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Clinical and surgical outcomes of upper lumbar disc herniations: a retrospective study

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Background/aim: Upper lumbar disc herniation (LDH), generally involving L1–L2 and L2–L3 level herniation, is less common than lower LDH and, in this retrospective study, the clinical and radiological findings of patients who suffered from upper LDH and were operated on due to this pathology were reviewed.

Materials and methods: Data regarding neurological and radiological findings of patients operated on between January 2005 and December 2013 were retrospectively collected. During this period, 3494 patients had surgery for LDH, and 129 of these patients had disc herniation at the upper levels. Seventy-eight patients with proper follow-up and data were included in the study.

Results: There were 39 males and 39 females enrolled in the study. Twenty-one patients (0.6%) were operated on due to L1–L2 disc herniation and 45 (1.2%) had L2–L3 disc herniation. Twelve (0.3%) patients had disc pathologies at both levels. The mean age of the population was 59.9 years old, and this was significantly higher than lower LDH averages previously described in the literature (42 years old). Cauda equina signs and urinary disturbances were frequently seen, in addition to symptoms related to back and leg pain, neurologic claudication, and weakness in lower extremities.

Conclusion: Upper LDHs requiring surgical therapy are extremely rare, more so than other LDHs. They are more frequent among older patients and are often present along with signs of cauda equina and urinary dysfunction.

Key words: Upper lumbar disc herniation, microdiscectomy, cauda equina syndrome, lumbar radiculopathy

1. Introduction

Lumbar disc herniation (LDH) is a prolapse of the nucleus pulposus from a defect in the annulus fibrosus forming the circumferential rim of the disc. This condition may generally occur secondary to degeneration of the intervertebral disc that comes with aging. Trauma is another common etiological factor and one of its many causes. LDHs frequently occur at the posterolateral parts of the spinal canal due to the longitudinal ligament lying at the posterior central part of the vertebral corpus (1–3).

Various studies have indicated that the lifetime prevalence of low back pain is between 60% and 80% (1). However, in the United States, the National Health and Nutrition Examination Survey (NHANES II) showed that the prevalence of low back pain lasting at least 2 weeks was 13.8% (3). Between 15% and 77% of low back pain is associated with LDHs seen in radiological imaging. Only 1%–2% of those cases require surgical intervention (1,3,4). The majority of low back pain improves with resting, medical treatment, and physical therapy. LDHs are mostly seen in the 3rd and 4th decades of life and are more frequent in males (72%) than in females (28%) (2). Iwasaki et al. reported on the predilection of herniated disc levels as follows: L5–S1 (51%), L4–L5 (41%), L3–L4 (5%), L2–L3 (2%), and L1–L2 (0.7%), respectively (2, 5). However, other studies suggested that the L4–L5 level is the most frequently affected level, followed by L5–S1 (6). While these prevalences are affected by variations such as age, race, region, or educational status, current statistics show that the most commonly affected sites are L4–L5 and L5–S1 (95%) among all lumbar disc herniations (3,7). L1–L2 and L2–L3 disc herniations, which constitute upper LDHs, are very rare.

Upper LDHs may have different clinical signs and surgical outcomes than lower lumbar disc herniations. Besides low back pain and radicular leg pain, there is an increased risk of neural compression and cauda equina syndrome in upper LDHs, which are both challenges in terms of surgical decision-making (2,8,9).

In our study, we retrospectively searched the clinical records of patients who underwent microdiscectomy due to L1–L2 and/or L2–L3 disc herniation in our clinic between January 2005 and December 2013 and compared these results with the literature.

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2. Materials and methods

We retrospectively analyzed patients who underwent lumbar microdiscectomy performed by different surgeons for any lumbar disc level at our institute between January 2005 and December 2013. Patients with L1–L2 and L2–L3 disc herniation were included in our study. L3–L4, L4–L5, and L5–S1 disc herniation, as well as previously operated cases, were excluded. We collected data on age, sex, the duration and characteristics of pain, the presence or absence of trauma, comorbidities, the presence of neurologic claudication, neurological examination findings, radiological patterns of disc herniation, and surgical outcomes and complications. The patients' preoperative and postoperative neurological examinations and assessments were made by scoring them with the Modified Japanese Orthopedic Association (mJOA) scale (10). Using this scale, upper and lower extremity motor dysfunctions and sensation and sphincter dysfunctions were analyzed by grading them between 0 and 18 points. All surgeries were performed under microscope, and the patients who underwent only laminectomy without discectomy were also excluded.

3. Results

The number of patients who had lumbar microdiscectomy at any level was 3494 during this time period. Of these cases, 78 of them (2.2%) were at upper lumbar levels (L1–L2 and/or L2–L3). Of these, 21 (0.6%) patients underwent L1–L2 discectomy, 45 (1.3%) underwent L2–L3 discectomy, and 12 (0.3%) underwent surgery for both levels.

Twenty-eight of upper LDH patients (35%) were also operated on for other lower lumbar levels during the same session. All patients were operated on under microscope and discectomy was performed for all patients. L2–L3 posterior interbody fusion was used in addition to L2–L3 discectomy for only one patient.

The patients' ages ranged from 23 to 82 years old, and the mean age was 59.9 years. The mean age was 57 years old in the L1–L2 group and 59 years old in the L2–L3 group (Table). There were 39 males and females in this group.

Although a majority of the patients described back or leg pain, back pain and leg pain were not mentioned by 9% and 12% of patients, respectively. The duration of back pain was shorter than 1 year in 32% (25 patients), 1–3 years in 22% (17 patients), and longer than 3 years in 46% (36 patients) of the patients. Additionally, 44% (34 patients) described neurologic claudication and 51% (40 patients) demonstrated signs of cauda equina. The patients' neurological assessments were made according to the mJOA scale and preoperative scoring ranged from 10 and 17, with a mean of 14.7 points.

Thirty-six percent of the patients (28 patients) had no additional comorbidities, while the rest (64%, 50 patients) had some type of systemic problem, such as diabetes mellitus, hypertension, coronary artery disease, goiter, or pulmonary disease. Furthermore, 64% (50 patients) never tried physical therapy in their preoperative period, 24% (19 patients) had but did not experience any improvement of symptoms, and 12% (9 patients) experienced temporary benefits.

Magnetic resonance imaging-based patterns of LDHs were as follows: there were posteriorly migrated herniations in 82% (64 patients), inferiorly in 10% (8 patients), and superiorly in 8% (6 patients).

For surgical outcomes, preoperative and postoperative mJOA scores were compared, and postoperative mJOA points increased in 88% (69 patients), while they did not change or got worse in 12% (9 patients). In 85% (66 patients), no complications occurred during the postoperative period. In 15% (12 patients), we experienced some complications. There were perioperative dural tears in 3 patients (3.8%), postoperative wound infections in 5 patients (6.4%), recurrence of disc herniation in 4 patients (4.1%), and increased weakness in a lower extremity in 1 patient (1.2%).

4. Discussion

In this study, upper LDHs were described as the L1–L2 and L2–L3 levels. There is some confusion about the levels of upper LDHs. Although some authors also included the L3–L4 and T12–L1 disc levels into upper LDHs (11–13), the general consensus considers only L1–L2 and L2–L3, as does this current study, as upper LDHs (2,14).

The rates of upper LDHs in our clinic were significantly lower than other LDHs in the current literature (2,5). The mean age was 60 years old for L1–L3 DHs, which is similar to the literature (2). There is a significant positive correlation between advanced age and upper LDHs compared to lower LDHs. These were reported as 41.8 years old for L4–L5 and 42.5 years old for L5–S1 in the literature (2,15).

On the other hand, Ma et al. showed a decreasing trend in the incidence of LDH with aging in the elderly, especially after 80 years of age (7). However, this study included patients over 65 years old and did not compare them with younger patients. According to our results, we speculated that age is the most important risk factor for upper LDHs. There were no differences between results regarding sex in our study, which is also in concordance with the literature (2).

The fact that upper LDHs have a higher risk of cauda equina syndrome is generally agreed upon. According to Fairbank et al., the symptoms of cauda equina syndrome are back pain, leg pain/sciatica, bladder or bowel incontinence, bladder retention, a decrease in urinary sensation, frequent urination and weakness; the signs are saddle

Table. Demographical features, symptoms, and results of upper lumbar disc herniations.

			L1–2	L2–3	L1–2 + L2–3	Total
Demographical features	Patients		21 (26.9%)	45 (57.6%)	12 (15.3%)	78
	Mean age		57	59	66	60
	Sex	F	13	19	7	39
		M	8	26	5	39
Preoperative findings	Back pain		20 (95.2%)	42 (93.3%)	11 (91.6%)	71 (91%)
	Radicular pain		16 (76.1%)	42 (93.3%)	11 (91.6%)	69 (88.4%)
	Duration of pain	<1 year	8 (38%)	14 (31.1%)	3 (25%)	25 (32%)
		1–3 years	6 (28.5%)	8 (17.7%)	3 (25%)	17 (21.7%)
		>3 years	7 (33.3%)	23 (51.1%)	6 (50%)	36 (46.1%)
	Neurological claudication		9 (42.8%)	19 (42.2%)	6 (50%)	34 (43.5%)
	Cauda signs		19 (90.4%)	44 (97.7%)	12 (100%)	75 (96.1%)
	Trauma		5 (23.8%)	8 (17.7%)	3 (25%)	16 (20.5%)
	Sphincter dysfunction		2 (9.5%)	7 (15.5%)	5 (41.6%)	14 (17.9%)
	Physical therapy		4 (19%)	19 (42.2)	5 (41.6%)	28 (35.8%)
	Preoperative mean mJOA score		14.3	15	14.3	14.7
	Comorbidity		12 (57.1%)	28 (62.2%)	10 (83.3%)	50 (64.1%)
Postoperative status	Complication		4 (19%)	6 (13.3%)	2 (16.6%)	12 (15.3%)
	Postoperative mean mJOA score		15.9	16.7	15.0	15.7
	Postoperative improvement		18 (85.7%)	42 (93.3%)	9 (75%)	69 (88.4%)

numbness, reduced anal tone, a loss of motor and sensory function, and decreased reflexes (16). In our research, the most frequent symptoms and signs were saddle type numbness, back pain, and leg pain. Compatible with past reports, preoperative urinary incontinence and paresis were found at high rates in patients operated on due to the upper LDHs in our series (13,15,17). Moreover, in the study conducted by Iwasaki et al. (2), urinary dysfunctions were more frequently documented in upper LDHs than lower LDHs. Trauma was not found to be an essential risk factor for upper LDHs, but comorbidities of patients with upper LDH were frequently seen in our series. The pattern of posterior central migration of the disc fragment was more frequent, similar to the literature (2,18).

In our research, in addition to the rate of postoperative improvement being high, some cases of recurrence or neurological worsening were described, which was similar to ratios found in the literature. Pásztor et al. (13) described 7 of 134 patients with unchanged or worsened conditions after surgery on upper LDHs. Additionally, there are some studies that found poorer outcomes for upper LDHs than for lower levels (19). Our preoperative and postoperative complication rates were not so high when compared with the literature (9,13). With the right indications, surgical treatment results in a satisfactory outcome for upper LDHs (9). In the study conducted by Lee at al., postoperative outcomes were not found to be significantly different between upper and lower LDHs (14).

In conclusion, upper LDHs are rarely seen pathologies and are more frequent among the elderly. In our series, L1–L3 DHs are relatively associated with degenerative spinal diseases and increase at advanced ages. With appropriate patient selection, upper lumber disc herniation is a safe intervention and results are satisfactory.

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