

## Significance of Space-Occupying Ratio According to MRI Finding in Lumbar Disc Herniation

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– Abstract –

**Study design :** Clinical significance of space-occupying ratio according to MRI finding in lumbar disc herniation.

**Objectives :** To estimate relationship between patient's symptoms and space-occupying ratio in herniated lumbar vertebral disc in MRI according to JOA scoring system.

**Summary of literature review :** Using MRI, herniated intervertebral disc may be estimated with the extent of derangement of the constituents of the disc. Symptoms and signs did not correlate with the degree of reduction of the herniation in MRI.

**Material and Method :** A retrospective analysis was performed upon 99 patients that underwent lumbar spine MRI. The degree of the occupied spinal canal was measured by 'Space-occupying ratio', which was the ratio of the longitudinal diameter at the spinal canal to the longitudinal diameter at the herniated nucleus pulposus. Each '30% Space-occupying ratio' to '50% Space-occupying ratio' was classified to analysis I, analysis II. Under the percent was group A, above the percent was group B. We estimate the patient's condition related with lower back pain according to JOA scoring system.

**Results :** The herniation type of the nucleus pulposus was classified to 5 protruded type, 62 subligamentous extruded type, 22 transligamentous extruded type, 10 sequestrated type. The patients who have above 30% were 62 cases, under 30% were 26 cases in analysis I, have above 50% were 19 cases, under 50% were 69 cases in analysis II. So, there was not distinguished from analysis I to analysis II according to the degree of the herniation. Mean JOA score was 9.307 in group A, mean JOA score was 9.370 in group B in analysis I. Mean JOA score was 9.391 in group A, mean JOA score was 9.315 in group B in analysis II. There was not correlate statistically with analysis I (p value=0.5669) and analysis II (p value=0.5390) using the Wilcoxon score test.

**Conclusion :** There was not correlate statistically with the degree of the herniation in lumbar spine MRI according to JOA scoring system.

**Key Words :** Space-occupying ratio, MRI, lumbar HNP

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\* 2001

가 1996 1 2000 12

9) . 1995 Fraser

가 (far lateral) (central) (lat-  
 eral) 99  
 4,5 가 57 (57.5%) 가 , 5  
 1 가 25 (25.2%) (Table 1).  
 JOA(Japanese Orthopaedic Association) 1 1

Matsubara <sup>15)</sup> ,  
 (Space-occupying ratio) (Figure 1).  
 가 30% (A ) (B )  
 I , 50% (A ) (B )  
 II , 30% , 50%  
 A B  
 JOA(Japanese Orthopaedic Association)  
<sup>16)</sup> Wilcoxon  
 (Table 2).

**Table 1.** Involved spine level.

Level	No. of Patients
L1,2	1(1%)
L2,3	5(5%)
L3,4	3(3%)
L4,5	57(57.5%)
L4,5,S1	6(6%)
L5,S1	25(25.2%)
L5,6	2(2%)

**Table 2.** JOA(Japanese Orthopaedic Association) scoring system.

1. Subjective symptoms(9 points)
A. Low back pain Normal(3), Occasional mild pain(2), Frequent mild or occasional severe pain(1), Frequent or continuous severe pain(0)
B. Leg pain and/or tingling Normal(3), Occasional slight symptoms(2), Frequent slight or occasional severe symptom(1), Frequent or continuous severe symptom(0)
C. Gait Normal(3) Able to walk farther than 500 M although it results in pain, tingling, and/or muscle weakness(2) Unable to walk farther than 500 M although it results in pain, tingling, and/or muscle weakness(1) Unable to walk farther than 100 M although it results in pain, tingling, and/or muscle weakness(0)
2. Clinical signs(6 points)
A. Straight leg-raising tests(SLR)(including tight hamstring) Normal(2), 30-70 degree(1), less than 30 degree(0)
B. Sensory disturbance None(2), slight disturbance(not subjective)(1), marked disturbance(0)
C. Motor disturbance(MMT) Normal(Grade 5)(2), slight weakness(Grade4)(1), marked weakness(Grade3-0)(0)
3. Urinary Bladder Function(-6 points)
Normal(0), mild dysuria(-3), severe dysuria(-6)

**Table 3.** Analysis of the herniated disc type according to the space-occupying ratio.

	Group A(30% )	Guoup B(30% )
Protruded	3	2
Subligamentous extruded	8	56
Transligamentous extruded	2	22
Sequestral	2	4
	Group A(50% )	Guoup B(50% )
Protruded	4	1
Subligamentous extruded	30	34
Transligamentous extruded	9	15
Sequestral	6	0



**Fig. 1.** Measurement method for space-occupying ratio  
The space-occupying ratio of the herniated material to the spinal canal,  $A/B(\text{space-occupying ratio}) \times 100(\%)$  on axial images, was calculated

(protruded type) 5, (subligamentous extruded type) 62, (transligamentous extruded type) 22, (sequestral type) 10. 30% 84, 15, 50% 50, 50% 49, (subligamentous extruded type; SE) (transligamentous extruded type; TE) SE 30% 56, 50% 34, TE 30% 22, 50% 15 (Table 3). JOA A 9.3, B 9.4, A 9.4, B 9.3. Wilcoxon A B ( ; p value=0.57, ; p value=0.54).

30%가 , 1980 가 가 , 가 13). Kim 4) 85% , 가 가

4,9,12,15), Matsubara 15) 32

가 . Fraser 9)

, Hause Fujiwara<sup>7)</sup>

4,12,15) 가 60~90%가 , 가 20~30% 가 9). Boden 12) 67 가

. Ahn 1)

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 가 ,

3가 1