

Original Article

Evaluation of Concordance between Degenerative Changes on Neck X-Ray and Symptomatic Cervical Disc Herniation

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ABSTRACT

Objectives: Radiographic assessment of cervical spine can help find the etiology of neck symptoms, however association between these findings is debatable. The aim of this study was to investigate the association between degenerative changes of the cervical spine and symptomatic cervical disc herniation. **Patients and Methods:** This cross-sectional retrospective study included 160 patients who underwent anterior cervical discectomy and fusion between February 2012 and June 2017 for cervical disc herniation. Demographic data, patients' symptoms and radiographic findings and indices were evaluated. The Chi-Square (X²) and one-way ANOVA were used to compare the observed data. **Results:** A total of 160 patients were studied. Among them, 83 (52%) were male and 77(48%) were female. The patients were classified into four groups on the basis of imaging findings: 89(55.6%) with degenerative changes and symptomatic disc herniation at the same level (group 1), 40(25%) with degenerative changes at a level adjacent to symptomatic level (group 2), 23(14.3%) with symptomatic herniation both at the degenerated level and at level immediately adjacent to it (group 3), and 8(5%) symptomatic herniation and degenerative changes at non-adjacent levels (group 4). There were no significant differences among the four groups from the viewpoint of gender, age, symptoms, smoking and sedentary life style. The study also showed no significant differences between groups with respect to Ishihara index, disc height and posterior osteophyte length. **Conclusion:** Degenerative changes visible on neck X-ray can be useful clues to the symptomatic disc herniation, but disc herniation may also develop at adjacent and non-adjacent levels.

INTRODUCTION

Incidence and prevalence of cervical disc herniation are not clear. Degenerative changes are commonly found in cervical spine imaging but often occur in asymptomatic individuals as well as those with neck pain(1). The prevalence of degenerative changes in asymptomatic individuals increase from 37% of 20-year-old individuals to 96% of 80-year-old individuals. However, the relationship between these changes and symptomatic cervical disc herniation are not well stated(2,3). We sought to investigate the association between degenerative changes observed in cervical spine X-Ray and symptomatic disc herniation.

MATERIALS AND METHODS

This cross-sectional retrospective study included 160 patients with degenerative changes in cervical spine who underwent anterior cervical discectomy and fusion between February 2012 and June 2017 for cervical disc herniation.

All patients were evaluated by detail history and clinical examination. Cervical MRI was performed on all patients. All patients underwent electrodiagnostic studies to confirm radiculopathy and to rule out peripheral neuropathy. Lateral view radiographs were used to measure cervical curvature index (Ishihara index), Disc height. Length of osteophytes were calculated from axial CT images.

The inclusion criteria were as follows:

1. Cervical radiculopathy or myelopathy
2. Degenerative changes on neck X-Ray
3. Symptomatic cervical disc herniation confirmed by MRI scan and Electrodiagnostic study.
4. Six weeks of conservative treatment did not alleviate symptoms.

Patients with history of cervical spine surgery, absence of degenerative changes in the cervical spine, presence of OPLL, evidence of Rheumatoid Arthritis and cervical spine fracture dislocations related to acute injuries were excluded from the study.

SPSS software version 20.0 was used for data analysis. One way ANOVA and chi square were used to compare data.

RESULTS

A total of 160 patients were studied. Among them, 83 (52%) were male and 77(48%) were female. The patients were classified into four groups on the basis of imaging findings: 89(55.6%) with degenerative changes and symptomatic disc herniation at the same level (group 1) (Figure 1.)



Figure 1. Degenerative changes at C4/C5 level and symptomatic disc herniation at that level

40(25%) with degenerative changes at a level adjacent to symptomatic level (group 2) (Figure 2.)

23(14.3%) with symptomatic herniation both at the degenerated level and at level immediately adjacent to it (group 3) (Figure 3.)

And 8(5%) symptomatic herniation and degenerative changes at non-adjacent levels(group 4) (Figure 4.)

There were no significant differences among the four groups from the viewpoint of gender, age, symptoms, smoking and sedentary life style as shown in Table 1.

The study also showed no significant differences between groups with respect to Ishihara index, disc height and posterior osteophyte length as demonstrated in Table 2.

DISCUSSION

The intervertebral disc is a complex structure acts as shock absorber between rigid bony vertebral bodies and are designed to hold the vertebrae together while increasing spinal flexibility(4,5). As normal part of the aging process, the discs begin to collapse and lose integrity and the entire disc becomes fibrotic and scar-like(6,7). Although disc degeneration is considered an aging process but it is quite difficult to differentiate the physiologic process of disc aging from that of disc degeneration(8,9). whatever the cause may be, Degenerative changes may develop throughout all parts of the functional spinal unit including the discs, facet joints, ligaments and osseous structures(10,11).

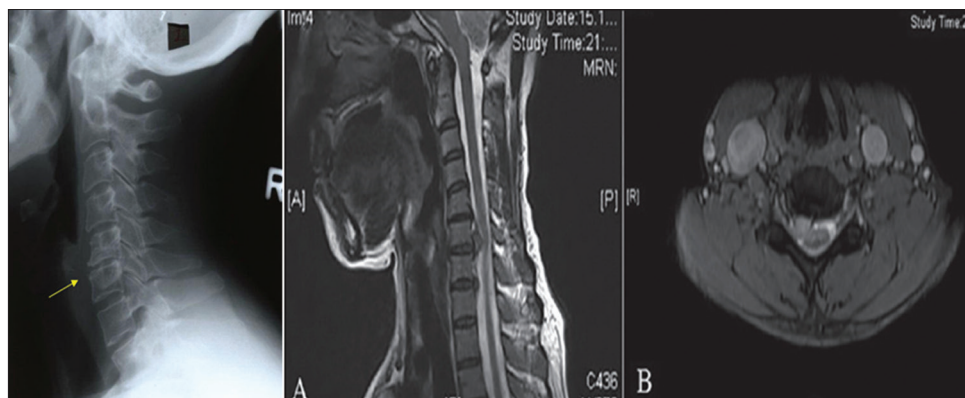


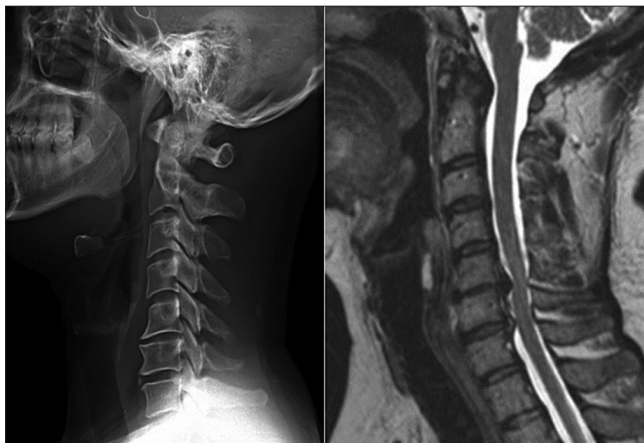
Figure 2. Prominent degenerative changes at C5/C6 and symptomatic disc herniation at C6/C7 level

Table 1. Demographic data of cases, symptoms duration and exacerbation

	Group 1(no.89)	Group 2(no.40)	Group 3(no.23)	Group 4(no.8)	P value
Gender (M:F)	46:43	22:18	12:11	3:5	0.820
Age (years)	53.5±8.4	55.5±8.3	51.6±6.6	53.2±6.6	0.277
Symptoms duration (months)	8.7±2.05	8.8±1.9	8.5±1.6	7.37±1.1	0.240
Symptoms exacerbation (weeks)	4.9±1.04	5.1±0.9	5.2±0.8	5.8±0.9	0.809
Smoking					1.460
Yes	20	12	6	3	
No	69	28	17	5	
Sedentary life style					0.773
Yes	37	15	8	2	
No	52	25	15	6	

Table 2. Radiographic data analysis

	Group 1(no.89)	Group 2(no.40)	Group 3(no.23)	Group 4(no.8)	P value
Ishihara index	3.8±0.96	4±0.77	3.6±1.11	4.5±0.53	0.145
Disc height(mm) at degenerated level	4.6±0.93	4.4±1.06	4.6±1.31	4±1.06	1.06
Disc height(mm) at symptomatic level	4.6±0.93	5.8±1.29	4.4±0.53	4.4±0.53	0.759
Maximum posterior osteophyte length(mm)	4.7±1.1	5.3±1.9	4.9±0.99	4.1±1.3	0.872

**Figure 3.** Degenerative changes at C5/C6 level and symptomatic disc herniation at both the C5/C6 and the C6/C7 levels**Figure 4.** Prominent degenerative changes at C5/C6 and C6/C7 levels and symptomatic disc herniation at C3/C4 level

AP and lateral radiographs of the cervical spine are within generally accepted standards of practice and can be helpful to assess the overall cervical morphology for patients presenting to the clinicians with cervical-related complaints(12,13).

Age-related changes of spondylosis are evident in 50% of the population by the fifth decade, while prevalence is estimated at 98% for people over 70(14). We believe these radiologic findings would help us to Understand the etiology of patients' symptoms When they present with signs or symptoms of cervical radiculopathy. Choosing the proper imaging technique is crucial to maximize benefits to the patient, and ensure optimal use of available financial resources. In 55.6 percent of our cases degenerative changes and symptomatic disc herniation were at the same level. To the best of our knowledge, this

paper is the first study to compare degenerative changes in the cervical spine and exact level of symptomatic disc herniation.

CONCLUSION

The results of this study showed that symptomatic disc herniation and degenerative changes were at the same level in 55.6 percent of cases, but if there is a mismatch between degenerative changes in cervical spine X-Ray and clinical findings, MRI is performed to diagnose disc herniation at other levels.

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