



The Outcome of Lumbar Microdiscectomy

Chateen Jabbar Ali^{1*}, Walid W. Al-Rawi² and Arjan Mohammed Rasheed¹

¹FIBMS Neurosurgery, Kirkuk general hospital /Kirkuk health Directorate, Iraq.

²F.R.C.S, Glasgow, Scotland, UK.

Authors' contributions

This work was carried out in collaboration among all authors. Author CJA designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors WWAR and AMR managed the analyses of the study. Author AMR managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/CJAST/2021/v40i131197

Editor(s):

(1) Dr. Ashish Anand, GV Montgomery Veteran Affairs Medical Center, USA.

Reviewers:

(1) Mohamed Fahmy El dakrouy, Matrouh University, Egypt.

(2) Siddartha Kasula, Krishna Institute of Medical Sciences, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/65089>

Received 05 November 2020

Accepted 10 January 2021

Published 11 January 2021

Original Research Article

ABSTRACT

Introduction: Low back pain (LBP) is the most common health problem between men and women between 20 and 50. Although most LBP's exact origin remains unknown, it is understood that degenerative damage to the intervertebral disk (IVD) plays a central role in the pathogenic mechanism leading to back pain. The study aims to study the incidence, clinical features, and presentations of the lumbar disc prolapse and clinical outcome of lumbar microdiscectomy for a period of 1 year post operatively.

Methods: 28 male's patient and 22 female patients qualified. The data were obtained by direct interrogation and clinical examination. The information that was taken from the patients includes the patient's age, gender, occupation, and chief complaint, history of present illness, and neurological signs and symptoms. Plain X-ray of the lumbosacral spine obtained for each patient in anteroposterior, lateral view and stress views.

Results: 15 male patients (53.5%) and eight females (36.3%). The most common site for the prolapsed disc was L4-L5 (58%); the next common site was L5-S1 (38%), backache was the most common presenting symptoms. It presents in all 50 patients (100%). Sciatica present in 45 patients (90%), in 13 patients the radiation of the pain was to the right leg, whereas 26 patients have radiation of pain to the left leg and six patients have bilateral radiation, 45 patients (90%) of total 50

*Corresponding author: E-mail: Chateenjabbbar60@gmail.com;

patients complaint from backache recovered,36 patients (86.7%) of real 45 patients compliant from sciatica improved, paresthesia represented in 32 patients (64%) and 28 patients (87.5%) of them recovered, whereas 16 patients (32%) had motor weakness and 12 patients (75%) recovered. **Conclusion:** Lumbar microdiscectomy may be associated with a more rapid initial recovery in patients with sciatica; most patients had good outcomes with lumbar microdiscectomy.

Keywords: Outcome; lumber; microdiscectomy; low back pain.

1. INTRODUCTION

The recognition of spinal disorders has a history almost as long as written language, with early Egyptian, Greek, Roman, and Arabic texts referring to the treatment of spinal disorders as early as 1550 B.C. Hippocrates (460 bce-377 BCE), Celsus (25bce-50 BCE), and Galen (131 bce-199 BCE) [1]. In 1934 , the syndrome of "disc herniation "was born when Mixter and Barr first proclaimed that a posterior rupture of the intervertebral disc that allowed nuclear material to escape and compress the adjacent spinal nerve root (s) was a common cause of back and leg pain [1]. Low back pain (LBP) is the most common health problem in men and women between the ages of 20 and 50 years. Although the exact origin of most LBP remains unknown, it is understood that degenerative damage to the intervertebral disk (IVD) plays a central role in the pathogenic mechanism leading to back pain [2]. The long-term outcome of acute low back pain is generally favourable. Rapid improvement in pain and disability and return to work are the norms in the first month. Further improvement generally occurs over three months [2]. It is estimated that 80% of all individuals and 25% of all working adults will experience back pain in any given year. More than 50% of those patients will harbor diseases of the lumbar spine, including lumbar disc herniation [2]. After treatment, the patients are grateful or angry, athletic or disabled, hopeful or depressed [2]. MRI achieves the Diagnosis of lumbar disc prolapse, which is the test of choice to evaluate disc disease. Make it suitable for visualizing lateral disc herniation.CT–myelography is still useful in patients who are unable to undergo MRI scanning [2,3]. Lumbar microdiscectomy may be associated with a more rapid initial recovery in patients with sciatica due to disc extrusion or sequester and a history of less than 12 weeks, and the purported advantage of the microscope is the ability for the surgeon and the assistant to visualize the operative field equally through a smaller surgical wound [4]. The present research aimed to study the incidence, clinical features,

and presentations of the lumbar disc prolapse, determine the clinical outcome of lumbar microdiscectomy for a period of 1 year post operatively and to know the most common complications that may occur and methods to avoid it.

2. METHODS

The study has been conducted at The Emergency Teaching Hospital in Duhok. Between January 2012 and 30th of October 2014, 50 patients, 28 male's patient and 22 female patients qualified. For the study, the selection of patients was according to the following criteria:

1. Clinical signs and symptoms suggestive of sciatica.
2. MRI evidence of disc herniation.
3. Operative finding of disc herniation.

A special structured" Questionnaire Form "was designed for the purpose of the study. The data were obtained by direct interrogation and clinical examination. The information that was taken from the patients includes, patient's age, gender, occupation, and chief complaint, history of present illness, and neurological signs and symptoms. Plain X- ray of the lumbosacral spine obtained for each patient in anteroposterior, lateral view and stress views. We looked for narrowing of disc space, straightening of normal lordotic curve, scoliosis, and osteophyte formation. MRI was done to all our patients; the views included both sagittal and axial reconstruction in T₁ and T₂ weighted phases. Antibiotics were used both intra-operatively at time of induction (ceftriaxone or gentamycin) and post-operatively for 5 -6 days. All patients were operated upon under general anesthesia in the prone position. Patient's abdomen was free for the respiratory excursion, with padded lifts beneath the chest and iliac crest flexion of the operating table is reduced for eliminating of lumbar lordosis. Skin incision is marked centered over the site of the herniated disc using the C-

arm x-ray guidance. Discectomy under microscopic magnification was done in all cases according to the side of disc herniation that shown on MRI images (axial view). Routine post-operative care was done on the neurosurgical ward. We followed up the patients for 1-year duration by reviewing symptom, performing careful clinical examination to look for any change in the clinical signs and radiographic examination (lumbosacral X-ray and MRI). Patient's complaints were demonstrated and managed accordingly. There was no complication. The Karnofsky scale and modified MacNab score has been utilized as a grading scale for the functional outcome [5,6].

3. RESULTS

The largest group comprised 23 patients in their fifth decade, 15 male patients (53.5%) and 8 females (36.3%). The next large group was in the fourth decade, 7 male patients (25%) and 6 females (27.2%). In the sixth decade, there was 5 male patients (17.8%) and 6 females (27.2%).

The number of male patients was 28 (56 %) and the number of female patients was 22 (44%).

Most of the patients are those who dealing with heavy works, among the female patients 15 of them were housewives, among the male patients 17 were heavy workers.

The study has shown than the most common site for the prolapsed disc was L4-L5 (58%); the next common site was L5-S1 (38%), while only 2 cases have prolapsed disc at L3-L4 (4%) Table 2.

Backache was the most common presenting symptoms. It presents in all 50 patients (100%). Sciatica present in 45 patients (90%), in 13 patients the radiation of the pain was to the right leg, whereas 26 patients have radiation of pain to the left leg and 6 patients have bilateral radiation. About radiation site was to lateral aspect of thigh in 15 patients, in 10 patients radiated to posterior aspect, whereas 20 patients had radiation to posterolateral aspect of the thigh. The range of duration of back pain was variable, from 14 days to 16 months. The mean was 3 months Table 3.

Weakness was present in 16 patients (32%) ranging between 3 and 4+ according to Medical Research Council grading system [7], no patients in this study had power grade 0, 1 and 2, however thirty four patients had normal power Table 4.

Paresthesia was present in 32 patients (64%), in 8 patients (16%) neurological claudication reported, whereas numbness presented in 24 patients (48%) Table 5.

Abnormal reflexes pattern shown in 22 patients (44%), there were 20 patients (40%) with ankle reflexes abnormality and only two patients complaint knee reflexes abnormality Table 6.

Abnormal reflexes pattern shown in 22 patients (44%), there were 20 patients (40%) with ankle reflexes abnormality and only two patients complaint knee reflexes abnormality Table 6.

At the level of L5-S1 SLR test was positive in 19 patients, 8 patients (16%) at $<30^\circ$ and 12 patients (24%) was between 30° - 60° , whereas at the level of L4-L5 29 patients presented with positive SLR test, 5 patients (10%) at $<30^\circ$ and 24 patients (48%) was between 30° - 60° . There was no any case reported with positive SLR test at the level of L3-L4. Table 7.

At the level of L5-S1 CSLR test was positive in 12 patients (24%), whereas at the level of L4-L5 20 patients (40%) presented with positive CSLR. There was no any case reported with positive CSLR test at the level of L3-L4 Table 8.

In this study, only three patients (6%) had sphincter disturbance and two patients (4%) with foot drop.

Spinal instability and scoliosis has been excluded in all of the study group patients. In this study four patients X-ray finding demonstrated sacralization, 28 patients (56%) presented with loss of lordotic curvature, whereas narrowing of disc space was presented in 30 patients (60%). Posterior osteophyte was shown in 10 patients (20%).

Postero lateral disc herniation represented in 31 patients (62%), while 7 patients (14%) had central disc herniation. Extruded disc represented in 9 patients (18%), whereas only three patients (6%) had sequestered disc herniation on MRI findings.

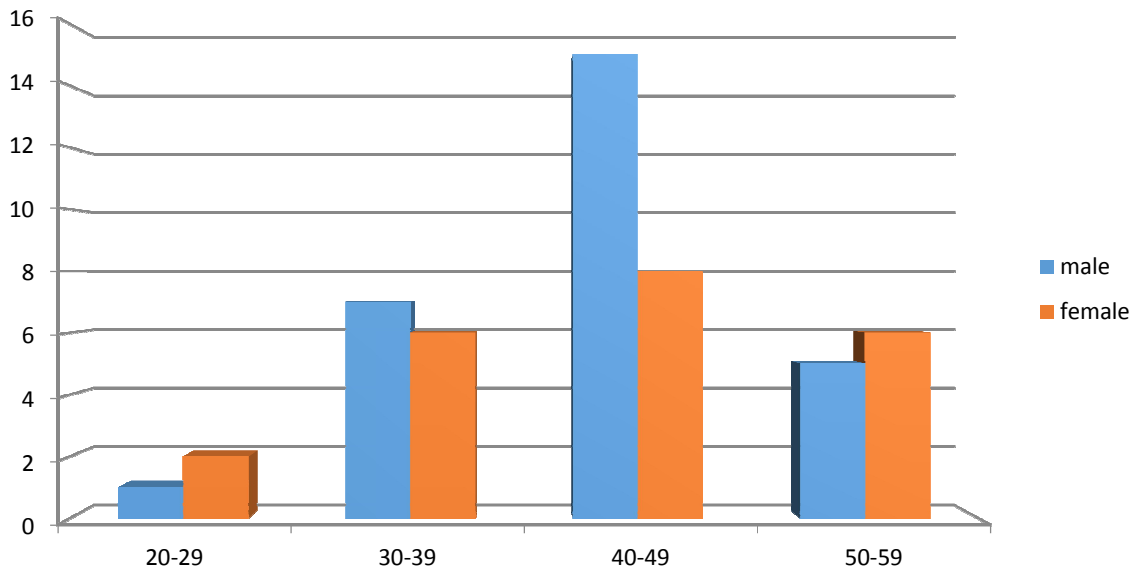


Fig. 1. Lumbar disc prolapse: age distribution

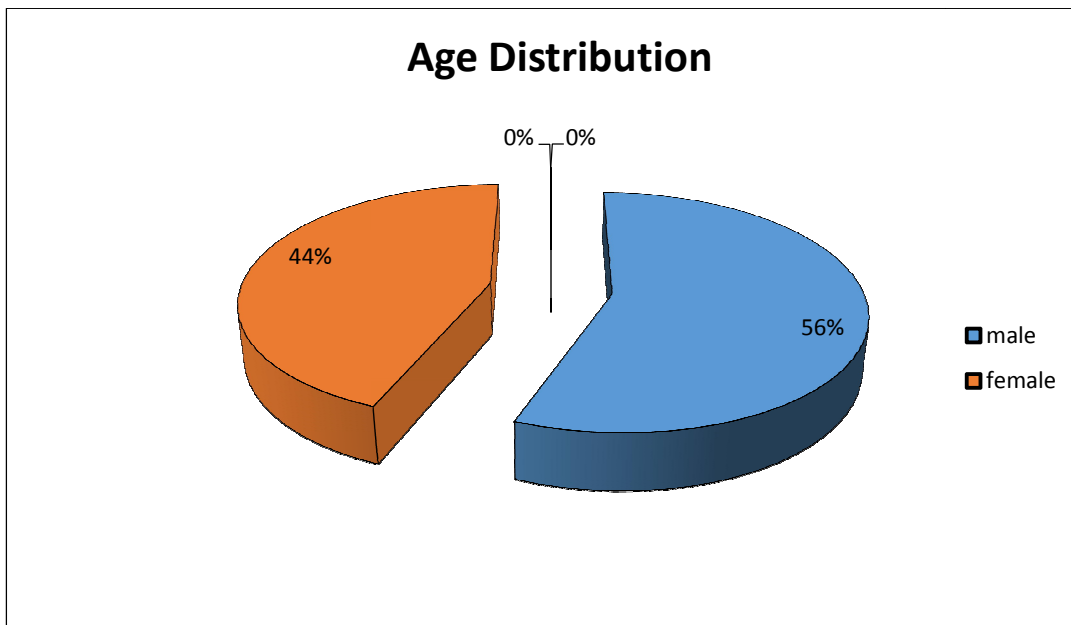


Fig. 2. Lumbar disc prolapse: gender distribution

Table 1. Occupations of patients with lumbar disc herniation

Occupations	No. of male	%	No. of female	% of total female
Heavy Workers	17	60.1	0	0
Civil Servants	11	39.9	7	31.9
House wife			15	68.1
Total	28	100	22	100

Table 2. The levels and sides of lumbar disc herniation

Herniated disc level	No. of cases		Total	% of total
	Rt. side	Lt. side		
L3-L4	1	1	2	4
L4-L5	11	18	29	58
L5-S1	8	11	19	38
Total	20	30	50	100

Table 3. Duration of back pain

Duration	Number of patients	%
< 3 months	16	32
3-6 months	18	36
6- 12 months	10	20
>12 months	6	12
Total	50	100

Table 4. Motor power grade

Power grade	Number of patients	%
0	0	0
1	0	0
2	0	0
3	1	2
4-	1	2
4	4	8
4+	10	20
5	34	68
Total	50	100

Table 5. Sensory symptoms of lumbar disc prolapsed

Symptoms	Number of cases	%
Paresthesia	32	64
Neurogenic Claudication	8	16
Numbness	24	48
normal	10	20

Table 6. Reflexes absent and number of cases

Reflex absent	Number of patients	Abnormal reflexes		%
		Zero	+Depressed	
Ankle	15	10	5	30
Unilateral	5	4	1	10
Bilateral				
Knee	2	2	0	4
Unilateral	0	0	0	0
Bilateral				

Table 7. SLR in lumbar disc prolapsed

Herniated disc level	Number of cases	SLR +ve	<30°	%	30° - 60°	%
L5-S1	19	19	8	16	12	24
L4-L5	29	29	5	10	24	48
L3-L4	2	0	0	0	0	0
Total	50	48	13	26	36	72

Table 8. CSLR in lumbar disc prolapsed

Herniated disc level	Number of cases	CSLR +ve	%
L5-S1	19	12	24
L4-L5	29	20	40
L3-L4	2	0	0
Total	50	32	64

Table 9. Other signs and symptoms of lumbar disc prolapsed

Signs and symptoms	Number of cases	%
Sphincter disturbance	3	6
Foot drop	2	4

Table 10. Plain X-ray finding of lumbo-sacral spine in herniated disc prolapsed

Plain X-ray finding	Number of cases	%
lumbarization	0	0
sacralization	4	8
Loss of lordotic curve	28	56
Narrowing of disc space	30	60
Posterior osteophyte	10	20

Table 11. MRI findings in the study group

MRI finding	Number of cases	%
Postero-lateral disc herniation	31	62
Central disc Herniation	7	14
Extruded disc	9	18
Sequestered disc	3	6
Total	50	100%

3.1 Operative Findings

Fenestration with microdiscectomy was done in 50 cases. The operative findings was posterolateral disc herniation in 31 cases (62%), central disc herniation in 7 cases (14%), extruded disc in 9 cases (18%), and sequestered disc in 3 cases (6%). These findings were the same of MRI findings. Total discectomy excision done in 6 cases (12%). No intradural rupture of the disc was found. Also regarding neuronal injuries none has occur intra-operatively. Unfortunately, however, there was only one operation performed at the wrong level. There were no post-operative complications.

3.2 Clinical Outcome

45 patients (90%) of total 50 patients complaint from backache recovered, 36 patients (86.7%) of total 45 patients compliant from sciatica improved, paresthesia represented in 32 patients (64%) and 28 patients (87.5%) of them

recovered, whereas 16 patients (32%) had motor weakness and 12 patients (75%) recovered, unfortunately only one case compliant from sphincter disturbance improved partially. There was no any improvement in two patients complaint foot drop.

3.3 Timing of Recovery

45 patients (90%) with back pain complaints pre-operatively improved within three months from operation day, 18 patients of sciatica complaining recovered immediately post -operatively, whereas 21 patients improved within 3 months. Only 10 patients (20%) with motor weakness recovered within three months, while 2 patients (4%) recovered after three months from doing operation. One patient from three patients complaint sphincter disturbance slightly improved after three months, however 24 patients from 32 patients that complaints paresthesia recovered after 3 months. Table 13.

Table 12. Post-operative neurological assessment

Signs &Symptoms	No. of cases had signs and symptoms	No. of cases recovered			% of total
		Complete	Partial	None	
Back pain	50	40	5	0	90
Sciatica	45	36	3	0	86.7
Paresthesia	32	20	8	0	87.5
Motor weakness	16	9	3	0	75
Sensory changes	24	11	8	0	79.2
Sphincter disturbance	3	0	1	0	33.4
Neurogenic claudication	8	4	1	0	62.5
Foot drop	2	0	0	0	0

Table 13. Time of recovery

Signs &Symptoms	Number of cases	Immediate post-operatively	< 3 month	3 -12 month
Back pain	50	0	45	0
Sciatica	45	18	21	0
Paresthesia	32	0	24	4
Motor weakness	16	0	10	2
Sensory changes	24	19	11	8
Sphincter disturbance	3	0	0	1 *
Neurogenic claudication	8	0	5	0
Foot drop	2	0	0	0

**slight improvement*

Table 14. Clinical outcome according to Karnofsky scale [5]

Score	No. of patients pre-op	%of patients pre-op	No. of patients post-op	%of patients post-op
100	0	0	6	12
90	3	6	16	32
80	10	20	14	28
70	17	34	8	16
60	20	40	6	12
Total	50	100	50	100

Table 15. Clinical outcome according to modified MacNab score [6]

Grade	Number of cases	% of cases
Excellence	20	40
good	29	58
fair	1	2
poor	0	0
Total	50	100

4. DISCUSSION

Lumbar microdiscectomy offered modest short-term benefits in patients with sciatica due to disc extrusion or sequester. The present work aimed to assess effectiveness of modern microdiscectomy in patients with lumbar disc

herniation and symptoms prolonged enough to merit elective operation by current clinical treatment guidelines. In this study, it was found that males were more affected than female, and the most common age groups were the fourth and fifth decades, and this is because of the nature of their duties and their life style. These

duties results in subjecting the discs of their lumbar spine to sever stress in everyday life, which increase intradiscal pressure that may lead to herniation. The results of this study is somewhat near to the results obtained by Orlando Righesso et al. [8] they observed the majority of the patients were in the fifth decade in which it goes with this study group. The average age of the studied population was 43.2 years, with a predominance of males (56%) over females. The left side was more commonly affected (60%). As for the level of the disc hernia, 58% were at L4-5 and 38% were at L5-S1. In the research obtained by Orlando Righesso et al. [8] the average age of the studied population was 47.6 years, with a predominance of males (53.3%) over females. The left side was more commonly affected (58%). As for the level of the disc hernia, 50.7% were at L4-5 and 42% were at L5-S1. In this study, it was observed that back pain was the most common presenting symptoms. Motor weakness was found in 16 patients (32%), Parasthesia in 32 patients (64%), and sphincter disturbance in 3 patients (6%). In the researches done by Orlando Righesso et al, the preoperative neurological findings, muscle strength were grade 4 in 133 patients and grade 2 in 2 patients; paresthesia was observed in 127 patients (84%) and complete anesthesia in none. Decreased reflexes were observed in 90 patients and absent reflexes in 15 patients. The previous results is somewhat similar to the present results with little differences in percentages which attributed to the smaller sample size in the present work [8]. In this study, fenestration was done in 50 cases. The operative findings was posterolateral disc herniation in 31 cases (62%), bulged central disc herniation in 7 cases (14%), extruded disc in 9 cases (18%), and sequestered disc in 3 cases (6%). These findings were the same of MRI findings. Total disc excision done in 6 cases (12%). No intradural rupture of the disc was found. No macroscopic dural tear or neuronal injuries occur intra-operatively. One case with wrong level complication reported otherwise, there were no any post-operative complications. The result of this study also compared with the results obtained by Bai et al. [9] in which Complication rate was infection (14.6%), in this study the infection rate was zero because of good operative room sterilization and good post-operative care. The common symptom of some degree of persistent neurological impairment after surgical repair of LDH is frequently under diagnosed because of inadequate or absent neurological follow-up. Popular clinical outcome

measures, such as the karnofsky scale system [5] and modified MacNab score (6), do not suffice for establishing true functional outcome because they do not take into consideration persistent paresthesia's and paresis of the lower limbs. The reported threshold of the duration of sciatica that is associated with poor outcomes varies in the literature [10]. However, the timing of surgical intervention seems to be pivotal in determining final neurological outcome, as demonstrated in the experimental study by Kobayashi et al. [11] in 2007. According to Kitab et al. [12] 20 in patients with LDH and sciatica lasting more than 8 months, there may be an increased risk of a poor clinical result. Paresis of the lower limbs. Between September 1996 and March 2002, one hundred and eighty-three consecutive patients surgically treated (fenestration) for a CT or MRI-verified one-level disc herniation on L4–L5 or L5–S1 level that correlated with the patients' symptoms were identified. A research done by Katarina Silverplats et al. [13] university Hospital, Go`teborg University, in which clinical outcome according MACNab scoring system was Excellent for (30%) of the patients, 37% with good scoring, 26%with fair and 7% with poor outcome. In this study, the results according MACNab score system was excellent in 20 patients (40%), good for 29 patients (58%),with one case reported with fair outcome (2%) and no any patients reported with poor clinically outcome. This study also compared with the results obtained by Virk et al. [6] 250 (96.5%) had good outcomes, while nine (3.4%) had poor outcome. All patients with poor outcomes were re-evaluated with an MRI and eight of them underwent revision surgery. The result of the study done by Virk et al. [14] is closely near to this study in which 98% of the patients had excellent and good outcome while one (2%) had just fair clinically outcome. In the assessment of patients post-operatively for improvement of signs and symptoms, back pain, sciatica and paresthesia were reported with good mean improvement (90%), (86.7%) and (87.5%), respectively. Two cases reported with foot drop pre operatively but there were no improvement post operatively follows up [14].

5. CONCLUSION

Lumbar disc herniation is mainly affecting the adults; Male patients develop disc lesions more than female patients. A shorter duration of backache and sciatica before the operation will give a better results post-operatively. Lumbar microdiscectomy may be associated with a more

rapid initial recovery in patients with sciatica; most patients had good outcomes with lumbar microdiscectomy. The risk of operating on the wrong level can be avoided by using of intra-operative c-arm x-ray.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Zhang C, Berven SH, Fortin M, Weber MH. Adjacent segment degeneration versus disease after lumbar spine fusion for degenerative pathology: A systematic review with meta-analysis of the literature. *Clin Spine Surg.* 2016;29(1):21-9.
2. Chapman E. In *Handbook of Clinical Anaesthesia*, Fourth Edition (CRC Press). 2017;353–373.
3. Richard Winn H, Youmans M, Winn. *Neurological surgery*. Youmans & Winn *Neurological Surgery.* 2017;8256–8264.
4. Ellenbogen RG, Sekhar LN, Kitchen ND, Brito da Silva H. Principles of neurological surgery. *Principles of Neurological Surgery (Elsevier Inc.)*. 2018;1–886.
5. Millhouse PW, Schroeder GD, Kurd MF, Kepler CK, Vaccaro AR, Savage JW. Microdiscectomy for a paracentral lumbar herniated disk. *Clin Spine Surg.* 2016;29(1):17-20.
6. Virk SS, Diwan A, Phillips FM, Sandhu H, Khan SN. What is the rate of revision discectomies after primary discectomy on a national scale? *Clin Orthop Relat Res.* 2017;475(11):2752-2762.
7. Vanhoutte EK, Faber CG, van Nes SI, et al. Modifying the medical research council grading system through Rasch analyses. *Brain.* 2012;135(Pt 5):1639-1649.
8. Orlando Righesso MD, Asdrubal Falavigna MD, Osmar Avanzi MD. Correlation between persistent neurological impairment and clinical outcome after microdiscectomy for treatment of lumbar disc herniation. *Saõ Paulo, Brazil.* 2011;42:178-81.
9. Bai YB, Xu L, Xi JC, Mu XJ. Diagnosis and treatment of lumbar disc herniation by discography and percutaneous transforaminal endoscopic surgery. *Zhonghua Yi Xue Za Zhi. Chinese.* 2012;92(47):3350-3.
10. Paulsen RT, Rasmussen J, Carreon LY, Andersen MØ. Return to work after surgery for lumbar disc herniation, secondary analyses from a randomized controlled trial comparing supervised rehabilitation versus home exercises. *Spine J.* 2020;20(1):41-47.
11. Kitab SA, Miele VJ, Lavelle WF, Benzell EC. Pathoanatomic basis for stretch-induced lumbar nerve root injury with a review of the literature. *Neurosurgery.* 2009;65(1):161-7; discussion 167-8.
12. Kobayashi S, Uchida K, Yayama T, et al. Motor neuron involvement in experimental lumbar nerve root compression: a light and electron microscopic study. *Spine (Phila Pa 1976).* 2007;32(6):627-634.
13. Katarina Silverplats, Lind B, Zoe'ga B, Halldin K, Gellerstedt M, Brisby H. Clinical factors of importance for outcome after lumbar disc herniation surgery: Long-term follow-up. *Eur Spine J* 2010;19:1459–1467.
14. Takenaka S, Tateishi K, Hosono N, Mukai Y, Fuji T. Preoperative retrolisthesis as a risk factor of postdecompression lumbar disc herniation. *J Neurosurg Spine.* 2016;24(4):592-601.

© 2021 Ali et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/65089>