

# Prevalence and Severity of Preoperative Disabilities in Iranian Patients With Radiculopathy From Cervical Disc Herniation

Farzad Omid-Kashani<sup>1,\*</sup>; Ali Parsa<sup>1</sup>; Lida Jarahi<sup>2</sup>; Shahrzad Sepidbar<sup>1</sup>

<sup>1</sup>Orthopedic Research Center, Department of Orthopedic, Faculty of Medicine, Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran

<sup>2</sup>Addiction Research Center, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

\*Corresponding author: Farzad Omid-Kashani, Orthopedic Research Center, Department of Orthopedic, Faculty of Medicine, Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, IR Iran. Tel: +98-5137646500, Fax: +98-5138595023, E-mail: omidif@mums.ac.ir

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**Background:** Patients with cervical disc herniation (CDH) may present axial neck pain, radiculopathy, myelopathy separately or all these outcomes together.

**Objectives:** This study aimed to evaluate the prevalence and severity of preoperative disabilities in Iranian patients with radiculopathy from CDH and compared these patients with those from other countries.

**Patients and Methods:** In this retrospective study, medical records (including demographic characteristics, preoperative clinical presentations, and neck disability index score (NDI)) of the 93 patients (42 female, 51 male) with a mean age of  $42.7 \pm 9.5$  (ranged; 23-71 years old) who had underwent surgery due to radiculopathy from cervical disc herniation between March 2009 and December 2013 in our orthopedic department were studied. Chi-square, Mann-Whitney, and Kruskal-Wallis tests were used to compare and correlate the variables.

**Results:** The most common symptoms of our patients included pain (95.7%) and paresthesia (79.6%), while a positive Spurling test was the most common sign (68.8%). The mean NDI in our patients was  $47.30\% \pm 12.81\%$  (ranged; 28-66%) and the most common type of disability was severe disability. We could not find any significant correlation between NDI and sex, age, level or number of herniated discs but as the patient's age increased, the probability of multilevel disc involvement also increased.

**Conclusions:** Iranian patients with CDH usually consented to surgery while they had severe disability. In comparison with developed countries, it seems that Iranian patients with CDH present too late to be treated effectively.

**Keywords:** Disability Evaluation; Radiculopathy; Hernia

## 1. Background

Patients with cervical disc herniation (CDH) may present axial neck pain, radiculopathy, myelopathy or all these together (1). As long as the chief complaint of the patient is axial neck pain, surgery is less recommended and these cases are better candidates for conservative strategies unless they are completely resistive (1, 2). Cervical disc herniation induced radiculopathy frequently occurs in the patients younger than 55 years, while the disease in older patients is commonly known as cervical spinal stenosis and is comprised of associated pathologies in ligamentum flavum, facet joint, uncovertebral joint or vertebral endplate (3). Cervical radiculopathy from disc herniation may be unilateral or bilateral and associated with sensory, motor or deep tendon reflex abnormalities (4, 5).

Similar to lumbar disc herniation, most cases with radiculopathy from CDH are also cured with conservative measures (6-8). Surgery can be suggested for those patients with refractory radicular complaints not amenable to six to twelve weeks of aggressive non-operative strategies to alleviate uncomfortable pain (2, 6). Surgical in-

tervention is also recommended for radiculopathy cases presenting a progressive or disabling motor deficit (9). It is strongly recommended that in preoperative study of the patients with suspected radiculopathy from CDH, electro diagnostic evaluation should be included to rule out other pathologies with similar clinical presentation (like carpal tunnel syndrome, brachial plexus injuries and etcetera) (10).

It seems that preoperative severity of disabilities in the patients with radiculopathy from CDH is not the same in different countries and this difference may be due to the several causes; such as percentage of insurance coverage, cultural differences, economic variations or presence of superstitious beliefs among various communities.

## 2. Objectives

This study aimed to evaluate the prevalence and severity of preoperative disabilities in Iranian patients with radiculopathy from CDH and compared these patients with those from other countries.

### 3. Patients and Methods

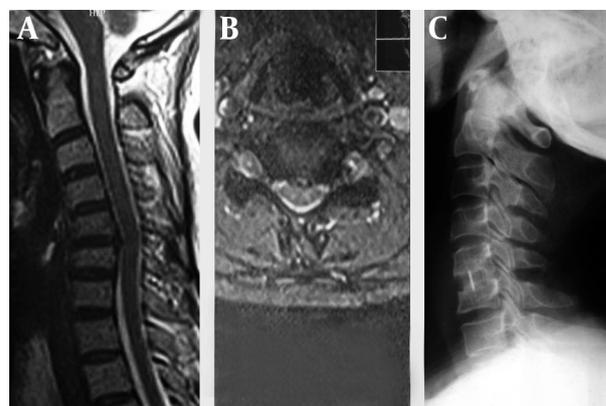
In this retrospective study, after gaining approval from the institutional review board (cone number 910872), medical records of patients, who had underwent surgery due to radiculopathy from cervical disc herniation between March 2009 and December 2013 in our orthopedic department, were studied. Our inclusion criteria included radiculopathy due to one, two or three levels of cervical disc herniation that had been treated with anterior cervical discectomy or corpectomy (Figure 1), and presence of appropriate indications for surgery (refractory radicular complaints to more than six weeks of aggressive conservative treatment, or significant neurological deficits especially if progressive). We excluded cases with revision surgeries, existence of significant underlying disease (such as uncontrolled diabetes mellitus, autoimmune disease and etcetera), unsuitable psychological status, and cervical spinal stenosis not merely due to disc herniation (presence of osteophyte, facet joint hypertrophy, ligamentum flavum hypertrophy and buckling, excessive kyphotic alignment, and etcetera). As the patients with cervical disc herniation induced myelopathy constitute a separate entity with completely different clinical presentation, we also excluded them from our study.

In all the included cases, medical records were evaluated completely and demographic characteristics and preoperative clinical presentations including symptoms and signs were considered. Preoperatively, the severity of disability was evaluated by the neck disability index (NDI) questionnaire. This questionnaire is one of the most commonly used functional outcome tools for cervical related disabilities. This outcome measurement tool is tremendously reliable and was formed by adjusting the Oswestry disability index (11). The questionnaire has been designed to allow the physician to realize how much the neck problem has influenced the patient's capability to deal with activities of daily life. This form consists of 10 questions; each has six possible answers scored from zero (the least disability) to five (the most severe disability). The patient should mark only one choice which strongly describes his/her problem at the time. The total score is multiplied by two and the result is expressed as a percentage. A score of 0 to 8% indicates no disability, while scores of 10-28%, 30-48%, 50-68%, and 70-100% represent mild, moderate, severe disability and completely disabled, respectively.

#### 3.1. Statistical analysis

Statistical Package for Social Science (SPSS) version 16 for windows (SPSS Inc. Chicago, IL, USA) was used for statistical analysis. Chi-square, Mann-Whitney and Kruskal-Wallis tests were used to compare and correlate the variables in appropriately indicated points. For all the statistics,  $P < 0.05$  was considered significant.

**Figure 1.** A 52 Years Old Female With C5-6 CDH



She presented with left arm pain and paresthesia of the lateral surface of forearm for eight months.

NDI score was 58%. A and B are preoperative sagittal and axial T2 weighted magnetic resonance imaging scans of this patient that show left sided C5-C6 disc herniation with loss of cervical kyphosis. C shows postoperative lateral view of the cervical spine two years after anterior cervical discectomy and fusion with polyetheretherkone (PEEK) cage.

### 4. Results

We treated 93 patients (42 female, 51 male) with mean age of  $42.7 \pm 9.5$  (ranged; 23-71 years old). The mean number of disc herniation per case was  $1.4 \pm 1.05$  (ranged 1-3). The prevalence of one, two, and three-disc involvement was 57 (61.3%), 32 (34.4%) and 4 (4.3%), respectively. The prevalence of cervical level of disc herniation (from top to bottom) was as below: C5-6 in 64 patients (68.8%), C6-7 in 53 (57.0%), C4-5 in 15 (16.1%), and C3-4 in one patient (1.1%). Clinical presentations (including symptoms and signs) of our patients are summarized in Table 1. The most common type of disability among our treated patients was severe disability. The association between this and other types of disabilities and the patients' sex ratio is shown in Table 2. According to the Mann-Whitney test, there was no significant correlation between NDI and sex ( $P = 0.234$ ). The mean NDI in our patients was  $47.30\% \pm 12.81\%$  (ranged; 28-66%). According to this questionnaire, prevalence of each item was calculated and presented in Table 3. Our results show that there was no significant relationship between NDI and age of the patients or between NDI and number of herniated discs ( $P = 0.68$  and  $P = 0.351$ , respectively), yet as the patient's age increased, the probability of multilevel disc involvement also increased (correlation coefficient = 0.544 and  $P = 0.002$ ). Based on the Kruskal-Wallis test, there was no relationship between the level of herniated disc and severity of disability ( $P = 0.674$ ).

**Table 1.** Preoperative Presentation of the Patients with CDH Induced Radiculopathy<sup>a</sup>

Clinical Presentation	Prevalence
<b>Symptoms</b>	
Arm pain	89 (95.7)
Left-sided chest and arm pain (cervical angina)	2 (2.2)
Neck Pain	76 (81.7)
Scapular pain	41 (44.1)
Anterior chest pain	21 (22.6)
Pain in head (headache)	13 (14.0)
Paresthesia	74 (79.6)
<b>Signs</b>	
Muscular weakness	43 (46.2)
Reflex abnormalities	62 (66.7)
Positive Spurling test	64 (68.8)
Positive shoulder abduction relief sign	50.5 (50.5)
Positive distraction test	38 (40.9)

<sup>a</sup> Data are presented as No. (%).

**Table 2.** Prevalence of NDI Scoring in Our Patients<sup>a</sup>

Degree of Disability	Prevalence		
	Male	Female	Total
No disability	2	1	3 (3.2)
Mild disability	8	8	16 (17.2)
Moderate disability	15	11	26 (28.0)
Severe disability	20	15	35 (37.6)
Completely disabled	6	7	13 (14.0)

<sup>a</sup> Data are presented as No. or No. (%).

**Table 3.** Prevalence of Different Disability Items (According to Neck Disability Index) in Our Patients

NDI Items	Score (%)					
	0	1	2	3	4	5
Pain Intensity	12 (12.9)	17 (18.3)	13 (14.0)	15 (16.1)	13 (14.0)	23 (24.7)
Personal Care	16 (17.2)	25 (26.9)	18 (19.4)	22 (23.7)	6 (6.5)	6 (6.5)
Lifting	4 (4.3)	18 (19.4)	4 (4.3)	19 (20.4)	24 (25.8)	24 (25.8)
Reading	9 (9.7)	19 (20.4)	15 (16.1)	29 (31.2)	9 (9.7)	12 (12.9)
Headache	39 (41.9)	25 (26.9)	17 (18.3)	7 (7.5)	3 (3.2)	2 (2.1)
Concentration	34 (36.6)	16 (17.2)	25 (26.9)	11 (11.8)	4 (4.3)	3 (3.2)
Work	13 (14.0)	6 (6.5)	31 (33.3)	18 (19.4)	4 (4.3)	21 (22.6)
Driving	7 (7.5)	19 (20.4)	9 (9.7)	16 (17.2)	24 (25.8)	18 (19.4)
Sleeping	25 (26.9)	18 (19.4)	14 (15.1)	9 (9.7)	18 (19.4)	9 (9.7)
Recreation	4 (4.3)	27 (29.0)	16 (17.2)	6 (6.5)	28 (30.1)	12 (12.9)

## 5. Discussion

Apparently, consent to surgery is not the same throughout the world. In this study, we found that Iranian patients with cervical disc herniation, refused to be operated unless they had become severely disabled. Although, our knowledge of CDH denotes that most of these cases heal gradually without any operation, it has been proven that in appropriately indicated patients surgery would be associated with satisfactory outcomes (6).

In the study conducted by Henderson et al, they evaluated 736 patients with CDH (12). In their study, the most prevalent clinical presentations were arm pain (99%); sensory deficit (85%), neck pain (80%), reflex deficit (71%), muscular weakness (68%) and scapular pain (52%). They noted that Spurling test and shoulder abduction relief sign were positive in a large percentage of their patients yet they did not declare the exact prevalence. Similarly, in our patients pain was the most prevalent symptom followed by, sensory deficit, reflex abnormalities, and muscular weakness, in decreasing order. In our study, the prevalence of Spurling, shoulder abduction relief sign, and distraction tests was 68.8%, 50.5%, and 40.9%, respectively.

In another study, Kelly et al. specifically analyzed the effect of CDH and its surgical treatment on driving ability (13). About 50% of patients reported moderate or severe disability during preoperative driving. As soon as six weeks after surgery (either anterior cervical discectomy and fusion or total disc arthroplasty) this disability improved to no or little disability and lasted throughout the follow-up. The author concluded that although radiculopathy or myelopathy from CDH can limit driving ability, after appropriate surgical treatment, most patients are able to return to contented driving at six weeks.

In our study, the prevalence of moderate or severe driving disability was 62.4% (58 patients). This difference may indicate the delayed reference of the patients or may be a sign of surgical fear among our patients.

Ren et al. in a prospective, consecutive series study evaluated the efficacy of cervical disc replacement in 45 Chinese patients with CDH (14). Contradictory to our study, they not only assessed the patients with radiculopathy, but also patients with myelopathy. The mean preoperative NDI in their study was 43.5%, which is somewhat lower than that of our study (47.3%). In another recent study by Kim from South Korea, the researchers retrospectively evaluated the surgical outcome of anterior microforaminotomy in 135 patients with CDH (15). In this study, preoperative NDI score was similar to our study (49.0%, ranged; 14 to 92%). These studies comes from Asian countries, yet studies from more developed countries usually point out much earlier presentation and easier patient consent to surgery. For example, in the study carried out by Jagannathan in Virginia, USA, the surgical result of single level posterior cervical foraminotomy in 162 cases was evaluated (16). The mean preoperative NDI score was reported as 36% (ranged; 4-78%), while pain and weakness were the most common presenting symptoms. These significant differences between levels of preoperative NDI scores in different countries may be the result of several underlying factors such as economic level, insurance coverage, and existence of superstitious beliefs in different societies about surgical procedures and so on. These differences will certainly influence the time of patients' presentation and their consent to surgery.

Although our study was performed on a relatively large number of patients, it certainly has some weaknesses. It was an isolated descriptive study and did not assess interferences (such as anterior cervical discectomy, arthroplasty or etcetera) and such studies are definitely worth less than interventional studies; yet we studied a particular aspect of the matter that had not been discussed in detail previously. To verify the effectiveness of these underlying factors on the time of presentation and the level of patients' consent to surgery, further studies are required in the future. In conclusion, Iranian patients with CDH usually consented to surgery when they had severe disability. These late and severe presentations and treatments may have adverse effects on surgical treatment and this needs to be proven in the future.

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## Authors' contributions

Study concept and design: Farzad Omid-Kashani, Ali Parsa. Analysis and interpretation of data: Ali Parsa, Lida Jarahi, Shahrzad Sepidbar. Drafting of the manuscript: Farzad Omid-Kashani, Ali Parsa, Lida Jarahi. Critical revision of the manuscript for important intellectual content: Farzad Omid-Kashani, Ali Parsa, Lida Jarahi and Shahrzad Sepidbar. Statistical analysis: Lida Jarahi, Shahrzad Sepidbar.

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