

요추 고정수술 후 인접척추 운동범위의 변화

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= Abstract =

The Change of Motion Ranges of Adjacent Vertebral Joints after Lumbar Fusion Operation

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Objectives : Transpedicular screw fixation has become an important method for internal fixation in variety of disorders. However, acceleration of degeneration at the adjacent segment in any follow. The goal of this study is to review the change of motion ranges of vertebral joints adjacent to fused level in lumbar spine.

Methods : This study consists of 22 patients with degenerative spinal instability. Treatment of spinal instability includes posterior fusion with transpedicular screw fixation or transpedicular screw fixation with posterior lumbar interbody fusion. The flexion - extension angle (FEA) was measured from dynamic views of lumbar spine taken both at preoperative and post operative period.

Results : The FEA of upper vertebral joint adjacent (FEA - u) to a fused L4 - 5 level was increased ($p = 0.010$). The FEA - u was increased in case of L5 - S1 fusion ($p = 0.025$). The change of FEA - u in case of L5 - S1 fusion was greater than that in L4 - 5 fusion ($p = 0.013$).

Conclusion : After L4 - 5 fusion, there seems to be more meaningful increase in FEA of L3 - 4 than that of L5 - S1. The reason may be due to the damage of L3 - 4 facet joints during the operation, the other possible explanation may be the anatomical stability of L5 - S1 vertebral joint. The change of FEA - u of L5 - S1 fusion is increased more than that of L4 - 5 fusion. Because there are compensations in the adjacent vertebrae both above and below the fused L4 - 5, the compensatory motion in FEA - u of L5 - S1 fusion was greater than that of the L4 - 5 fusion.

KEY WORDS : Spinal instability · Transpedicular screw fixation · Flexion - extension angle.

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대상 및 방법

1994 1 1996 12 L4 - 5
 L5 - S1
 35 1
 가 22
 (retrospective study)

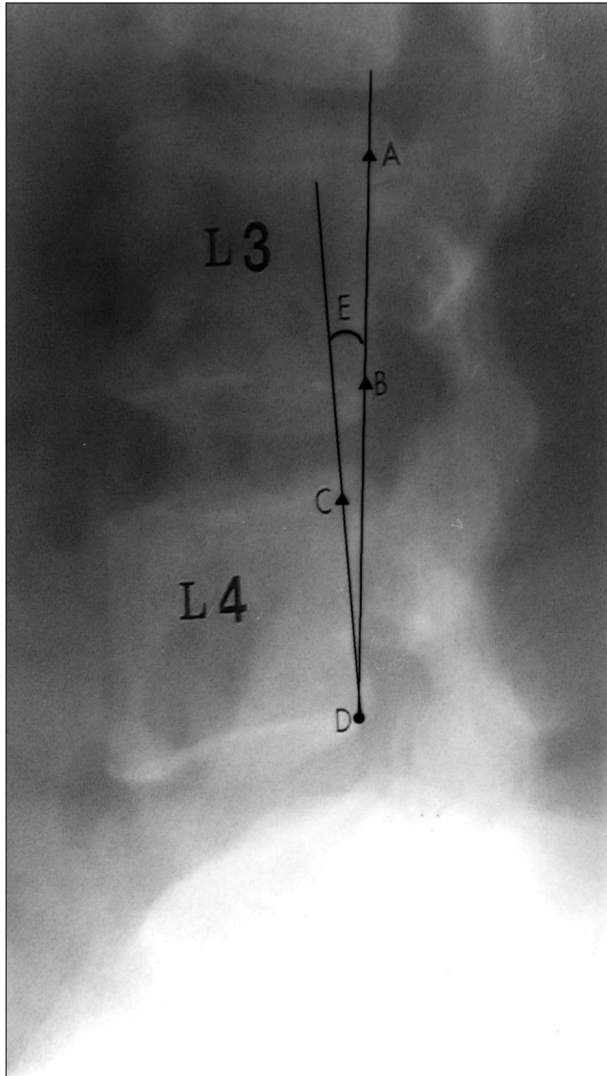


Fig. 1. Measurement of flexion-extension angle on lumbar spine on extension motion. A : Superior posterior point of L3 body, B : Inferior posterior point of L3 body, C : Superior posterior point of L4 body, D : Inferior posterior point of L4 body, E : Angle between line that is to continue A and B and line that is to continue C and D(Extension Angle).

42 , 26.7 ± 9.3 14
 (transpedicular screw fixation)
 (PLIF)
 (facet capsule)
 (laminectomy)
 L3 - 4
 L3 L4
 (flexion angle, FA),
 (extension angle,
 EA)
 (flexion -
 extension angle, FEA, degree)
 (Fig. 1).
 6 1

unpaired Student's t - test
 p<0.05

결 과

22 7 15
 1 : 2.1 28 61
 49.5 ± 8.9 L4 - 5
 14 , L5 - S1 8
 L4 - 5 L1 -
 2 5.5 ± 4.2%(7.2 ± 5.4,
 7.6 ± 2.9), L2 - 3 18.5 ± 3.3%(
 6.5 ± 3.3,
 7.7 ± 3.3) 가
 L3 - 4 60.1 ±
 4.5%(7.0 ± 3.7,
 11.2 ± 5.2) 가
 (p=0.010, Table 1).
 L5 - S1 34.4 ± 6.5%(11.4
 ± 7.2, 15.4 ± 5.7)가 가
 L5 - S1
 가 L1 - 2 30.1 ± 3.5%(5.4 ±

Table 1. The FEA changes of L3-4, L5-S1 after L4-5 fusion operation(degrees)

Patient No	Pre op L3-4 FEA	Post op L3-4 FEA	Post op change(%)	Pre op L5-S1 FEA	Post op L5-S1 FEA	Post op change(%)
1	8.0	13.0	62.5	2.0	10.0	400.0
2	3.0	4.0	25.0	25.0	25.0	0
3	2.0	4.0	50.0	3.0	11.0	266.7
4	10.0	11.0	9.0	14.0	14.0	0
5	9.0	9.0	0	9.0	11.0	22.2
6	12.0	19.0	58.3	15.0	20.0	33.3
7	10.0	10.0	0	11.0	11.0	0
8	3.0	14.0	366.7	15.0	19.0	26.7
9	8.0	9.0	11.1	9.0	10.0	11.1
10	7.0	17.0	142.9	4.0	19.0	375.0
11	9.0	10.0	10.0	23.0	23.0	0
12	3.0	20.0	566.7	14.0	14.0	0
13	2.0	4.0	100.0	14.0	21.0	50.0
14	12.0	13.0	8.3	2.0	7.0	250.0
Mean ± SD	7.0 ± 3.7	11.2 ± 5.2*	60.1 ± 4.5	11.4 ± 7.2	15.4 ± 5.7	34.4 ± 6.5

* : p<0.05 vs Preoperative L3-4 FEA FEA : Flexion-Extension Angle

Table 2. The FEA changes of L4-5 after L5-S1 fusion operation(degrees)

Patient No	Pre op L4-5 FEA	Post op L4-5 FEA	Post op change(%)
1	4.0	17.0	325.0
2	6.0	20.0	233.3
3	1.0	10.0	900.0
4	9.0	10.0	11.1
5	31.0	38.0	22.6
6	2.0	10.0	400.0
7	6.0	37.0	516.6
8	12.0	20.0	66.7
Mean ± SD	8.9 ± 9.6	20.3 ± 11.5*	128.0 ± 10.6

* : p<0.05 vs Preoperative L4-5 FEA FEA : Flexion-Extension Angle

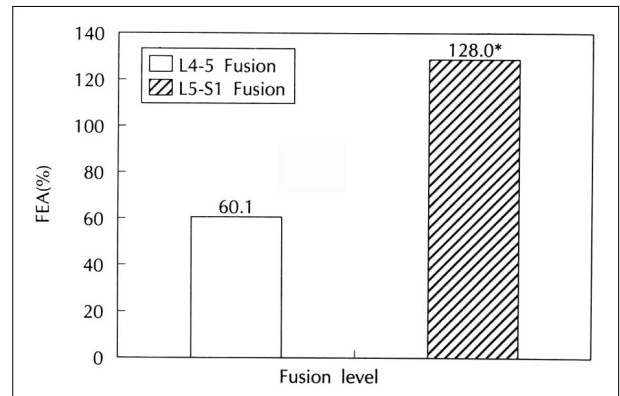


Fig. 2. Increased FEAs of upper adjacent vertebral joint after lumbosacral fusion operations. * : p<0.05, FEA : Flexion-Extension Angle.

3.5, 7.1 ± 3.5), L2 - 3 14.8 ± 5.5% (8.1 ± 5.8, 22.2 ± 6.2% (9.3 ± 5.1), L3 - 4 8.0 ± 6.3, 9.7 ± 6.0) 가 , L4 - 5 128 ± 10.6% (8.9 ± 9.6, 20.3 ± 11.5) 가 (p=0.025, Table 2). L4 - 5 L3 - 4 FEA 가 3 , 11 , L5 - S1 FEA 가 5 , 9 , L5 - S1 L4 - 5 FEA 가 4 , 4

L5 - S1 L4 - 5 가 L4 - 5 L3 - 4 가 (p=0.013, Fig. 2). 고 찰

(motion segment) 3 가 60.1 ± 4.5% 가가 L3 - 4 , L1 - 2, L2 - 3
5.5 ± 4.2%, 18.5 ± 3.3%
가 L1 - 2, L2 - 3
(Posterior fusion) 가 가 , 가
(Bilateral lateral fusion) 가 가 ,
(Anterior fusion) 가 L4 - 5 가 가 ,
¹⁴⁾ 가 , L5 - S1
가 가 ²⁾⁵⁾¹¹⁾¹⁶⁾²⁰⁾ 가가 L4 - 5 L5 -
Lehmann ¹⁵⁾ S1 , L4 -
42% 5 L3 - 4 가 L5 -
, 45% , S1 L4 - 5 가가

가 가 가 ⁶⁾
¹⁾⁹⁾ 가가 가 **결 론**
³⁾¹⁴⁾, Ha ¹⁰⁾ canine
in vitro study
가가 가 가
L4 - 5 L3 - 4
가 가 L5 - S1 가
L4 - 5 L3 - 4 2) L4 - 5 L3 - 4
가 가 S1 가 가 L5 -
L5 - S1 L3 - 4
Schlegel ¹⁹⁾ 58 L5 - S1
가 가 3) L4 - 5 L5 - S1
L4 - L4 - 5
5 L5 - S1

4)

가

가 가

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