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Supplement 1. Demographic data and operative data in subgroup excluding cases with endplate injury at two points

Characteristic	Non-subsidence	Subsidence	*p*-value
Demographic data			
Total patients	47	40	
Age (yr)	75.4±7.3	77.0±7.0	0.350
Sex (male)[a]	13 (39.4)	9 (26.5)	0.260
Follow-up (mo)	27.0±15.7	22.7±12.5	0.230
Body mass index (kg/m^2)	22.9±4.2	22.6±3.9	0.830
DEXA (T score)	–2.47±1.0	–2.29±1.3	0.683
Hounsfield units	102.6±28.3	84.4±29.4	0.037*
Surgical factors			
Operative duration (min)	296.8±102.2	269.6±70.2	0.222
Blood loss (mL)	335.4±434.3	227.5±268.2	0.239
Fusion numbers (0/1)[a]	17/30	32/8	0.100
End plate injury (0/1)[a]	39/8	14/26	<0.001*

Values are presented as number, mean±standard deviation, or number (%) unless otherwise stated. Continuous variables were analyzed using the Mann-Whitney *U* test. Fixation range (0: 1A1B, 1: 2A2B or more).
DEXA, dual-energy X-ray absorptiometry.
*p<0.05 (Statistically significant). [a]By chi-square test.

Supplement 2. Radiographic data in subgroup excluding cases with endplate injury at two points

Variable	Non-subsidence	Subsidence	*p*-value
Preoperative			
Standing local kyphosis (°)	12.1±17.5	16.5±16.6	0.298
Supine local kyphosis (°)	5.2±13.8	3.3±10.1	0.529
ΔLocal kyphosis (supine–standing) (°)	–7.1±9.2	–13.5±11.9	0.017*
Postoperative			
Local kyphosis (°)	–1.9±11.6	1.3±13.6	0.313
ΔLocal kyphosis (post–pre standing) (°)	–14.0±12.7	–15.3±16.7	0.736
ΔLocal kyphosis (post–pre supine) (°)	–6.9±9.2	–1.8±14.6	0.091
Final follow-up			
Local kyphosis (°)	0.1±13.7	10.3±19.5	0.017*
ΔLocal kyphosis (final–post) (°)	2.0±5.5	9.0±12.7	0.005*

Values are presented as mean±standard deviation unless otherwise stated. Continuous variables were analyzed using the Mann-Whitney *U* test.
*p<0.05 (Statistically significant).

Supplement 3. Global alignment in subgroup excluding cases with endplate injury at two points

Variable	Non-subsidence	Subsidence	*p*-value
Preoperative			
C7–SVA (mm)	107.2±43.4	120.9±42.1	0.269
TK (°)	23.1±12.9	33.7±20.1	0.031*
LL (°)	14.9±15.7	15.5±18.9	0.896
PI (°)	48.6±11.1	52.4±10.9	0.183
PT (°)	28.4±8.4	30.2±11.3	0.493
SS (°)	21.9±10.9	21.6±14.0	0.938
PI–LL (°)	33.7±16.5	36.0±20.1	0.695
TPA (°)	33.0±9.9	34.8±11.1	0.552
Postoperative			
C7–SVA (mm)	76.4±35.7	94.9±53.9	0.139
TK (°)	32.7±14.8	36.4±13.1	0.311
LL (°)	26.7±17.6	26.9±12.9	0.971
PT (°)	24.7±8.5	27.3±8.0	0.231
SS (°)	22.9±11.1	24.7±7.9	0.472
PI–LL (°)	21.7±17.6	23.5±14.3	0.726
TPA (°)	26.2±7.5	30.8±9.5	0.047*

Values are presented as mean±standard deviation unless otherwise stated. Continuous variables were analyzed using the Mann-Whitney *U* test.
C7–SVA, the distance between the C7 plumb line and the central sacral vertical line; TK, thoracic kyphosis; LL, lumber lordosis; PI, pelvic incidence; PT, pelvic tilt; SS, sacral slope; TPA, T1 pelvic angle.
*p<0.05 (Statistically significant).

Supplement 4. Multivariate analysis for the risk factors of subsidence in subgroup excluding cases with endplate injury at two points

Explanatory variables	Reference	aOR (95% CI)	*p*-value
ΔLocal kyphosis (supine–standing)	<–14.0	10.5 (1.5 to 70.6)	0.015*
Thoracolumbar	Lumbar	1.8 (0.1 to 3.0)	0.504
Hounsfield units	>87.5	7.6 (1.2 to 49.9)	0.035*
Endplate injury (1)	0	4.8 (0.5 to 19.1)	0.040*
Fusion numbers	2A2B	9.8 (1.6 to 60.8)	0.015*

aOR, adjusted odds ratio; CI, confidence interval.
*p<0.05 (Statistically significant).

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Supplement 5. Global alignment after dividing the subjects into two groups based on the fusion levels

Variable	Long fusion	Short fusion	*p*-value
Preoperative			
C7–SVA (mm)	111.5±45.3	116.2±40.9	0.685
TK (°)	19.8±15.9	31.6±16.6	0.006*
LL (°)	5.6±18.7	17.7±16.9	0.008*
PI (°)	47.6±10.4	51.9±11.0	0.129
PT (°)	28.9±8.0	29.2±10.3	0.896
SS (°)	19.2±9.7	31.6±16.6	0.177
PI–LL (°)	37.7±21.9	30.0±19.4	0.128
TPA (°)	34.1±11.6	34.4±9.8	0.919
Postoperative			
C7–SVA (mm)	85.9±43.7	87.1±48.1	0.924
TK (°)	32.1±15.8	34.5±12.1	0.511
LL (°)	23.3±16.9	25.8±16.4	0.539
PT (°)	24.9±8.3	26.9±7.8	0.312
SS (°)	21.1±9.7	24.6±9.9	0.155
PI–LL (°)	21.0±17.9	22.8±15.3	0.662
TPA (°)	27.9±8.6	29.9±9.1	0.375

Values are presented as mean±standard deviation unless otherwise stated. Continuous variables were analyzed using the Mann-Whitney *U* test.
C7–SVA, the distance between the C7 plumb line and the central sacral vertical line; TK, thoracic kyphosis; LL, lumber lordosis; PI, pelvic incidence; PT, pelvic tilt; SS, sacral slope; TPA, T1 pelvic angle.
*p<0.05 (Statistically significant).

Supplement 6. Demographic data, operative data, and preoperative HU after dividing the subjects into two groups based on the fusion levels

Characteristic	Long fusion	Short fusion	*p*-value
Demographic data			
No. of patients	56	44	
Age (yr)	75.8±7.1	77.6±6.9	0.233
Sex (male)	19 (33.9)	12 (27.3)	
Follow-up (mo)	27.7±18.0	21.8±11.6	0.121
Body mass index (kg/m^2)	22.7±4.6	22.9±3.7	0.452
DEXA (T score)	–2.5±1.6	–2.4±0.9	0.844
HU	91.8±34.1	88.2±30.1	0.687
Surgical factors			
Operative duration (min)	325.3±115.6	257.9±76.5	0.002*
Blood loss (mL)	349.8±425.9	283.2±344.8	0.479
Fixation range	5.0±1.6	3.2±0.4	<0.001*
Thoracolumbar/lumbar	34/22	19/25	0.081
End plate injury (0/1/2)	34/16/6	19/18/7	0.297

Values are presented as number, mean±standard deviation, or number (%) unless otherwise stated.
HU, Hounsfield units; DEXA, dual-energy X-ray absorptiometry.
*p<0.05 (Statistically significant).

Supplement 7. Postoperative complications and clinical outcomes after dividing the subjects into two groups based on the fusion levels

Variable	Long fusion	Short fusion	*p*-value
Postoperative complications			
Cage subsidence	25 (44.6)	28 (63.6)	0.215
Clinical outcomes			
VAS of back pain			
Pre	79.2±28.1	74.7±3.2	0.314
Final	29.9±23.2	33.5±25.4	0.523
Δ	52.9±26.1	42.5±30.9	0.094
JOA scores			
Pre	10.7±3.9	9.24±4.4	0.102
Final	20.1±4.2	20.5±4.6	0.742
Improvement ratio	50.8±20.2	56.9±26.8	0.225

Values are presented as number (%) or mean±standard deviation. Continuous variables were analyzed using the Mann-Whitney *U* test and categorical variables were analyzed using the Fisher's exact test.
VAS, Visual Analog Scale; JOA, Japanese Orthopedic Association.

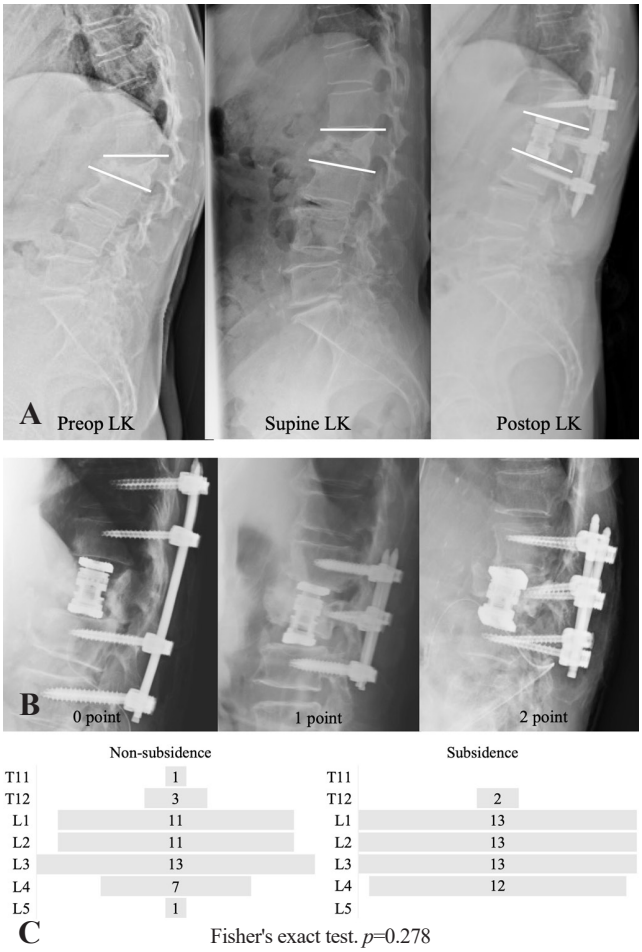

Fig. 1. (A) Method of measuring local kyphosis (LK). **(B)** Evaluation of endplate injury grade. **(C)** Distribution of vertebrae treated with Xcore. Preop, preoperative; Postop, postoperative.