	With RF (n = 7)	P*				
Preoperative				Postoperative			
PI (°)	48.2 ± 11.2	50.5 ± 12.6	NS	PT (°)	25.2 ± 9.5	22.8 ± 9.0	NS
PT (°)	33.2 ± 9.6	33.1 ± 8.6	NS	SS (°)	22.7 ± 12.8	27.1 ± 9.7	NS
SS (°)	15.0 ± 18.9	17.4 ± 9.7	NS	LL (°)	39.9 ± 12.5	42.2 ± 13.2	NS
LL (°)	2.1 ± 14.8	-6.2 ± 8.0	NS	Change in LL (°)	37.8 ± 11.9	48.4 ± 8.8	0.033
SVA (cm)	8.3 ± 6.4	16.7 ± 14.1	NS	SVA (cm)	1.9 ± 3.6	3.2 ± 2.2	NS
PSO angle (°)	-1.7 ± 4.6	-6.1 ± 5.5	0.049	Change in the SVA (cm)	-6.4 ± 6.4	-13.4 ± 12.0	NS
PI-LL (°)	46.1 ± 15.1	56.7 ± 11.0	NS	PSO angle (°)	18.9 ± 7.6	17.8 ± 7.4	NS
				Change in the PSO angle (°)	20.3 ± 7.6	23.9 ± 4.7	NS
				PI-LL (°)	8.3 ± 11.6	8.3 ± 6.5	NS
				RCA (°)	50.8 ± 15.5	61.1 ± 14.3	NS

Table 2.



Results

Table 3. Risk Factor Analysis for Rod Fracture Using Stepwise Logistic Regression Analysis

	Univariate Analysis	Multivariate Analysis		
	<i>P</i>	OR	95% CI	<i>P</i>
Adjacent interbody cage	0.011	0.011	0.000–0.390	0.013
Preoperative SVA (cm)	0.044			
Preoperative PI-LL (°)	0.095			
Preoperative PSO angle (°)	0.046			
Change in the SVA (cm)	0.057			
Change in LL (°)	0.044	1.190	0.995–1.422	0.058

OR, odds ratio; CI, confidence interval; SVA, sagittal vertical axis; PI, pelvic incidence; LL, lumbar lordosis; PSO, pedicle subtraction osteotomy.



Discussion

- In our study including single-level lumbar PSO cases using an ST pedicle screw system, **the incidence of RF was 12.3%**, which was slightly lower than that reported in previous studies.
- The current study suggested that an **adjacent interbody cage was an independent risk factor for RF after PSO.**
- The degree of LL correction was not a statistically significant risk factor for RF in the current study ($P = 0.058$).

