

- MRI -

Degenerative Changes of Adjacent Segment Following Cervical Anterior fusion -Correlation with Preoperative MRI Findings of Adjacent Disc-

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- Abstract -

Study Design: We retrospectively reviewed the preoperative and postoperative radiographs of patients who underwent anterior cervical discectomy and fusion.

Objectives: We wanted to determine whether the preoperative Magnetic Resonance Imaging (MRI) findings of the levels adjacent to the level of fusion correlated with the postoperative degenerative changes seen on X-ray after anterior cervical discectomy and fusion.

Summary of Literature Review: Anterior cervical fusion causes acceleration of the degenerative changes at the levels below or above the fused segment. These changes may be accelerated if preoperative MRI shows degenerative changes at the levels adjacent to the segment to be fused.

Materials and Methods: Twenty-two patients (forty-four adjacent levels) who underwent anterior cervical discectomy and fusion from January 1998 to August 2002 (average follow up: 2 years and 6 months, range: 2 to 4 years) were enrolled in this study. Preoperatively, all the patients had no degenerative changes at adjacent levels on the plain radiographs, but they had at least one adjacent level with degenerative findings on MRI. The patients were grouped according to the findings of the adjacent levels seen on MRI: low signal changes on the T2 weighted image (group A), disc bulging on the sagittal and axial images (group B), annular tear seen on the axial image (group C), osteophyte formation (group D), and no abnormalities (group E).

Results: Out of 44 cases of 22 patients, 14 cases (31.8%) showed degenerative changes. 2 out of 7 in group A, 6 out of 11 in group B, 3 out of 4 in group C, 2 out of 3 in group D and 1 out of 19 in group E showed degenerative changes on X-rays at the final follow up.

Conclusion: Our findings suggest that abnormalities on the levels adjacent to the level to be fused, as seen on preoperative MRI, predispose these levels to degenerative changes postoperatively.

Key Words: Anterior cervical fusion, Adjacent level, Degenerative change

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* 2004

Robinson¹⁾, 1955 Smith 가

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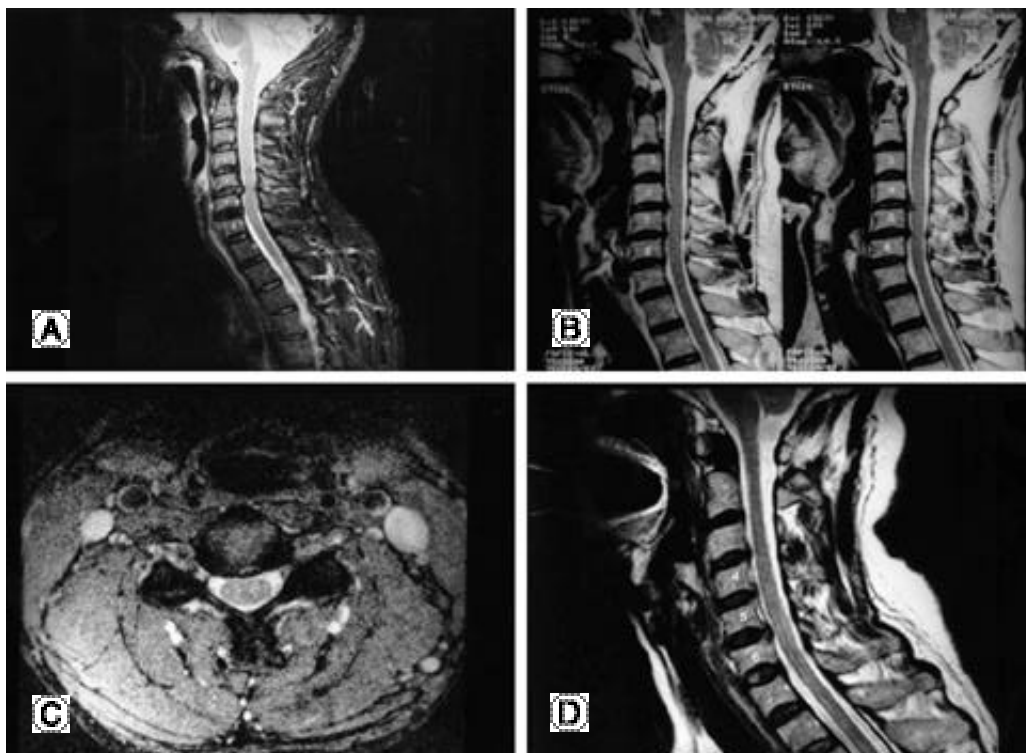


Fig. 1. Degenerative findings of adjacent levels seen on MRI (A) Group A. Disc herniation at C3-4 with low signal change seen at lower adjacent level, C4-5, on T2 weighted image. (B) Group B. Disc herniation at C4-5 with disc bulging at lower adjacent level, C5-6. (C) Group C. Annular tear shown on axial image. (D) Group D. Disc herniation at C5-6 with osteophyte formation at upper adjacent level, C4-5.

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C : MRI , 1 MRI E 19
D : MRI A,B,C,D 25
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가 (Fig. 2A-D, Fig. 3A-D).

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Table 1. Degenerative changes in each group

	A	B	C	D	E
1) Disc space narrowing	1	2	1		
2) Spur formation	1	3	2	1	1
3) Changes in motion segment		1		1	



Fig. 2. This 67-year old male patient underwent anterior cervical discectomy and fusion for herniated intervertebral disc at C3-4. Preoperative X-ray showed no degenerative changes at adjacent levels of C3-4 (A) But preoperative T2 weighted sagittal MR image showed protrusion of the disc at C3-4. Adjacent to this level, C4-5 disc showed bulging, which was categorized as group B. Disc at C2-3 showed no degenerative changes and subsequently were categorized as group E. (B) Twenty-seven months after anterior cervical discectomy and fusion was done using autogenous iliac bone graft and ORION plate, X-ray shows that degenerative changes have occurred at lower adjacent level, C4-5, with narrowing of the disc space and spur formation. The upper adjacent level, C2-3, showed no degenerative changes.

Smith Robinson¹⁾ 1955 Katsuura²⁰⁾ 18,19),

가 Cinerontgenography 가 가

3,8,9), 10), 11,12), 13), 14,15,16), 17), (end plate), (facet joint), (CT), (MRI), 20), 21,22), 23,24), Wu⁶⁾ 가 MRI 가



Fig. 3. This 44-year old male patient underwent anterior cervical discectomy and fusion for herniated intervertebral disc at C5-6. Pre-operative X-ray showed no degenerative changes at C4-5 or at C6-7 (**A**) But preoperative T2 weighted sagittal MR image showed protrusion of the disc at C5-6. Adjacent to this level, C4-5 disc showed annular tear on T2 weighted axial image, which was categorized as group C. Disc at C6-7 showed no degenerative changes and subsequently were categorized as group E. (**B**) Twenty-six months after anterior cervical discectomy and fusion was done using autogenous iliac bone graft and ORION plate, X-ray shows that degenerative changes have occurred at upper adjacent level, C4-5, with narrowing of the disc space and spur formation. The lower adjacent level, C6-7, showed no degenerative changes.

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