Cross-sectional Study

Assessment of early functional outcome of lumbar discectomy in Soba and Future hospitals, Khartoum, Sudan 2021

Dr Hussameldin Mohammed Alhassan Ali Mohammed, Mr Yassir Gashy, Adnan Ayman Mohammed Adnan Alnaser, Fatima Elbasri Abuelgasim Mohammed

Faculty of Medicine, University of Khartoum State, Al-Qasr Street, Medical Campus, P.O. 1111, Khartoum, Sudan

Faculty of Medicine, University of Gezira, Gezira State, PO Box 20, Wad Medani, 2667, Sudan

ARTICLE INFO

Keywords:
Lumbar
Discectomy
Orthopedics
Neurosurgery

ABSTRACT

Background: Herniated lumbar disc is one of the common causes of back pain. Discectomy provides rapid relief of back pain and radicular pain. Few studies have been done in our setting to look for the outcome of discectomy. The purpose of this study was to assess the outcome of discectomy.

Methods: This prospective cross-sectional hospital-based study was carried out on Soba Teaching Hospital and Future hospitals in Khartoum, Sudan. Sixty-one patients with lumbar discectomy were included in this study, collected data through a direct interviewing questionnaire and took some information from patients’ files. Then collected data were analyzed using the statistical package for social science (SPSS) 24.

Results: In sixty-one patients with lumbar discectomy of them, 24(39.3%) were within the age group 31-45 years old, 21(34.4%) were within the age group 46-50 years old, and 10(16.4%) were within age group 51-65 years old. Results showed a male-to-female ratio of 1.5:1. The most common presenting symptoms were right Leg pain or numbness in 14(23%) patients. In the majority, 33(54.1%) of patients, the duration of symptoms was 6-12 months, 46(75.4%) underwent discectomy only, and 15(24.6%) underwent discectomy with fusion. Preoperatively, the majority of 30(49.1%) patients had a complete disability, 26(42.6%) had a severe disability, and 5(8.2%) had a moderate disability. In contrast, postoperatively, the majority, 35(57.4%) of patients, had mild disability, 24(39.3%) had no disability, and only 2(3.3%) had moderate disability (P value < .001). Moreover, there was a statistically significant association between the presence of co-morbidity and postoperative outcome (P value = .021).

Conclusion: Discectomy is a gold stander procedure in the management of LDH. Patients showed excellent functional outcomes. The most common presenting symptoms were right leg pain or numbness. Patients postoperatively showed significant clinical improvement according to the mODI score.

1. Introduction

Lumbar Disc Herniation (LDH) usually results from the recurrent torsional strain that leads to tears of the outer annulus, which leads to herniation of the nucleus pulposis. The highest prevalence of LDH is between t30 and 50 years, with a male-to-female ratio of 2:1 [1] (see Tables 1-5).

Intervertebral disc disease and disc herniation are most common in the third and fourth decades of life. Ninety-five per cent of lumbar disc herniation occurs at either L4-L5 or L5-S1 level [2].

There are two treatment methods for LDH: conservative (such as medical therapy, exercise, physical therapy, bed rest and patient education) and surgical methods. Most patients with severe clinical manifestations of LDH show significant improvement within a month. Surgical treatment is required for ineffective conservative treatment, pain and neurological deficits [1].

Back pain caused by lumbar intervertebral disc herniation accounts for a significant portion of back pain-related issues. Although lumbar disc disease does not cause death, it does cause morbidity and economic loss owing to the lost work hours. Sciatica is caused by a prolapsed intervertebral disc, which affects around 5-10% of all backache sufferers. In the presence of a narrow spinal canal, even a tiny prolapsed...
Lumbar disc prolapse. However, discectomy procedures vary [3].

More than half of the affected patients respond to conservative treatment, but about 5% will undergo surgery [4].

A herniated disc might cause compression of the cauda equina and its roots. Removing the disc or discectomy has been the mainstay treatment for lumbar disc prolapse. However, discectomy procedures vary [3].

5% of patients presented with clinical symptoms, e.g. low back pain, radicular pain (in buttock & leg pain), and cauda equina syndrome. More than half of the affected patients respond to conservative treatment, and about 5% will undergo surgery [4].

The L4-L5 and L5-S1 articulations have the most significant motion due to ongoing medical treatment and disability [7].

The functional outcome of lumbar discectomy is best measured by the Modified Oswestry Disability Index (ODI), which is the gold standard of low-back functional outcome tools [6]. It consists of a questionnaire designed to give us information about how back pain has affected a patient’s ability to manage everyday life. It categorises the patient as having a minimal, moderate or severe disability due to back pain.

Surgical success rates range between 74% and 98%, thus leaving the risk of instability, degeneration and breakdown, which leads to a high incidence of herniated discs at L4-L5 and L5-S1 levels.

Surgical discectomies, either through an open approach or modern microscopic or endoscopic approaches, are applied in case of persistent incapacitating low back pain and sciatica with six weeks or more of treatment or in patients with early or progressive neurological deficits [5].

The main objective of any treatment modality evaluation is a functional outcome. Because lumbar disc herniation is a benign condition with a benign condition with pain as the primary reason restricting the patient’s activities, it is expected following treatment. The patient would have a satisfactory functional result and return to their premorbid state. However, the expected following treatment. The patient would have a satisfactory functional result and return to their premorbid state. However, the functional outcome varies between research, ranging from 49 to 90%. There should be a variety of elements influencing the outcome [8].

The main objective of any treatment modality evaluation is a functional outcome. Because lumbar disc herniation is a benign condition with pain as the primary reason restricting the patient’s activities, it is expected following treatment. The patient would have a satisfactory functional result and return to their premorbid state. However, the favourable outcome varies between research, ranging from 49 to 90%. There should be a variety of elements influencing the outcome [8].

The main objective of any treatment modality evaluation is a functional outcome. Because lumbar disc herniation is a benign condition with pain as the primary reason restricting the patient’s activities, it is expected following treatment. The patient would have a satisfactory functional result and return to their premorbid state. However, the favourable outcome varies between research, ranging from 49 to 90%. There should be a variety of elements influencing the outcome [8].

The main objective of any treatment modality evaluation is a functional outcome. Because lumbar disc herniation is a benign condition with pain as the primary reason restricting the patient’s activities, it is expected following treatment. The patient would have a satisfactory functional result and return to their premorbid state. However, the favourable outcome varies between research, ranging from 49 to 90%. There should be a variety of elements influencing the outcome [8].
Developing an objective method of determining effects that would not depend on the procedure used would yield comparable results, whether rated by the operating surgeon. This study will help evaluate these outcomes pre- and post-operatively [9]. The study will also assess the association between surgical outcome and several variables, including age, gender, symptoms’ duration, and operation type.

2. Materials and methods

This is a prospective cross-sectional hospital-based study. The ethical clearance committee of Sudan medical specialization board and Educational Development Center for Health Professions has written ethical clearance and approval for conducting this research. Informed written consent from participants was taken after the purposes and nature of the study were well-explained. All data collected in this study was confidential by using a coding system. Hospital permission was taken from hospital managers. The study was conducted in Soba Teaching Hospital and Future hospitals in 2021. Most of the disc surgeries are performed in those two hospitals. We recruited the study population all at once. Inclusion criteria are patients with confirmed sciatica or radiculopathy symptoms resulting from lumbar disc herniation and patients who underwent lumbar disectomy at least three months ago. Exclusion criteria are patients who ad Revision surgery and underwent non-invasive disc procedures (e.g., spinal injection or spinal electrical stimulation). A total coverage method was applied to cover all patients who fulfilled the study criteria.

The total number of cases covered was 61. In this study, the data was collected by the research first author using patients' records to collect primary demographic data and type of operation. Information regarding function was collected pre-operatively and post-operatively by interviewing patients using a questionnaire based on the Modified Oswestry Disability Index (MODI) score. A data collection tool (checklist) was used to gather the required information from records and direct contact with patients or through the phone. Data were entered, cleaned, and analyzed using SPSS version 24.0. Descriptive statistics in terms of frequency tables with percentages and graphs. Means and standard deviations were presented with relevant graphical representations for quantitative data. Bi-variable analysis to determine the associations between the different risk factors variables and the other relevant demographic/clinical characteristics with Chi-square test (for categorical variables) and t-test (quantitative variables) statistical tests. A P value of .05 or less is considered statistically significant. Data was represented after analysis using uni-variable tables, cross-tabulation (bi-variable tables) and figures. This work has been reported in line with STROCSS criteria [10].

3. Results

Sixty-one patients with lumbar disectomy were presented to future and Soba university hospitals included in this study. Out of them, 24 (39.3%) were within the age group 31–45 years old, 21 (34.4%) were within the age group 46–50 years old, and 10 (16.4%) were within the age group 51–65 years old Figure (1). Results showed male predominance in 37 (60.7%) patients, with a male-to-female ratio of 1.5:1. Figure (2).

Regarding presenting symptoms, the most common presenting symptoms were right leg pain or numbness in 14 (23%) of patients, followed by left leg pain or numbness with both back and leg symptoms in 14 (21.3%). Right leg pain or numbness with both back and leg symptoms in 9 (14.8%). Back and leg symptoms in 7 (11.5%). Leg pain in 6 (9.8%). Left leg pain or numbness in 5 (8.2%). Low back pain in 4 (6.6%) patients. Low back pain with left leg pain or numbness in 1 (1.6%). Left leg pain or numbness with both back and leg symptoms and stiffness in 1 (1.6%) and both back and leg symptoms with stiffness in 1 (1.6%) patients.

Regarding the duration of symptoms, in 33 (54.1%), the duration was 6–12 months, followed by 24 (39.3%), the duration was <6 months and 4 (6.6%) with a duration of 2–5 years.

Type of operation, 46 (75.4%) underwent disectomy only, and 15 (24.6%) underwent disectomy with fusion.

The majority, 42 (68.9%) of patients, underwent operation from 4 weeks to 3 months, while 19 (31.1%) experienced it <4 weeks.

Forty-one patients (67.2%) had no co-morbidities, with 9 (14.8%) had hypertension, 4 (6.6%) had diabetes and hypertension, 3 (4.9%) had diabetes, 2 (3.3%) had asthma, and 1 (1.6%) had a transient ischemic attack (TIA). 13 (21.3%) of patients had work compensation, while 48 (76.7%) had not. Preoperatively, the majority of 30 (49.1%) patients had a complete disability, 26 (42.6%) had a severe disability, and 5 (8.2%) had a moderate disability.

Postoperatively, the majority of 35 (57.4%) patients had mild disability, 24 (39.3%) had no disability, and only 2 (3.3%) had moderate disability. The paired sample t-test showed statistically significant differences between the preoperative mean score of 33.85 ± 6.864 and the postoperative mean score of 6.229 ± 4.536. P value < .001.
There was a statistically insignificant association between the type of operation and postoperative outcome, \( P \text{ value} = .637 \).

There was a statistically insignificant association between the duration of symptoms and postoperative outcome, \( P \text{ value} = .133 \). Table (1)

There was a statistically insignificant association between the presence of Work compensation and postoperative outcome, \( P \text{ value} = .409 \). Table (2).

There was a statistically significant association between the presence of co-morbidity and postoperative outcome, \( P \text{ value} = .021 \). Table (3).

There was a statistically significant association between gender and preoperative score, \( P \text{ value} = .049 \). Table (4).

There was a statistically significant association between age and postoperative outcome, \( P \text{ value} = .000 \) Table (5).

4. Discussion

Lumbar disc herniation affects around 9% of the population worldwide [11]. Despite the technical refinements, surgical treatment of herniated discs remains controversial. Although excellent results have been reported after discectomy, low back pain relief has been less predictable.

In this study, sixty-one patients with lumbar discectomy presented to Future Hospital or Soba University Hospital were included. Of them, 24 (39.3%) were within the age group 31–45 years old, and 21 (34.4%) were in the age group 46–50. The results are in line with Wankhade UG et al. study of patients with an average age of 37.96 years ranging from 24 to 60 years [8]. Also, Aprile BC et al. study stated that patients aged between 22 and 71 years (mean age, 39.8 years) [12], Yadav RKet al. reported mean age of 35 years and Hamawandi et al. reported a mean age of patients (30.68 ± 7.30). The youngest was 19 years, and the oldest was 47 [13,14]. On the other hand, Azimi P et al. reported older age of patients. Thus, the mean age was 52.4 [15].

This study showed that male was predominance 37(60.7%) of patients, with a male-to-female ratio of 1.5:1. Similar results were obtained by Wankhade UG et al.; Yadav RK et al.; and Aprile BC et al. studies [8, 13,14]. Contrary to our study, Kumar A et al. and Wu et al. studies have a predominantly female population [16,17]. Additionally, ageing has been reported as a predictor of preoperative disability. On the other hand, age has no significant influence on successful outcomes following lumbar discectomy.

The symptoms’ duration in 33(54.1%) participants was 6–12 months, followed by 24(39.3%), with fewer than six months. Kumar A et al. study reported that the mean duration of symptoms was 10.13 months, also nearly similar to our findings; Dipak S et al. recorded that the average period of symptoms before surgery was 10.2 months (range 2–12 months) [18]. Moreover, we noted that preoperative symptom duration has no significant impact on the surgical outcome. Wankhade UG et al. study findings indicated that the duration of severe preoperative symptoms had a significant effect on clinical outcome and interpreted that a long duration of symptoms resulted in more severe nerve root lesions and poorer outcomes than a short duration of symptoms [8]. Also, Shi J et al. study agrees with this finding [19].

The disability due to prolapsed intervertebral disc was assessed using the modified Oswestry Disability Index (mODI) determined before and after the surgical procedure. The Oswestry Disability has decreased drastically, showing good improvement postoperatively. Preoperatively, the majority, 30(49.1%) of patients, had a total disability, 26(42.6%) had a severe disability, and 5(8.2%) had a moderate disability. In contrast, postoperatively, the majority, 35(57.4%) of patients, had mild disability, 24(39.3%) had no disability, and only 2(3.3%) had a moderate disability. The mean ODI preoperative, 33.85 ± 6.864, has significantly decreased to 6.229 ± 4.536. In comparison to previous studies, Kumar A et al.; stated the mean ODI preoperative, which is 73.67 ± 7.54, had gone down to 16 ± 3.28 (10–20) at 14-week follow-up [16]. Gupta A et al. reported a Mean mODI of 7.734 following lumbar discectomy [18].

Also, Azimi P et al. reported the mODI score also was found to be statistically different between the groups in pre-and postoperative (\( P < .0001 \)) [19] and also Swamy AS et al. documented similar results [6]. Similarly, Hamawandi SA et al. study showed better clinical and functional outcomes with early surgical intervention, which aligns with the findings of Basques et al., Ahmadi SA et al., Pitsika M et al., Wankhade UG et al., Omid-Kashani F et al., Ng LC et al., [19–26]. On the other hand, Shrestha et al. declared no significant association between symptoms’ duration and mODI [27]. Furthermore, Gelalis et al. discussed that symptoms’ duration does not affect clinical outcomes [28]. However, this study also revealed no significant influence of the type of operation, preoperative period of symptoms, and work compensation on the clinical outcome of patients.

Our study confirmed that Lumbar discectomy is the golden choice for patients with lumbar prolapse after the failure of conservative
5. Conclusion

Among LDH patients, the male-to-female ratio was 1.5:1. Regarding presenting symptoms, the most common were right leg pain or numbness. In over half of the patients, the duration of symptoms was 6–12 months. Patients postoperatively showed significant clinical improvement according to the mODI score. Type of operation, duration of symptoms, and work compensation had no significant influence on the patient’s functional outcome, while co-morbidity was significantly affected. It is recommended that lumbar surgical discectomy should remain the gold standard choice for patients with LDH and failed conservative treatment. LDH patients with co-morbidities should be evaluated carefully and undertake peri-operative optimization to enhance the functional outcome. More patients who underwent other types of surgeries should be included in future studies. Further studies with a large sample size focusing on the size of disc herniation and level should be conducted.

Data availability statement

Data is available upon request from the corresponding author.

Informed consents

Informed written consent from participants was taken after the purposes and nature of the study are well explained.

Ethical approval

Written ethical clearance and approval for conducting this research were obtained from the ethical clearance committee in Sudan medical specialization board and from Educational Development Center for Health Professions.

Funding statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

Author contribution

Dr. Hussameldin Mohammed Alhassan Ali Mohammed: study concept, data collection and analysis, paper writing. Mr. Yassir Gashy: paper writing. Adnan Alnaser: paper writing. Fatima Elbasi Abuelgasim Mohammed: paper writing and review.

Registration of research studies

1. Name of the registry:
2. Unique Identifying number or registration ID:

3. Hyperlink to your specific registration (must be publicly accessible and will be checked):

Guarantor

Dr. Hussameldin Mohammed Alhassan Ali Mohammed.

Authorship

All authors fulfilled the authorship criteria.

Ethical Publication statement

All authors gave their consent for the publication and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Acknowledgement

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2022.104866.

References

[1] Abley’s System of Orthopedics and Fractures, ninth ed., 2010, pp. 458–466.
[2] Emel Yılmaz, et al., The effect of functional disability and quality of life on decision to have surgery in patients with lumbar disc herniation, Orthopedic nursing 37 (4) (2018) 246–252.
[3] S.S. Sangwan, Z.S. Kundu, R. Singh, P. Kamboj, R.C. Siwach, P. Aggarwal, Lumbar disc excision through fenestration, Spine 40 (2006 Apr) 86–89.
[4] Jeffrey C.MD. Wang, Matthew S.MD. Shapiro, Joshua D.MD. Hatch, Jason BS. Knight, Frederick J.PHD. Dorey, Delanamter, B.M.D. Bick, The outcome of lumbar disectomy in elite athletes, Spine: March 24 (6) (1999) 570–573, 15.
[5] C.T. Pappas, T. Harrington, V.K. Sonntag, Outcome analysis in 654 surgically treated lumbar disc herniations, Neurosurgery 30 (6) (1992 Jun) 862–866.
[6] A. Swamy, K. Sharma, A. Ghrigar, Functional outcome of discectomy for lumbar disc prolapse, J. Spine 6 (2017) 382.
[7] C.A. Wilson, et al., Spine J. 16 (2016) 1413–1422.
[8] U.G. Wankhade, M.K. Umashankar, B.J. Reddy, Functional outcome of lumbar disectomy by fenestration technique in Lumbar disc prolapse-return to work and relief of pain, J. Clin. Diagn. Res.: J. Clin. Diagn. Res. 10 (3) (2016 Mar) RC09.
[9] Orlando Righesso, et al., Comparison of open disecotomy with microendoscopic discectomy in lumbar disc herniations: results of a randomized controlled trial, Neurosurgery 61 (3) (2007) 545–549 ; discussion 549.
[10] G. Mathew, R. Agha, for the STROCSS Group, Strocss 2021: strengthening the reporting of cohort, cross-sectional and case-control studies in Surgery, Int. J. Surg. 96 (2021), 106165.
[11] C. Cunha, A.J. Silva, P. Pereira, et al., The inflammatory response in the regression of lumbar disc herniation, Arthritis Res. Ther. 20 (2018) 251, https://doi.org/10.1186/s13075-018-1743-4.
[12] B.C. Apile, M.C. Amato, C.A. Oliveira, Functional evolution after percutaneous endoscopic lumbar disectomy, an earlier evaluation of 32 cases, Rev. Brasileira de Ortopedia 55 (2020 Sep 30) 415–418.
[13] P. Azimi, H.R. Mohammadi, H. Nayeb-Aghaei, S. Azhari, H. Sadrifar-Ghadehifar, S. Sadeghi, Functional status and surgical outcome of fenestration versus laminotomy discectomy in patients with lumbar disc herniation, Iran. J. Neurosurg. 1 (1) (2015 Jun 10) 23–27.
[14] A.A. Hamawandi, L.I. Sulaiman, A.M. Abdulmaleem, Effect of duration of symptoms on the clinical and functional outcomes of lumbar microdiscectomy: a randomized controlled trial, Orthop. Surg. 14 (2022) 157–168, https://doi.org/10.1111/os.13114.
[15] R.R. Yadav, R.B. Lakhey, S. Paudel, D. Kafle, R. Pokhare, Symptomatic improvement and functional outcome of discectomy in prolapsed lumbar intervertebral disc, Nepal Orthop. Assoc. J. 6 (2) (2020) 5–10.
[16] A. Kumar, A.K. Ramanathan, Functional outcome of microscopic lumbar discectomy for the treatment of lumbar disc prolapse in tertiary care hospital in South India, Int. J. Orthop. 6 (3) (2020) 488–492.

D.M.A.A. Mohammed et al.
[17] C. Wu, C.Y. Lee, S.C. Chen, et al., Functional outcomes of full-endoscopic spine surgery for high-grade migrated lumbar disc herniation: a prospective registry-based cohort study with more than 5 years of follow-up, BMC Musculoskelet. Disord. 22 (2021) 58, https://doi.org/10.1186/s12891-020-03891-1.

[18] A. Gupta, H.S. Chhabra, D. Nagarjuna, M. Arora, Comparison of functional outcomes between lumbar interbody fusion surgery and discectomy in massive lumbar disc herniation: a retrospective analysis, Global Spine J. 11 (5) (2021 Jun) 690-696, https://doi.org/10.1177/2192568220921829. Epub 2020 May 19. PMID: 32875922; PMCID: PMC8165912.

[19] S. Dipak, R. Shrestha, D. Dhoju, S.R. Kayastha, S.C. Jha, Study of clinical variables affecting long term outcome after microdiscectomy for lumbar disc herniation, Kathmandu Univ. Med. J. 13 (52) (2016) 333-340.

[20] J. Shi, Y. Wang, F. Zhou, H. Zhang, H. Yang, Long-term clinical outcomes in patients undergoing lumbar discectomy by fenestration, J. Int. Med. Res. 40 (2012) 2355–2361.

[21] Basques, A. Bryce, et al., The effect of preoperative symptom duration on postoperative outcomes after a tubular lumbar microdiscectomy, Clin. Spine Surg. 32 (1) (2019) E27–E30, https://doi.org/10.1097/BSD.0000000000000711.

[22] S.A. Ahmadi, I.P. Burkert, H.J. Steiger, S.O. Eicker, Multidimensional long-term outcome analysis after single-level lumbar microdiscectomy: a prospective single-centre study, Eur. J. Orthop. Surg. Traumatol. 28 (2018) 189-196.

[23] M. Pitsika, E. Thomas, S. Shaheen, H. Sharma, Does the duration of symptoms influence outcome in patients with sciatica undergoing micro-discectomy and decompressions? Spine J. 16 (2016) S21–S25.

[24] U.G. Wankhade, M.K. Unshankar, B.S. Reddy, Functional outcome of lumbar discectomy by fenestration technique in lumbar disc prolapse—return to work and relief of pain, J. Clin. Diagn. Res. 10 (2016) RC9-RC13.

[25] F. Omidi-Kashani, E. Ghayem Hanakhani, A.R. Kachooei, M.D. Rahimi, R. Khanzadeh, Does duration of preoperative sciatica impact surgical outcomes in patients with lumbar disc herniation? Neurol. Res. Int. 2014 (2014), 565189.

[26] L.C. Ng, P. Sell, Predictive value of the duration of sciatica for lumbar discectomy. A prospective cohort study, J. Bone Joint Surg. Br. 86 (2004) 546-549.

[27] D. Shrestha, R. Shrestha, D. Dhoju, S. Kayastha, S.C. Jha, Study of clinical variables affecting long term outcome after microsurgery for lumbar disc herniation, Kathmandu Univ. Med. J. 13 (2015) 333–340.

[28] I.D. Gelalis, E.I. Papastasiou, E.E. Pakos, et al., Clinical outcomes after lumbar spine microdiscectomy: a 5-year follow-up prospective study in 100 patients, Eur. J. Orthop. Surg. Traumatol. 29 (2019) 321–327.