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Outcome of back pain and radiculopathy in patients with single level lumbar discectomy

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Abstract

Background: Surgery for lumbar disc herniation is one of the most commonly performed procedures in spine surgery. Questions remain if lumbar discectomy is the optimal treatment for patients with lumbar disc herniation who exhibit a substantial amount of preoperative back pain.
Objective: To evaluate the outcome of improvement of back pain and radiculopathy between male and female patients with single-level discectomy and in relation to different indications for the surgery.
Patients and Methods: In this retrospective follow-up study, 80 patients (40males and 40 females) with symptoms of radiculopathy and back pain who underwent single-level open discectomy (small incision of 2-3 cm) were followed-up by discharge from the hospital between 2017 and 2019 in Erbil, Iraqi Kurdistan. The patients were included after having the symptoms of radiculopathy as confirmed on magnetic resonance imaging. In addition, patients who had undergone discectomy due to radiculopathy without response after 6 weeks of conservative treatment were included in this investigation.
Results: The mean age of the patients was 45.1 (19-70 years old). The study showed that the level of back pain and radicular pain was significantly decreased from the initial step to 3, 6, and 12 months. The levels of back and radicular were not changed significantly from three to six months. The study showed that the prevalence of different levels of back and radicular pain was similar between male and female patients at different periods. The study did not find a significant difference in levels of back and radicular pains among patients with different indications in male and male patients.
Conclusion: This study showed that single-level lumbar discectomy improved back and radicular pain by 12 months postoperatively in males and females, regardless of the indication for surgery.
Keywords: Herniation , backache , Erbil

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Introduction

Patients who receive surgical therapy for lumbar herniated intervertebral disc (HIVD) present with radiculopathy and low back pain (LBP). In this situation, the LBP refers to sciatica, but radiculopathy is considered to be the main indication for surgery rather than LBP [1]. Following consecutive therapy, the majority of lumbar HIVD symptoms get better, but in the event of failure, it might be used to treat radiculopathy. The literature has discussed positive postoperative outcomes for discectomy [2, 3]. Surgery for lumbar disc herniation is considered to be the most commonly performed procedure in spine

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surgery [4]. Radicular leg pain, or sciatica, is the predominant symptom of patients with lumbar disc herniation (LDH). But disc herniation with low back pain is also present in these patients [5-7]. The surgeries ask whether lumbar discectomy is the optimal therapy for patients with lumbar disc herniation. These patients have a considerable level of back pain preoperative.Neurosurgeons have tried more aggressive discectomies to reduce the incidence of re-herniation. This technique has been associated with greater postoperative degeneration, and back pain [8]. Of these techniques, sequestrectomies of disc fragments are acceptable to minimize disc removal and degenerative back pain, but they develop an elevated rate of herniation [8]. There are a limited number of studies on comparisons between male and female patients and their association with an indication of the disease. This study aimed to evaluate the outcome of improvement of back pain and radiculopathy between male and female patients with single-level discectomy.

The studies conducted in other regions of the world have shown that the satisfaction of patients with back pain is higher even after reherniation at 6, 12, and 24 months after the surgery [9]. Therefore, we need to find out the improvement in pain of the patients with different outcomes and different time periods. In this regard, the association of pain levels with indications of the disease was examined in this study.

Patients and Methods

Study design and sampling

In this retrospective follow-up study, 80 patients (40males and 40 females) with back pain who underwent open single-level discectomy (a small incision of about 2-3 cm) were followed-up by discharge from the hospital. Patients of both genders who received the single-level lumbar discectomy for back pain between 2017 and 2019 were eligible to include in this study. The patients were recruited from a Serdem private hospital, Erbil, Iraqi Kurdistan. The patients who were included in this study had single-level lumbar HIVD. The patients were included after having the symptoms of radiculopathy confirmed on magnetic resonance imaging. In addition, patients who had undergone discectomy due to radiculopathy without response to 6 weeks of conservative treatment were included in this investigation.

Inclusion and exclusion criteria

The following patients were included in the study: patients with a single disc, from L2-S1, and from 18-70 years old. Patients with traumatic disc prolapse, spondylolisthesis, and those with more than one level were excluded from the study.

Open single-level discectomy

The open single-level discectomy involved two main steps. The steps are: patient positioning in a prone position; a 2-3 cm long median skin incision; subperiosteal exposure of the interlaminar space; and, through an interlaminar approach, a partial laminectomy done. Laminectomy involved both inferior edge of the lamina above and the superior edge of the lamina below. The next step was resection up to the medial one third of the medial facet bone and partial flavectomy; nerve root retraction; removal of eventual free disc fragments; and annular cutting to obtain a small window through the annulus.

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Measurements

The level of pain is measured by the visual analog scale (VAS) and compared between males and females. The VAS scale rated pain from 0 (no pain) to 10 (worst pain). The categories of pain were determined as follows: 1-3: mild pain with little to no impact on activities of daily living (ADLs); 4-6: moderate pain with some impact on ADLs; 7-10: severe pain with significant impact on ADLs.

Statistical Analysis

The general information of the patients was determined as a mean (SD) or number (percentage). The levels of back and radicular pain were determined as a mean (SD). The comparisons of back and radicular pains of patients over time were examined in a paired-test. The comparisons of pain severity between male and female patients who received single-level lumbar discectomy at different periods were examined in a one-way ANOVA test. The significant level of difference was determined with a p-value of less than 0.05. The statistical calculations were performed in John's Macintosh Project Pro application.

Results

The study found that the mean age of the patients was 45.1, ranging from 19 to 70 years old. In this study, we included 40 male and female patients who received a single-level discectomy. The surgery was performed at the following levels: L2-3 (3.8%), L3-4 (17.5%), L4-5 (50.0%), and L5-S1 (28.8%). The indications for surgery were bulged disc (10.0%), foraminal disc bulge (12.5%), herniation (43.8%), and sequestration 33.8%, Table (1).

Table (1): General characteristics of patients

Characteristics (n=80)	Frequency Distribution	
	Number (Percentage)	95% CI
Age (Range: 19-70 yrs.) Mean (SD)	45.1 (12.7	42.3 (11.0)- 47.9 (15.0)
Gender		
Male	40 (50.0)	39.3-60.7
Female	40 (50.0)	39.3-60.7
Level		
L2–3	3 (3.8)	1.3-10.5
L3–4	14 (17.5)	10.7-27.3
L4–5	40 (50.0)	39.3-60.7
L5–S1	23 (28.8)	20.0-39.5
Indication		
Bulged disc	8 (10.0)	5.2-18.5
Foraminal disc bulge	10 (12.5)	6.9-21.5
Herniation	35 (43.8)	33.4-54.7
Sequestration	27 (33.8)	24.3-44.6

The study showed that the level of back pain and radicular pain was significantly decreased from the initial step to 3, 6, and 12 months. The levels of back and radicular pain were not significantly different from three to six months Table (2).

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Table (2): Comparisons back and radicular pains of patients over time

	Time periods				
	Initial	**3 months**	**6 months**	**12 months**	
Back pain	8.6 (0.8)	0.9 (1.4)	0.9 (1.4)	0.9 (1.4)	
Radicular pain	8.7 (0.7)	1.1 (1.5)	1.1 (1.5)	1.1 (1.5)	
Comparisons	**Initial vs. 3 months**	**3 months vs. 6 months**	**6 months vs. 12 months**	**Initial vs. 6 months**	**Initial vs. 12 months**
P-value					
Back pain	<0.0001	0.3210	1.0000	<0.0001	<0.0001
Radicular pain	<0.0001	1.000	1.0000	<0.0001	<0.0001
Paired t-test was performed for statistical analyses.					

The study showed that the prevalence of different levels of back and radicular pain were similar between male and female patients at different periods Table (3), Figure (1).

Table (3): Comparisons of pain severity between male and female patients who received single-level lumbar discectomy at different periods

Pain	**Gender**		
	Female (n=40)	**Male (n=40)**	**P-value**
Back pain			
Initial back pain No pain Moderate pain Severe pain	 0 (0.0) 1 (2.5) 39 (97.5	 1 (2.5) 2 (5.0) 37 (92.5)	0.5001
Back pain at 3 months No pain Mild pain Moderate pain Severe pain	 23 (57.5) 9 (22.5) 5 (12.5) 3 (7.5)	 30 (75.0) 6 (15.0) 3 (7.5) 1 (2.5)	0.3879
Back pain at 6 months No pain Mild pain Moderate pain Severe pain	 23 (57.5) 9 (22.5) 6 (15.0) 2 (5.0)	 30 (75.0) 6 (15.0) 3 (7.5) 1 (2.5)	0.4141
Back pain at 12 months No pain Mild pain Moderate pain Severe pain	 21 (52.5) 10 (25.0) 6 (15.0) 3 (7.5)	 30 (75.0) 6 (15.0) 3 (7.5) 1 (2.5)	0.2046
Radicular pain			
Initial radicular pain **Severe pain**	40 (100)	40 (100)	NA
Radicular pain at 3 months Mild pain Moderate pain No pain Severe pain	 10 (25.0) 5 (12.5) 22 (55.0) 3 (7.5)	 7 (17.5) 5 (12.5) 26 (65.0) 2 (5.0)	0.7861

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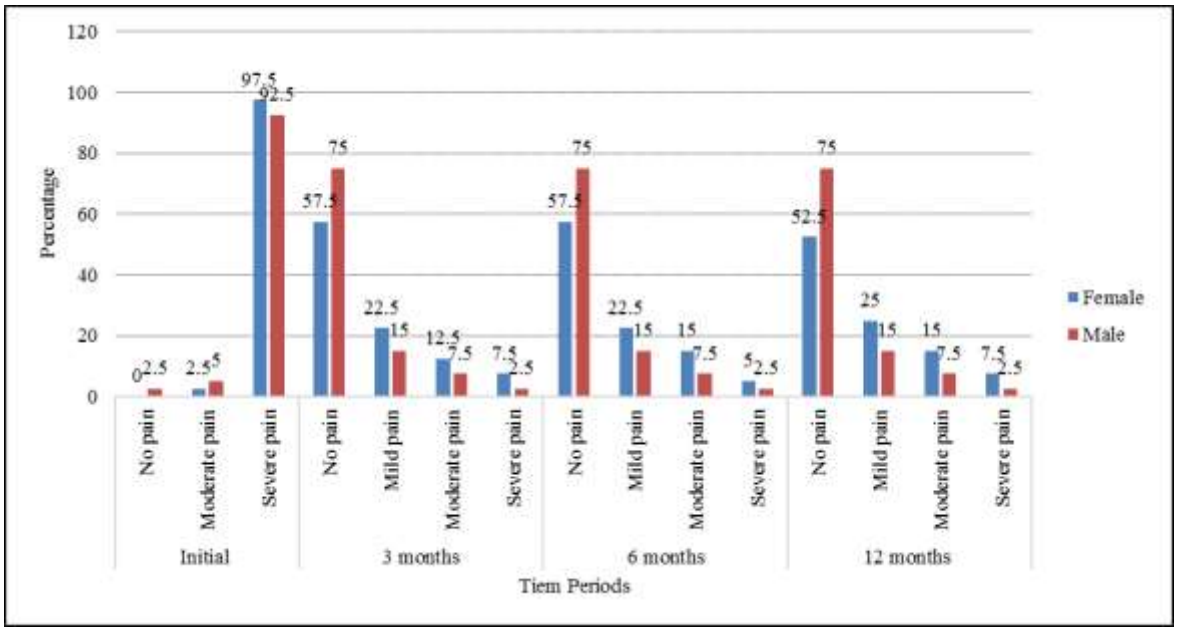
Radicular pain at 6 months categories No pain Mild pain Moderate pain Severe pain	 22 (55.0) 10 (25.0) 6 (15.0) 2 (5.0)	 26 (65.0) 7 (17.5) 6 (15.0) 1 (2.5)	0.7539
Radicular pain at 12 months categories No pain Mild pain Moderate pain Severe pain	 21 (52.5) 10 (25.0) 7 (17.5) 2 (5.0)	 26 (65.0) 8 (20.0) 5 (12.5) 1 (2.5)	0.7007
Pearson chi-squared test was performed for statistical analyses.			



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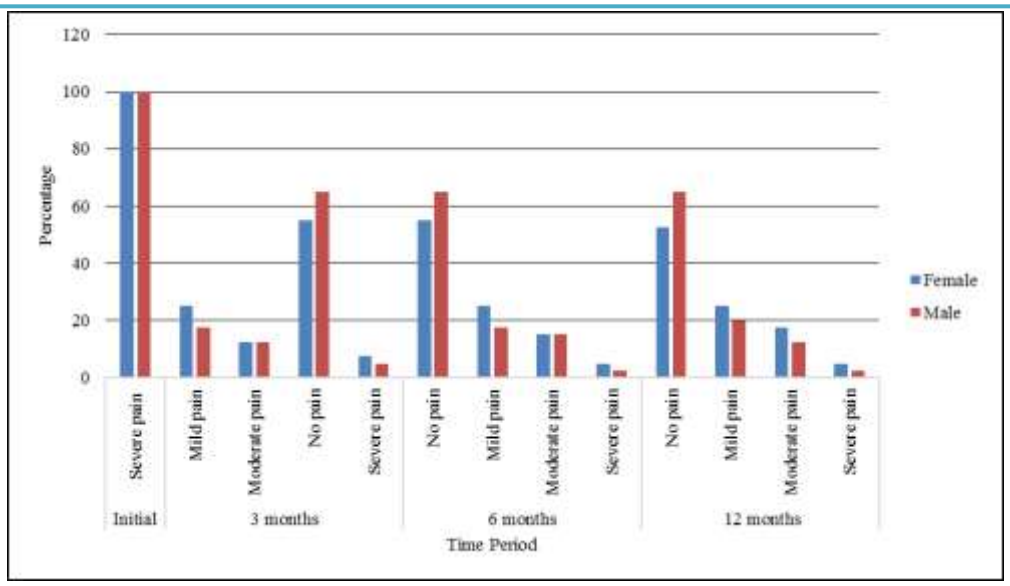

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Figure (1): Comparisons of pain severity between male and female patients who received single-level lumbar discectomy at different periods

According to Table (4) of the study, there was no discernible difference in the severity of back and radicular pains between male and male patients with various indications.

Table (4): Comparisons of back and radicular pains among main indications at different periods

Time period	Indication Mean (SD)				P-value
	Bulged disc	Foraminal disc bulge	Herniation	Sequestration	
Males					
Initial pain	8.0 (2.3)	9.0 (0.9)	8.6 (0.8)	8.5 (0.8)	0.5440
Back pain at 3 months	0.0 (0.0)	2.2 (3.5)	0.5 (0.9)	1.0 (1.6)	0.1338
Back pain at 6 months	0.0 (0.0)	2.2 (3.5)	0.5 (0.9)	0.9 (1.6)	0.1359
Back pain at 12 months	0.0 (0.0)	2.2 (3.5)	0.5 (0.9)	0.9 (1.6)	0.1359
Initial radicular pain	9.0 (0.7)	9.0 (0.9)	8.6 (0.9)	8.7 (0.7)	0.6805
Radicular pain at 3 months	0.4 (0.9)	2.3 (3.8)	0.8 (1.2)	1.8 (2.6)	0.3491
Radicular pain at 6 months	0.4 (0.9)	2.3 (3.8)	0.8 (1.2)	1.6 (2.2)	0.3389
Radicular lar pain at 12 months	0.4 (0.9)	2.3 (3.8)	0.8 (1.2)	1.3 (1.8)	0.3369
Females					
Initial pain	7.7 (1.5)	8.5 (1.3)	8.9 (0.8)	8.5 (0.7)	0.1550
Back pain at 3 months	1.3 (2.3)	2.3 (2.6)	1.3 (1.5)	0.7 (1.3)	0.4050
Back pain at 6 months	1.3 (2.3)	2.3 (2.6)	1.3 (1.5)	0.9 (1.5)	0.5448
Back pain at 12 months	2.0 (2.6)	2.5 (3.0)	0.9 (1.5)	0.8 (1.0)	0.2559
Initial radicular pain	7.7 (1.5)	8.5 (1.3)	8.9 (0.8)	8.5 (0.7)	0.1550
Radicular pain at 3 months	1.3 (2.3)	2.3 (2.6)	1.3 (1.5)	0.7 (1.3)	0.4050
Radicular pain at 6 months	1.3 (2.3)	2.3 (2.6)	1.3 (1.5)	0.9 (1.5)	0.5848
Radicular lar pain at 12 months	1.3 (2.3)	2.3 (2.6)	1.3 (1.5)	1.2 (1.7)	0.7456
One-way ANOVA was performed for statistical analyses.					

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Discussion

This study showed that levels of back and radicular pain were significantly decreased from baseline to 12 months in both male and female patients. In addition, the study showed that the indications and gender of the disease had no effect on the level of back and radicular pain. In other studies, the impact of discectomy on the year-long pain relief for LBP patients was assessed. For example, Ko and Kwon (2022) included 106 patients who received a discectomy between 2010 and 2016. At 3, 6, and 12 months following surgery, the patients' pain levels were evaluated. Low back pain (LBP) showed a significant improvement at 3 months following the operation, but this improvement was not present at 12 months, in contrast to our study. At three months, the analysis revealed a significant reduction in both referred buttock pain (RBP) and lower leg radiating pain (LRP). This improvement was evident at 3 months, regardless of the type of termination, which is consistent with our study [10].

A systematic review reported the incidence of LBR following lumbar discectomy for the herniating disc. They reported that recurrence of LBP after primary single-level discectomy was between 3 and 34% at 6-12 months and between 5 and 36% at a 2-year follow-up.

The improvement is seen in patients after the surgery, but 25% of them experience LBP and worsening of disability at 2 years after operation [11]. Carragee et al (2006) reported that 11% of patients who received discectomy persisted with LBP or radiculopathy. Also, 23% of patients who received aggressive discectomy persist with LBP or radiculopathy [12].

The improvement in pain levels after the short term (6 -24 months) was reported in several studies [12-15].

Carragee *et al* (2006) included 30 patients who received posterior lumbar discectomy for lumbar disc herniation. These patients were treated with aggressive (subtotal) resection of intervertebral disc material after removal of the extruded or protruded fragments. These patients were compared to a group of 46 patients treated with limited discectomy alone. They reported that the failure rate was 18% in the limited discectomy and 9% in the subtotal discectomy group. But, the back pain was significantly worse in the subtotal discectomy group at 12-month follow-up [12]. The significant improvement in the pain levels in patients at 12 months may refer to the difference in occupation of the patients who were included in this study.

The literature has described improvements in a variety of indications in back pain patients, which is in line with the findings of the present study. For instance, Ko and Kwon [10] reported relief from three different types of pain associated with a herniated intervertebral disc in the lower back. Within the first three months, they found that patients with subligamentous extrusion-type herniations experienced a significant reduction in low back pain. After three months, however, no improvement had been noticed. Additionally, radiculopathy and referred buttock pain both got better within a year of surgery, as well as referred buttock pain within six months.

Limitations

The patients who were included in this study were not allocated randomly, but we

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maintained homogeneity for age, indication, and levels between male and female patients. In addition, we obtained the outcomes of the patients retrospectively. The outcomes could be due to recall bias.

Conclusions

This study showed that single-level lumbar discectomy improves back and radicular pain by 12 months postoperatively in males and females, regardless of their clinical conditions.

Recommendations

The present study supports and encourages that both back pain and radicular pain in patients with single level lumbar disc prolapse can be treated surgically with significant improvement.

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Source of funding: The current study was funded by our charges with no any other funding sources elsewhere.

Ethical clearance: The researchers did not apply any intervention to the patients since the study was retrospective. In addition, we did not collect any sensitive information from the patients, and the confidentiality of their personal information was protected throughout the study.

Conflict of interest: Nil

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حصيلة مستوى آلام الظهر وأعتلال الجذور لدى المرضى الذين تم أستئصال القرص القطني آحادي المستوى لديهم

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الملخص

خلفية الدراسة: تعد جراحه فتق القرص القطني واحده من أكثر الاجراءات شيوعآ في جراحه العمود الفقري. تظل الاسئلة المطروحه اذا كان الاستئصال القرص القطنى هو العلاج الامثل للمرضى الذين يعانون من فتق القرص القطني وألام الظهر قبل الجراحه.

اهداف الدراسة: لتقييم نتائج تحسين ألام الظهر وتضخم الجذور بين ألمرضى الذكور والإناث الذين يعانون من استئصال القرص الاحادي المستوى وفى ما يتعلق بمؤشرات مختلفه للجراحه.

المرضى والطرائق: تم إجراء الدراسه فى الفترة من ١ يناير ٢٠١٧ الى ١يناير ٢٠١٩فى اربيل/كوردستان/العراق وشملت ٨٠ مريضاً (٤٠ ذكور-٤٠ الإناث (الذين يعانون من اعراض إعتلال الجذور والام الظهر. خضعوا لعملية الإستئصال القرص المفتوح على مستوى واحد (شق صغير حوالى ٣-٢سم)تم تضمين المرضى بعد ظهور أعراض الإعتلال الجذور تم تأكيده فى التصوير بالرنين المغناطيسى.كما تم تضمين المرضى الذين خضعوا لعملية الإستئصال القرص بسبب اعتلال الجذور دون الإستجابة لمدة ٦ اسابيع فى العلاج

النتائج: اظهرت الدراسة ان مستوى الام الظهر و الام الجذور انخفض بشكل ملحوظ من الفترة الاوليه الى ٣،٦،١٢ شهر ولم تتغير مستويات الظهر الجذريه بشكل كبير من ٣- الى ٦ اشهر وكذالك اظهرت ان انتشار مستويات مختلفه من الام الظهر والجذريه كانت متشابهه بين الذكور والإناث فى فترات مختلفه. لم تجد الدراسه فرقا معنويا فى مستويات الام الظهر والجذريه بين المرضى ذوي المؤشرات المختلفه بين الذكور والإناث.

الاستنتاجات: اظهرت الدراسه ان إستئصال القرص القطنى أحادى المستوى يحسن الام الظهر والجذريه لمدة ١٢ شهراً بعد الجراحه لدى الذكور والإناث .

الكلمات المفتاحية: فتق القرص القطني ، آلام الظهر ، اربيل

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تاريخ قبول البحث: ١ أيلول ٢٠٢٢

[٢،١] مستشفى اربيل التعليمي - اربيل - العراق