

The Influence of the Degree of Lumbar Disc Degeneration on MRI and the Amount of Removed Disc on Clinical Outcomes

Kyu Yeol Lee, M.D., Sung Keun Sohn, M.D., Myung Jin Lee, M.D., Il Kwon Chung, M.D.

Department of Orthopaedic Surgery, College of Medicine, Dong-A University, Busan, Korea

– Abstract –

Study Design: The influence of lumbar disc degeneration, the space-occupying ratio on MRI and the amount of removed disc on the clinical outcomes of an open discectomy were analyzed retrospectively.

Objectives: This study analyzed the pre and post-operative factors associated with the clinical outcome of an open discectomy.

Summary of Literature Review: Much controversy still exists regarding the factors that influence the clinical outcome following an open discectomy.

Materials and Methods: Out of 207 patients who had been treated with an open discectomy for a lumbar disc herniation, between April 1997 and December 2003, 161 patients who underwent MRI with the same apparatus, with at least 6 months of follow-up, were analyzed. The study group was composed of 111 men and 50 women, with a mean age at the time of surgery of 33.1 years old. The mean follow-up period was 42 months. The degree of disc degeneration was classified according to the Thompson's classification, and the extent of the discectomy was measured by the volume. The postoperative outcomes were judged using Nayer's classification.

Results: The highest frequency of disc herniation occurred at the L4-5 level, with being of the subligamentous extrusion type. The disc degeneration observed on MRI had a high statistical correlation with age ($p < 0.001$); however, there was no statistical relationship with the level of disc herniation, sex and the amount of disc removed by discectomy ($p > 0.05$). Clinically, 123 cases were more than fair, and 4 cases underwent reoperation due to recurrence. The clinical outcome, sex, age and space-occupying ratio were of little statistical value ($p > 0.05$). Statistically, the greater the amount of disc removed, the better the clinical outcome ($p < 0.05$). Those with disc degeneration classified as grade 3 from the MRI had unsatisfactory clinical outcomes ($p < 0.05$).

Conclusions: Those with disc degeneration classified as grade 3 from the MRI had unsatisfactory clinical outcomes. The greater the amount of disc removed the more satisfactory the clinical outcomes. No statistical relationships were found between the space-occupying ratio and the clinical outcome.

Key Words: Lumbar disc herniation, Disc degeneration, Discectomy, Clinical outcome

Address reprint requests to

Myung Jin Lee, M.D.

Department of Orthopaedic Surgery, College of Medicine, Dong-A University,
3 Ga-1, Dongdaesin-dong, Seo-gu, Busan, 602-715, Korea

Tel: 82-51-240-2845, Fax: 82-51-243-9764, E-mail: tynitus@dau.ac.kr

*

2004

30%

5)

80~90%

1,2)

3,4)

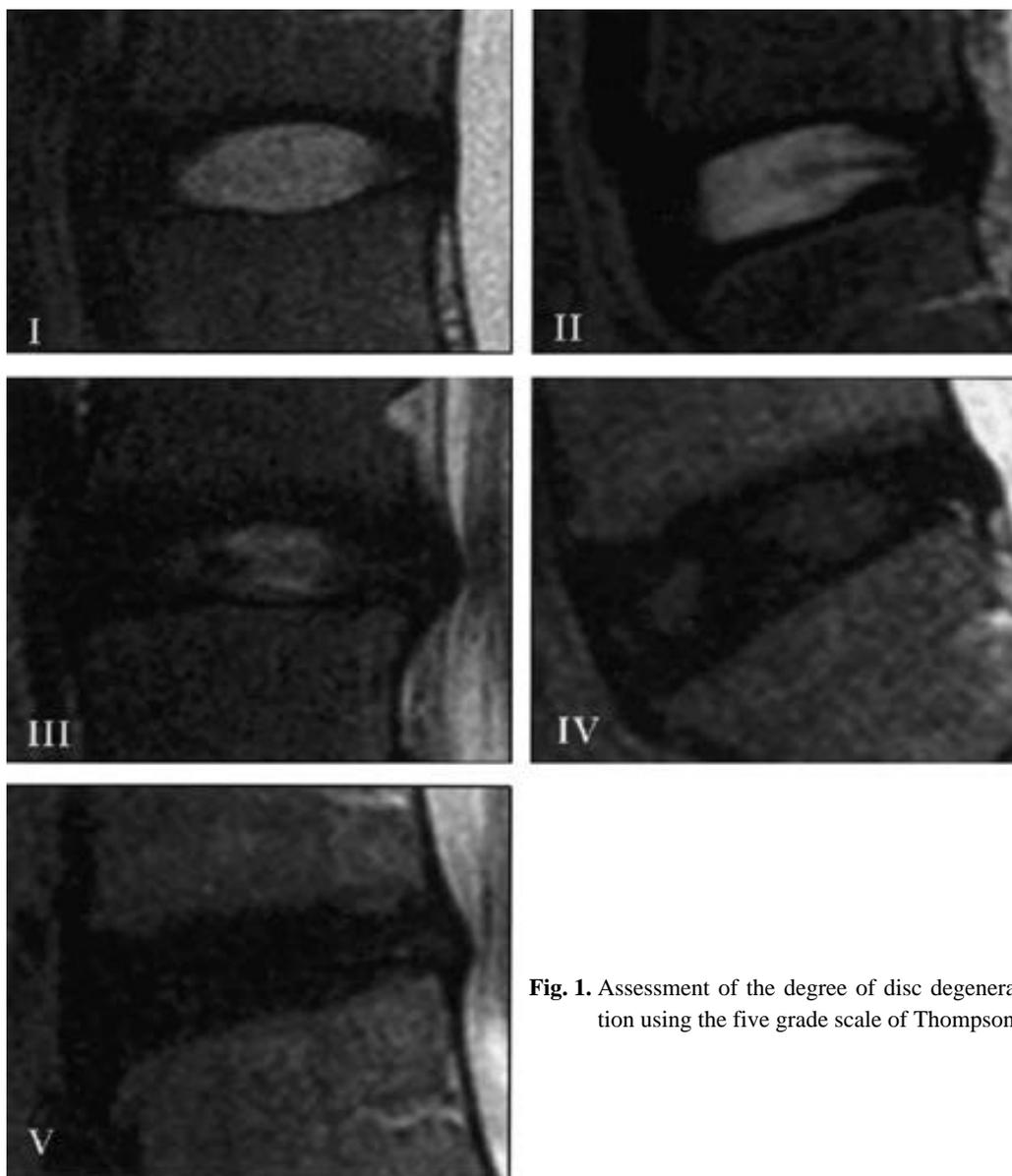


Fig. 1. Assessment of the degree of disc degeneration using the five grade scale of Thompson.

1.

1997 4 2003 12

207

6

가

161

1

가 111

가 50

33.1

42

2.

1.5 tesla Magnetum 42SP (Siemens, Erlangen, Germany)

T1-weighted, proton density, T2-

weighted

T1-weighted

Steinmentz

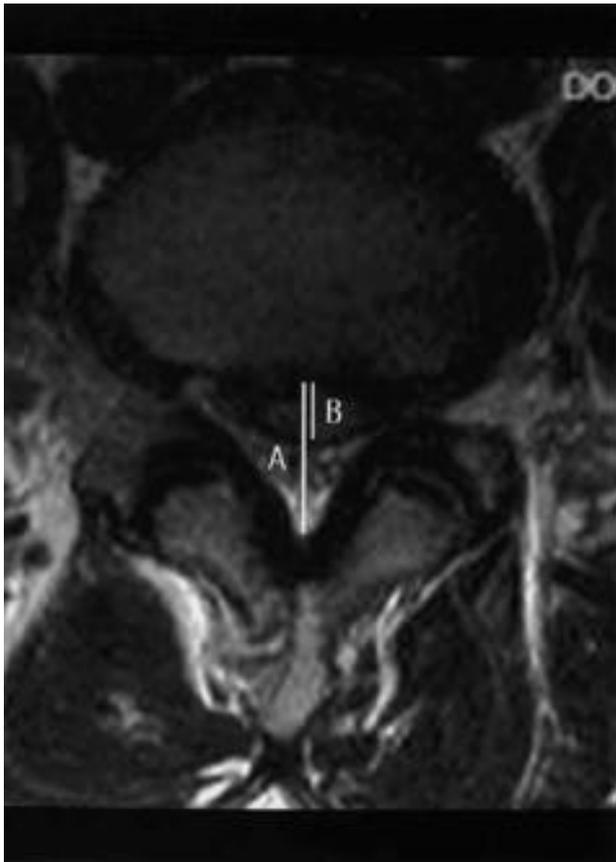


Fig. 2. Measurement method for space-occupying ration The space-occupying ration of the herniated material to the spinal canal. $B/A \times 100$ on axial images was calculated

가 (bulging disc) 1)
(protruded disc), 2) (extruded sub-
ligamentous disc), 3) (extruded
transligamentous disc), 4) (sequestered disc)

Thompson⁶⁾

1

가

2

3

(Fig. 1).

Matsubara⁷⁾

(Space-occupying ratio)

(Fig. 2).

Farfan⁸⁾

3~4

2~3

가

(partial laminectomy and discectomy)

2

2

Naylor⁷⁾

(Table 1).

3.

SAS

chi-

square

, t-, Pearson

95%

2.

1. 가 111 , 가 50 89 가 , 5- 1 4-5 65 , 3~4 5 , 2-3 2 .

3 30 , B 30 가 . 3 59 , C 60 , 3. (P<0.0001) (Table 2), 103 가 (P<0.0001) (Table 3). 42 , 16 .

Table 1. Nayer 's classification

Excellent	No residual symptom No complaint	34.98%	가
Good	Relief of the major symptom Only minor residural symptom (No need for treatment)	37.3%	32.1%
Fair	Relief of major symptom Residual symptom (Need for treatment)		
Failure	No relief of symptom		가 3

Table 2. Correlation between age and grade of MRI finding

	Age		
	<30	30-59	>60
Grade I	1	0	0
Grade II	30	0	0
Grade III	68	23	0
Grade IV	11	20	2
Grade V	0	3	3

Table 3. Correlation between age and clinical result

	Age		
	<30	30-59	>60
Excellent	31	0	0
Good	68	24	1
Fair	11	20	3
Failure	0	2	1

(P<0.005)(Table 4).

3.

(P<0.05) (Fig. 3).

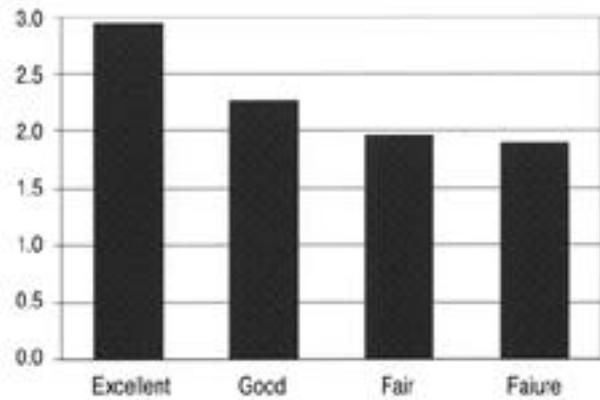


Fig. 3. Correlation between disc volume of discectomy and clinical result.

Table 4. Correlation between grade of MRI finding and clinical result

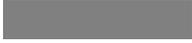
	Disc degeneration grade of MRI				
	Grade I	Grade II	Grade III	Grade IV	Grade V
Excellent	1	15	2	13	0
Good	0	13	58	17	5
Fair	0	2	28	2	1
Failure	0	0	3	1	0

가
Koh²⁷⁾ 256

가
Frymoyer²⁸⁾ 가 5
16), 가
6 가 3
가 5 가 3
가 가
가
가
가
Szypryt¹⁷⁾ 가 Thompson 3
88%, Mink¹⁸⁾ 82.6% 가
30% Gibson⁵⁾ 가
40%, Powell¹⁹⁾ 가
가 Thompson 3
가
가
가 가
가 가²⁰⁾
가 가
4.2%, Wilson Harbaugh²²⁾ 4% Williams²¹⁾
3.3%, Lowell²⁴⁾ 3% Caspar²³⁾
가
MRI^{25,26)}

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 : 1997 4 2003 12 207
 , 6 가 161
 가 111 , 가 50 33.1 42
 Thompson , Nayer
 : 4-5 가 , 가
 가 (p<0.001),
 , , (p>0.05).
 , (p>0.05). 가 3
 (P<0.05). Thompson 3
 : 가 , 가 ,

_____ : , , ,

3가 1

Tel: 82-51-240-2845 Fax: 82-51-243-9764 E-mail: tynitus@dau.ac.kr