

Outcome of Two Fusion Methods In Isthmic and Degenerative Spondylolisthesis of the Lumbar Spine

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– Abstract –

Design : A retrospective study was performed in isthmic and degenerative spondylolisthesis patients who had undergone posterolateral fusion (PLF) only (group) or posterolateral fusion (PLF) with posterior lumbar interbody fusion (PLIF) (group).

Objectives : The objective of this study was to help in the selection of a surgical treatment option for spondylolisthesis.

Summary of Literature Review : Irrespective of whether group or group , satisfactory results have been reported in the surgical treatment of spondylolisthesis. However, isthmic and degenerative types have not been investigated in terms of outcome.

Material and Methods : We analyzed 112 patients (Isthmic: group (32), group (22), Degenerative : group (37), group (21)) who underwent surgical treatment for spondylolisthesis between April 1995 and December 2000. Kirkaldy-Willis criteria, radiologic union state, reduction ratio of slippage, change of disc space and change of segmental angle were analyzed as indicators of outcome.

Results : We found the following by radiologic analysis: In isthmic spondylolisthesis, group was better than group in terms of reduction ratio of slippage (reduction loss: 3.38% vs. 2.3%, $P=0.15$), change of segmental angle (reduction loss : 2.11 ° vs. 1.6 °, $P=0.15$), bone union (83% vs. 92%, $P=0.45$) and change of disc space (reduction loss : 2.83 mm vs. 1.9 mm, $P=0.02$). In the degenerative spondylolisthesis, group did not show significant difference from group in terms of reduced slippage (reduction loss: 3.8% vs. 3.85%, $P=0.47$), change of segmental angle (reduction loss: 2.73° vs. 2.64°, $P=0.43$), bone union (80% vs. 87%, $P=0.72$) or disc height (reduction loss: 3.2 mm vs. 3.14 mm, $P=0.45$).

In terms of clinical outcome, group was better than groups in cases of isthmic spondylolisthesis (fair : 85% vs. 93%, $P=0.72$), however, groups was not better than groups in cases of degenerative spondylolisthesis (fair : 83% vs. 85%, $P=0.23$).

Conclusions : In the degenerative spondylolisthesis patient, no significant difference was found between group and group , but in the isthmic spondylolisthesis patient, group and group were found to be significantly different in terms of the reduction ratio of the disc heights.

Key Words : Spondylolisthesis, Isthmic, Degenerative, PLF, PLIF

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* 2002

(13~35) , group
 20.3 (12~33) .
 group 47.8 (25~64)
 6 가 , 28) 8 , 24 , group 50.5
 (35~60) 5 , 17 .
 가 group 58.4
 (41~71) 10 , 27 , group
 60.5 (45~68) 4 , 17
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 , group 4~5 16 ,
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 (Table 1).
 2.
 1.
 1995 4 2000 12 , , ,
 32 (Group) Taillard²⁴⁾ ,
 Novus Cage (Sofamor Danek. USA)
 22 .
 (Group)
 group 37 group 21
 group
 17.5 (12~23) , group Lenke ¹⁵⁾ ,
 16.2 (12~22) 가 A,
 group 21.5 가

Table 1. Patient data

| | Isthmic type | | Degenerative type | |
|-----------------------|-------------------|-------------------|-------------------|-------------------|
| | PLF only (Group) | PLF+PLIF (Group) | PLF only (Group) | PLF+PLIF (Group) |
| Follow-up(month) | 17.5 | 16.2 | 21.5 | 20.3 |
| Age | 47.8 | 50.5 | 58.4 | 60.5 |
| Sex (M:F) | 8:24 | 5:17 | 10:27 | 4:17 |
| No. of fusion segment | 2.0 | 2.0 | 2.0 | 2.0 |
| Fusion level L3-4 | 0 | 0 | 5 | 2 |
| L4-5 | 24 | 16 | 25 | 16 |
| L5-S1 | 8 | 6 | 7 | 3 |

| 2). test | Independent sample t-test | Chi-square | P 0.05 | group | |
|----------|--------------------------------|------------|--------|--------------------|-----------|
| | | | | 11.5% | 6.3% |
| 1. | Kirkaldy-Willis ¹⁴⁾ | Chi-square | P 0.05 | 17.8%, 7.7%, | 12.6 ° |
| | | | | 19.5%, 9.5%, 13.4% | 2.1 ° |
| 1. | Taillard ²⁴⁾ | Chi-square | P 0.05 | 15.2 °; 13.1 ° | 0.5 ° |
| | | | | 13 °; 16.6 °; 15 ° | 2 ° |
| | | | | 1.6 ° | (P=0.15). |

Table 2. Kirkaldy-Willis 가

| 4 categories | |
|--------------|---|
| Excellent | The patient has returned to his normal work and other activities with little or no complaint. |
| Good | The patient has returned to his normal work but may have some restriction in other activities and may on occasion after heavy work have recurrent back pain requiring a few days` rest. |
| Fair | The patient has to reduce his working capacity, taking a lighter job or working part-time, and may occasionally have recurrence of pain requiring absence from work for one to two weeks, once or twice a year. |
| Poor | The patient does not return to work. |

Table 3. Radiologic Measurements

| Operation | | Preop | Postop | Last follow-up | Reduction | Reduction loss | |
|-------------------|-------------------|----------------------|--------|----------------|-----------|----------------|--------|
| Isthmic type | PLF (Group) | Anterior translation | 8.8% | 12.7% | 16% | 2.8% | 3.3% |
| | | Segmental angle | 12.6 ° | 15.2 ° | 13.1 ° | 0.5 ° | 2.1 ° |
| | | Disc height | 9.0 | 11.2 | 8.4 | -0.6 | 2.8 |
| | PLF+PLIF (Group) | Anterior translation | 19% | 8% | 10.3% | 8.7% | 2.3% |
| | | Segmental angle | 13 ° | 16.6 ° | 15 ° | 2 ° | 1.6 ° |
| | | Disc height | 8.7 mm | 11.7 mm | 9.8 mm | 1.1 mm | 1.9 mm |
| Degenerative type | PLF (Group) | Anterior translation | 17.8% | 7.7% | 11.5% | 6.3% | 3.8% |
| | | Segmental angle | 12.6 ° | 15.5 ° | 12.8 ° | 0.2 ° | 2.7 ° |
| | | Disc height | 8.4 mm | 11 mm | 7.8 mm | -0.6 mm | 3.2 mm |
| | PLF+PLIF (Group) | Anterior translation | 19.5% | 9.5% | 13.4% | 6.1% | 3.8% |
| | | Segmental angle | 12.8 ° | 15.6 ° | 13 ° | 0.2 ° | 2.6 ° |
| | | Disc height | 8.2 mm | 12.1 mm | 9.0 mm | 0.8 mm | 3.1 mm |

group
12.6 °; 15.5 °; 12.8 °
group
12.8 °; 15.6 °; 13 °
0.2 °
(P=0.43).
2.6 °
0.2 °
2.7 °

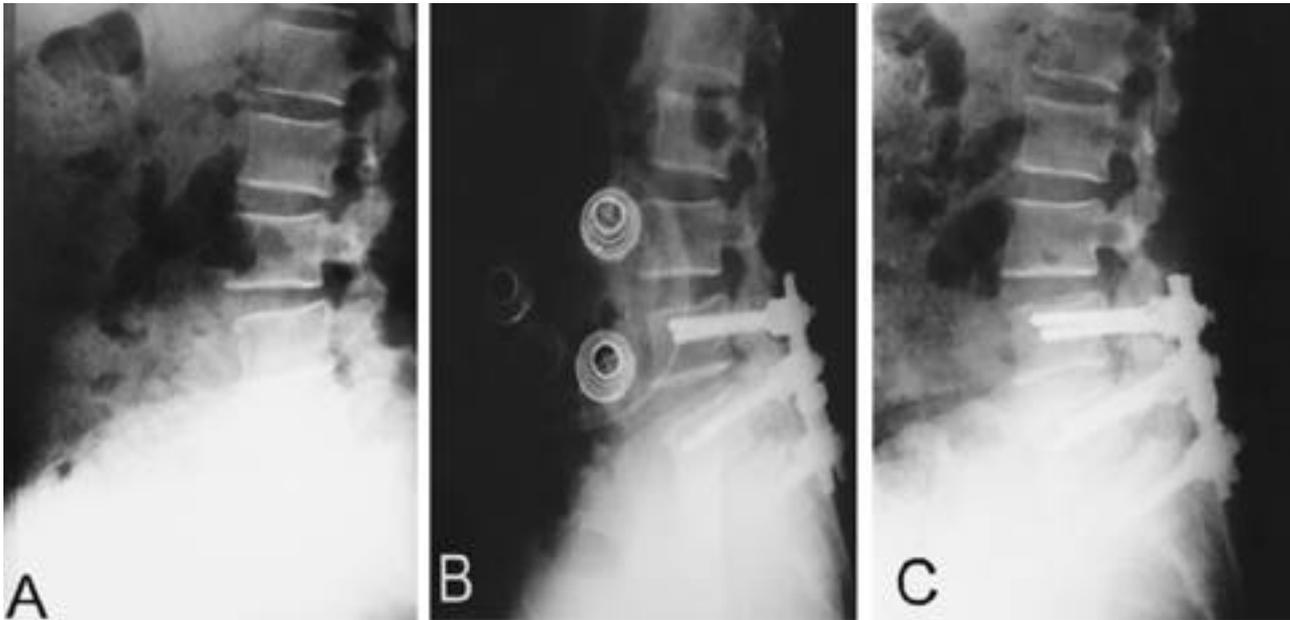


Fig. 1. Isthmic Spondylolisthesis with PLF

- A. Lateral radiograph of symptomatic isthmic spondylolisthesis in a 48-year-old female.
- B. Postoperative radiograph demonstrated correction of deformity.
- C. Last follow-up radiograph demonstrated loss of the correction.

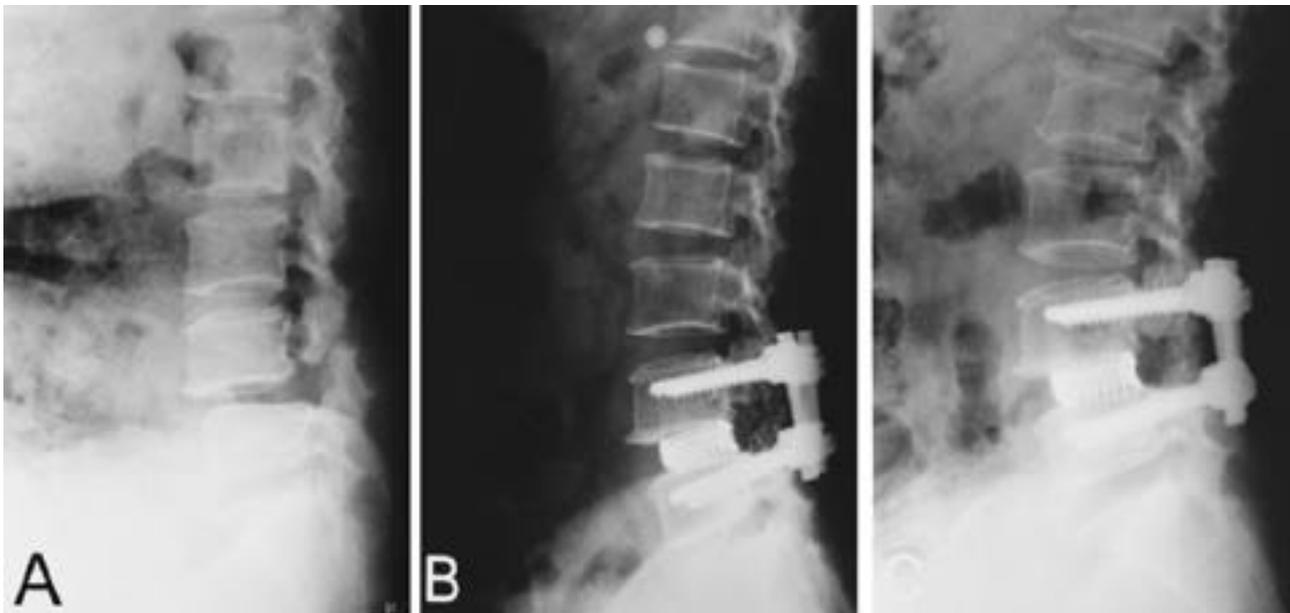


Fig. 2. Isthmic Spondylolisthesis with PLF and PLIF

- A. Lateral radiograph of symptomatic isthmic spondylolisthesis in a 53-year-old female.
- B. Postoperative radiograph demonstrated full correction of deformity.
- C. Last follow-up radiograph demonstrated well-consolidated interbody fusion without loss of the slippage.

3.

(P=0.45).

Lenke ¹⁵⁾

group 92% group B

83%,

80%, group (P=0.72).

87% group B

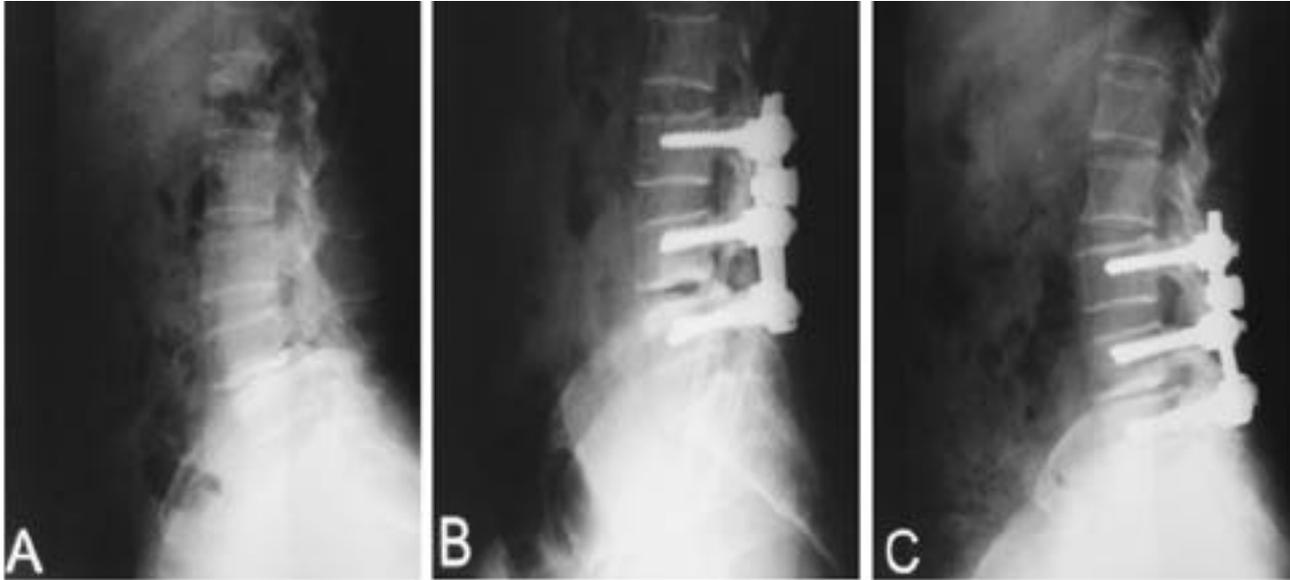


Fig. 3. Degenerative Spondylolisthesis with PLF

- A. Lateral radiograph of symptomatic degenerative spondylolisthesis L4 on L5 in a 52-year-old female.
- B. Postoperative radiograph demonstrated correction of deformity.
- C. Last follow-up radiograph demonstrated loss of disc height.

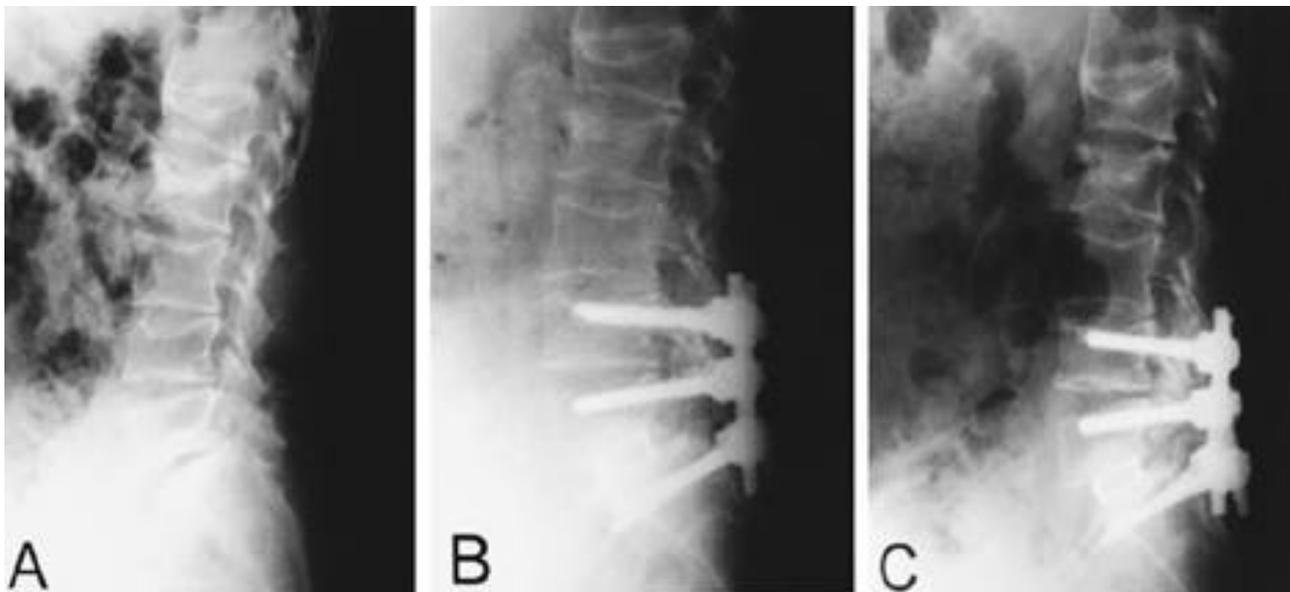


Fig. 4. Degenerative Spondylolisthesis with PLF and PLIF

- A. Lateral radiograph of symptomatic degenerative spondylolisthesis in a 66-year-old female.
- B. Postoperative radiograph demonstrated correction of deformity.
- C. Last follow-up radiograph demonstrated loss of the correction and disc height.

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 9.0 mm, 11.2 mm, 8.4 mm
 -0.6 mm 2.8 mm .
 group 8.7 mm, 11.7 mm, 9.8 mm ,
 1.1 mm 1.9 mm ,
 (P=0.02).
 group ,
 8.4 mm, 11 mm, 7.8 mm
 -0.6 mm 3.2 mm .
 group 8.2 mm, 12.1 mm, 9.0 mm ,
 0.8 mm 3.1 mm . ,
 (P=0.45). ,

5. 가 12)
 Kirkaldy-Willis 14)
 group group , ,
 (:85%/93%, P=0.72) .
 group (fair :83%/85%, P=0.23) , 70~95%
 2,7,10,12,23)
 가
 7,16,18,19,20,22), Enker Steffee⁵⁾
 가 96% 86% .

Wiltse 28) , ,
 , , 1,3,4,5,13,23,27)
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 , 가 8) 가 1,5,6,13,23,27)
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 Newman Stone²¹⁾
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 9,25) . , , 가 ,

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group group

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: (group)
 : (group) ,
 : 1995 4 2000 12 1 가
 112 (: group (32), group (22), : group (37), group (21))
 가 Kirkaldy-Willis 가 ,
 : group group (:3.38%/2.3%,
 P=0.15), (:2.11 %1.6 °P=0.15), (83%/92%, P=0.45)
 (:2.83 mm/1.9
 mm, P=0.02) group
 group (:3.8%/3.85%, P=0.47), (group
 :3.2 mm/3.14 mm, P=0.45), (:2.73°/2.64°, P=0.43)
 , (80%/87%, P=0.72) group
 group group (fair :85%/93%,
 P=0.72) group group
 (fair :83%/85%, P=0.23)
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