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A Minimum Follow-up Study of 10 years After Pedicle Screw Fixation and Fusion for Degenerative Lumbar Diseases

Byung-Joon Shin, M.D., Jae-Chul Lee, M.D., Jun-Seo Nam, M.D.,
Yong-Bum Kim, M.D., Soo-Jin Yoon, RN. Young-II Cho, M.D.#, Yon-II Kim, M.D.

*Department of Orthopaedic Surgery, Soonchunhyang University College of Medicine,
Spine center Seoul Hospital, Seoul, Korea*

Department of Orthopaedic Surgery, Soonchunhyang University College of Medicine, Gumi Hospital, Gumi, Korea#

– Abstract –

Study Design: A retrospective study was conducted.

Objectives: To evaluate the long-term clinical results and radiological changes of lumbar spinal fusions with pedicle screw fixation for degenerative lumbar disease.

Summary of Literature Review: Pedicle screw fixation of the lumbar spine is a widely used procedure, but there is little long-term follow-up information on the results of the technique.

Materials and Methods: Patients, who underwent surgery for degenerative lumbar diseases, from May 1988 through December 1994, were included. Those patients who received surgery for tumors, infections, traumas, and deformities were excluded, as were those who received long-level fusions. The clinical results were evaluated with Kim's criteria. Radiologically, changes in lumbar lordosis and disc height were measured, and calcification in the disc spaces was evaluated.

Results: One hundred-thirty-six patients matched the study criteria. Of these, 13 had died, and there were 123 available for the study. Clinical follow-up was completed in 58 patients. There were 36 women and 22 men. The average age at the time of surgery was 52.7 years. The average follow-up was 148 months. Forty-four patients had satisfactory results at the final follow-up. Repeat surgery was necessary in 7 patients: 6 of them on a single segment and 4 with a posterior lumbar interbody fusion. A final radiologic analysis was completed in 44 patients. Lumbar lordosis was reduced from 43 degrees to 33 degrees. The lordotic angle of the fusion segments was reduced from 22 degrees to 13 degrees. The relative heights of the discs were markedly reduced at L3-4 and L4-5, from 40% to 30% and from 37% to 27%, respectively. Calcification of the disc space was observed in 37 segments out of a total of 58 that were treated with posterolateral fusions.

Conclusion: The clinically satisfactory result rate was similar to that of the 5-year follow-up reported in a previous study by the author. Repeat operations were necessary if disc herniation or stenosis developed in the adjacent vertebral segments.

Address reprint requests to

Byung-Joon Shin, M.D.

Department of Orthopaedic Surgery, College of Medicine, Soonchunhyang University Hospital

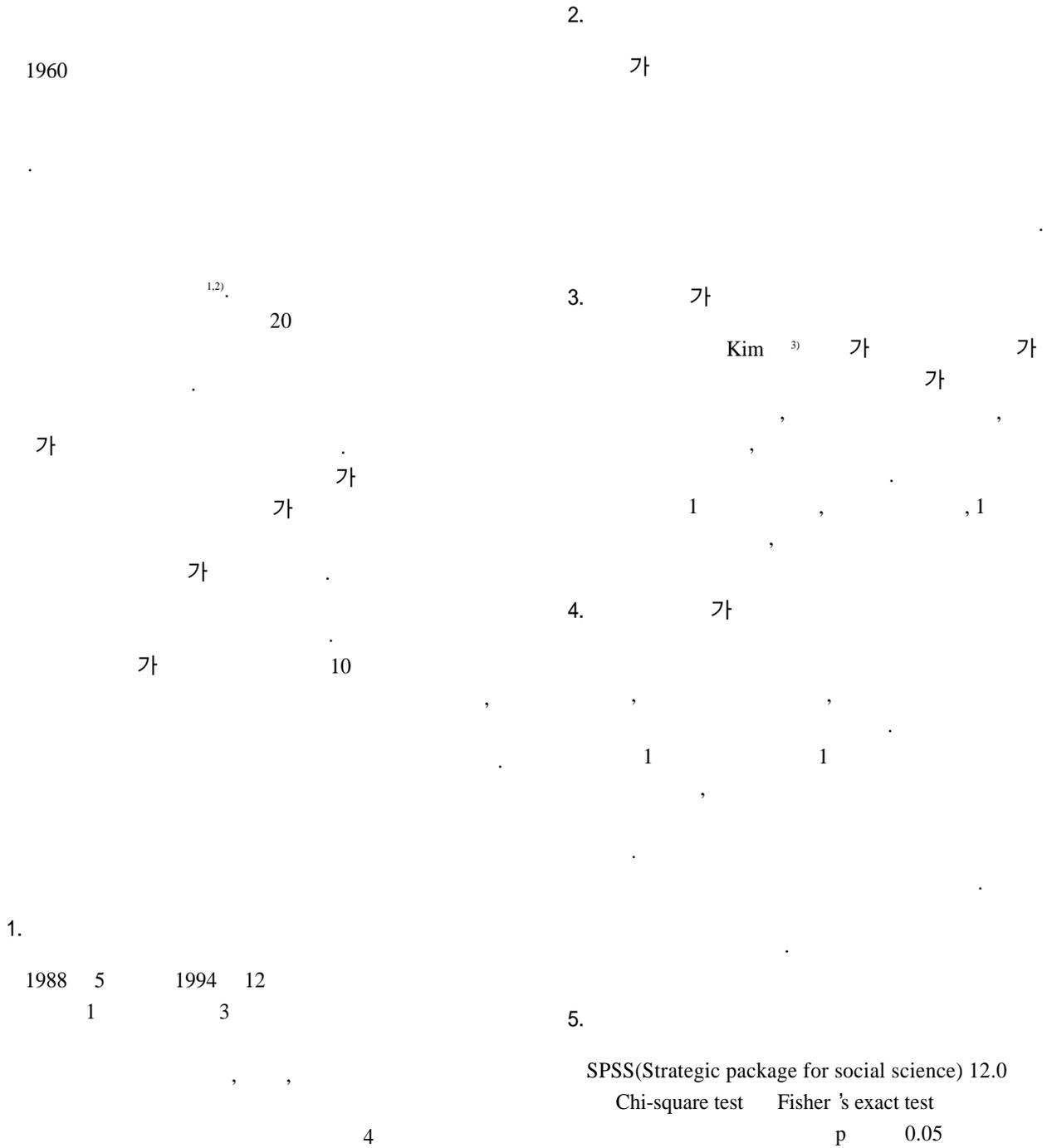
657 Hannam-dong, Yongsan-gu, Seoul 140-743, Korea

Tel: 82-2-709-9056, Fax: 82-2-796-3682, E-mail: schsbj@hosp.sch.ac.kr

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Patients who were treated with a single-level PLIF demonstrated a higher repeat operation rate. Lordotic angles and disc space heights were reduced significantly during the follow-up period. Many disc spaces (64%) involved in posterolateral fusions had calcific deposits, which meant that spontaneous disc space fusion would occur over time, even though the disc space was not fused at the time of surgery.

Key Words: Degenerative lumbar disease, Pedicle screw fixation, Long-term follow-up



1. 13 123 62 (50.4%) 61 가 58 9 49 44 (35.8%) 136 가 4 5 2. 65 22 ± 9.4 (34-74) (120~195) 가 11.0 가 58 (46.0%) 52.7 148 ± 14.7 47.8 ± 3. 29 44 (75.8%) 7 (12%) 가 4 (Fig. 1), 5 2 1 3. 29 44 (75.8%) 7 (12%) 가 4 (Fig. 1), 5 2 1 4. 1) 10.6) 33.4 (10.1) (p=0.00) 0.592 가 Y=5.96+0.64X(R²=0.35) 2) 21.9 (8.8) 10.9) 13.0 (8.8) (p=0.00) 0.662 가 Y=3.29+0.44X(R²=0.39) 3) (Fig. 2) 1 2 33.2 ± 7.0% 29.8 ± 5.4% (p=0.02) 0.412 Y=19.25+0.32X(R²=0.17) 3 38.4 ± 5.8% 31.3 ± 7.2% (p=0.00) 0.291 4 39.7 ± 7.5% 30.2 ± 10.1% (p=0.00) 0.361 4 5 37.3 ± 8.3% 27.3 ± 9.7% (P=0.00) 0.484 Y=4.82+ 0.59X(R²= 0.23) 5 1 36.7 ± 9.0% 34.0 ± 9.0% 가 (P=0.01) 0.568 가 Y=10.29+0.62X(R²=0.32) (p=0.051) 9

4) (58.8%), 4 5 29
 20 (69.0%), 5
 1-2 5 - 1 1 10 6 (60%)
 148 5.63% (9.35) (1.4%) 148 가
 10.73% (9.57) 가 (p=0.000).
 가 6)
 (p=0.000).
 58 10.74% (가
 9.91) 9 10.68% (7.53) 가
 (p=0.987)

5) 가 (Fig. 3). 가
 58 37 (63.8%) 가
 가 2 3
 2 1 (50%), 3
 4 17 10 가



Fig. 1. (A)Initial myelograph showing spondylolisthesis of L5 with thecal sac compression (B)At 14 years postoperatively, myelographs show a narrowing of spinal canal above fusion segment. (C)Radiograph showing 1 year follow-up finding after posterior lumbar interbody fusion of upper segment.

가 , 가 (9/62)
 , Brantigan ¹¹⁾
 , 가 22%(5/23)
 가
 Christensen ⁹⁾
 28%, 14%
 70~85%
 가
 14%
 Glaser ⁴⁾ 가 . Glaser ⁴⁾ Hambly ⁷⁾
 10
 가 ,
 7 (12%)
 10 가 ,
 80% 가 . 6
 가 , 10 가 가 1
 가 ⁵⁾가 5 가 Lehmann ⁶⁾
 79.4% 가 7 , 6 가 1
 , , 4 가 1
 가 Branti-
 gan ¹¹⁾
 가
^{6,9,10)} 가
^{5,11,12,13)} 가
 (fusion mass) 가
 가
 (equivocal group) 가
 10 , , , 가
 3 , 가 가 ,
 , Frymoyer ¹⁴⁾
 , Hambly ⁷⁾
 가
 , Kumar ¹⁶⁾
 가
^{12,13)} Lehmann ⁶⁾
 15%

가 . Lehmann ⁶⁾ 33 가
 42% 100 mm²
 15%
 . Rahm Hall¹⁵⁾ 가 5 가
 , Brantigan ¹¹⁾ 가 61%
 10 가
 가 3-4 4-5 가
 64% 58%
 가 5 ,
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 가
 5 가 가
 가 가
 가 . Frymoyer ¹⁷⁾ 가
 가 가
 , 58%
 가 ,

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 Kim 가 가
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 가 22 , 가 36 , 52.7 , 148 (120-195)
) . 1 37 ,2 16 ,3 5 44
 , 14 . 15 , 29 76%
 7 (12.1%)
 6 1 ,4
 44 가 43 33
 22 13 3-4 40%가
 30% , 4-5 37%가 27% 58 37
 (63.8%)
 : 가 5 가 가
 1
 3-4 4-5 가
 64%

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Tel: 82-2-709-9051 Fax: 82-2-796-3682 E-mail: schsbj@hosp.sch.ac.kr