International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 05, 2020
ISSN: 1475-7192

Comparison of Limited and Aggressive Open Lumbar Discectomy in Terms of Clinical Recurrence Complications, Discitis, Osteomyelitis and Postoperative Lumbar Pain

[1]Ali Nazemi Rafie, [2]Alireza Lotfipour, [3]Alireza Kamali, [4]Alireza Mohammadi, [5]Mohsen Dalvandi

Abstract--

Introduction: *Low back pain is still one of the major public health problems. According to studies done today, back pain after cold is the second cause of job absence. 70 to 80% of people in the world suffer from low back pain, which eventually leads to consultation with a physician and other health care providers for evaluation and treatment. Each year, governments spend heavy costs on diagnosing, treating, and coping with back pain disabilities. The aim of this study was to evaluate and compare two methods, limited and aggressive open lumbar discectomy in terms of clinical recurrence complications, discitis, osteomyelitis and postoperative lumbar pain.*

Materials and methods: *In this study, sampling was done from patients referred to the neurosurgery ward of the hospital from 2016 to 2018. The study population included patients with lumbar disc herniation pain requiring surgical intervention and entered the study with inclusion criteria. Two surgical methods were used to perform the discectomy in patients. For the purpose of this study, the sample size with 80 power study and 95% significance level of the calculated volume is equal to 70 samples. Finally, the data were entered into SPSS software to make sample size and thus statistical analysis with the help of this software.*

Results: *The mean age of the first group was 35.57 years and in the second group was 9.34 years. The incidence of discitis with osteomyelitis was one case for the first group (2.5%) and in two cases for the second group (5%). The rate of recurrence of the disc was evaluated; three cases for the first group (7.5%) and two cases for the second group (5%). The mean preoperative pain score was 7.95 for the first group and 7.6 for the second group was obtained from 10. There was no significant difference between the two groups in the rate of disc recurrence during the six months after surgery (P-value = 0.18). Associated risk was also assessed for the incidence of discitis and osteomyelitis in the two groups, with no significant difference (P-value = 0.12). The mean pain reduction score one day after surgery was 5.1 for the first group and 4.625 for the second group, with no significant difference (P-value = 0.29).*

[1]*Department of Neurosurgery, Arak University of Medical Sciences, Arak, Iran*
[2]*Department of Neurosurgery, Arak University of Medical Sciences, Arak, Iran*
[3]*Department of Anesthesiology and Critical Care, Arak University of Medical Sciences, Arak, Iran.*
[4]*Department of Neurosurgery, Arak University of Medical Sciences, Arak, Iran.*
[5]*Department of Neurosurgery, Arak University of Medical Sciences, Arak, Iran, Email: mdalvandi@yahoo.com*

DOI: 10.37200/IJPR/V24I5/PR2020782
Received: 23 Apr 2020 | Revised: 30 Apr 2020 | Accepted: 24 May 2020

Conclusion: *According to the results of this study in the treatment of lumbar disc herniation with high evidences, it can be concluded that* sequestrectomy *surgery due to shorter operation time, less manipulation of natural regional elements and lack of obvious difference in incidence disk recurrence is preferable to the aggressive method. Of course, some searches showed an increased recurrence rate in these patients, but extensive Meta-analyzes rejects this finding.*

Keywords--- *Limited and Aggressive Open Lumbar Discectomy, Discitis, Osteomyelitis.*

I. INTRODUCTION

Back pain despite its ancient history, it is still an epidemic of modern society. About 80% of people have experienced low back pain at least once. Lower back pain is the first cause of limitation in daily activities, the second cause of physician referral and job absence, and the fifth cause of hospitalization that affects the production cycle and community economy more than any other patient (1). Every year governments spend heavily costs on diagnosing, treating, and coping with back pain disabilities, and our country Iran, is no exception. Diagnosis of the cause, prevention and treatment of low back pain has an important role in reducing health costs of governments and will lead patients to return to their daily activities faster (2). Low back pain has many causes; lumbar intervertebral disc is one of the most common causes of pain especially in the third and fourth decade of life (3). Intervertebral disc herniation (disc herniation) is caused by disk disposition, which occurs more frequently in the lumbar spine in spinal disc disease. These patients will be treated with surgery if treatment fails (4). The intervertebral disc acts as a joint between the vertebrae and the shock absorber. The disc herniation causes a specific spinal nerve and more nerve tension, which causes pain in the lower extremity (5). Understanding spinal cord disorders and their treatment has a history dating back to 1550 BC. Sciatic pain was first described by Katono in 1764. Rapid advances in the treatment of spinal diseases have occurred in the last century due to the discovery of X-rays by Rontgen in 1985 (6). Discectomy has been the focus of worldwide treatment for lumbar disc herniation for many years (7). Although various new technology-based approaches have been introduced so far, many surgeons around the world continue to use this method for the treatment of lumbar disc herniation, and numerous reports of approaches and the desired results have been published (8,9). Recurrent lumbar disc herniation is the most common complication after primary open discectomy and is characterized by leg back pain or after a specified period without pain after surgery at least 6 months after surgery. Laboratory examination is required to search for evidence of infection (10). Treatment of recurrent lumbar disc herniation involves more aggressive medical and surgical treatment (12, 11). The purpose of this study was to compare the results of limited and aggressive discectomy in terms of clinical recurrence complications, osteomyelitis, discitis and postoperative lumbar pain in patients with lumbar disc who underwent one of two surgical procedures.

II. MATERIAL AND METHODS

In this study, to evaluate the benefits or disadvantages and to compare the two methods of limited and aggressive discectomy, sampling was performed from patients referred to the clinic or neurosurgical department of

DOI: 10.37200/IJPR/V24I5/PR2020782
Received: 23 Apr 2020 | Revised: 30 Apr 2020 | Accepted: 24 May 2020

Vali-e-Asr Hospital between about 2 years, from 2016 and 2018. The population included patients with lumbar disc herniation pain requiring surgical intervention and was included in the study.

Inclusion criteria:

1- Being under 60 years of age
2- Disc herniation as the only complication of the individual's problem (radiculopathy) in MRI imaging

Exclusion criteria:

1- Patients with canal stenosis or listhesis
2- Smoking addiction
3- Diabetes Mellitus

Two surgical methods were used to perform the discectomy in patients. In the limited procedure (the first method), only the most minimally invasive procedure was to remove the bulging disc and, after ensuring that the nerve root was free, without the use of curettage and without insisting on maximal dislocation of the intervertebral space after surgery with normal saline containing gentamicin was terminated. In the case of an extruded piece without bulging space, only the extrusion without cutting on the intervertebral space was limited to the use of a disk drive.

In the case of aggressive (Group II) surgery procedures were followed the same way, but to remove the contents of the intervertebral disc and after incision on the area with a knife No 15, attempted to maximize space clearance and to assist with curettage this method was used.

Sample Size

For the purposes of the present study, the sample size with respect to the recurrence rate reported in previous studies is P1 = 0.18 for limited discectomy and P2 = 0.9 for aggressive discectomy. Considering the power of the study 80 and the significance level of 95% of the volume calculated by the following formula equals 35 samples for two groups in total 70 samples.

$$n = \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 [P_1(1-P_1) + P_2(1-P_{2)}]}{(P_1 - P_2)^2}$$

Data analysis

In this study, 7 patients in the first group and 4 patients in the second group were unavailable for follow-up at 6 months and were randomly assigned to similar patients. The data were entered into SPSS software to determine the sample size and thus statistical analysis.

DOI: 10.37200/IJPR/V24I5/PR2020782
Received: 23 Apr 2020 | Revised: 30 Apr 2020 | Accepted: 24 May 2020

III. RESULTS

The mean age of the first group was 35.57 years and in the second group was 9.34 years. 25 patients in the first group and 27 patients in the second group were male. Pain scores of patients before surgery were assessed by pain scale 1 to 10 with using a patient questionnaire. The maximum pain was rated 10. With using pain scale one day after surgery and 6 months after surgery patients were evaluated.

Also, cases of disc recurrence and surgical site infections in the form of discitis or osteomyelitis in these six months were evaluated in two groups according to clinical and laboratory findings. The incidence of discitis with osteomyelitis in first group was one case (2.5%) and in second group it was two cases (5%). The rate of recurrence of disc was evaluated; three cases for the first group (7.5%) and two cases for the second group (5%). Mean preoperative pain score was 7.95 for the first group and 7.6 for the second group.

One day after surgery, patients were asked about pain and mean VAS score was 2.85% in the first group and 2.975% in the second group. These values for mean pain after 6 months, considering that at the end of the study, 4 patients in the first group and 6 patients in the second group were unavailable, were 2.575% and 2.875% for the first group and second group, respectively.

This study was performed by relative ratio and weighted mean difference with 95% confidence interval. Random effects model was applied by heterogeneity by $X^2$and I^2 tests. Statistical validity was considered significant at P-value below 0.05.

There was no significant difference between the two groups in the rate of disc recurrence during the six months after surgery (P-value = 0.18). Associated risk was also assessed for the incidence of discitis and osteomyelitis in the two groups, with no significant difference (P-value = 0.12). The mean pain reduction one day after surgery was 5.1 score in the first group and 4.625 in the second group, with no significant difference (P-value = 0.29). The mean pain reduction scores were 5.375 and 4.725, respectively (P-value = 0.17) for the first 6 months after surgery.

IV. DISCUSSION

Low back pain is still one of the major public health problems. According to studies done today, low back pain is the second cause of job absence. 70 to 80% of people in the world suffer from low back pain, which eventually leads to consultation with a physician and other health care providers for evaluation and treatment. Low back pain is the most common cause of activity restriction in people under 45 years. LBP is commonly seen in middle-aged people and the prevalence of LBP is the same in men and women. The prevalence of LBP in whites is higher than blacks (13).

Each year, governments spend heavily costs on diagnosing, treating, and coping disabilities from low back pain. Diagnosis of the cause, prevention and treatment of low back pain has an important role in reducing the cost of administration and will lead patients to return to their daily activities faster. Therefore, this study was designed to

DOI: 10.37200/IJPR/V24I5/PR2020782
Received: 23 Apr 2020 | Revised: 30 Apr 2020 | Accepted: 24 May 2020

evaluate and compare the two methods of minimally and gras surgery in the treatment of lumbar disc protrusion (14).

In this study, we evaluated the potential benefits or disadvantages of two methods, such as recurrence in surgery, site infection (osteomyelitis and discitis) and pain reduction as a result of surgery. According to the results of this study, there was no statistically significant difference in the rate of recurrence of disc ejection in the two groups. Based on the statistics obtained from previous articles and the review of previous extensive Meta-analyzes, the findings of this study are consistent with most of the other conclusions. However, some articles have reported a higher incidence in sequestrectomy.

Among these papers were a retrospective study of Solomon et al., A retrospective study that resulted in a limited discectomy total of 152 patients between January 1, 2001, and June 30, 2003. The results of this study show that 88.9% of these patients had excellent or good surgical outcome and a long-term result was reported. Improvement in back and leg pain was reported in 89.8% and contact or leg pain in 88%. The long-term average disability index was 8.89%, indicating a minimum disability. Recurrence and need for reoperation occurred in 11.1% of cases. This study demonstrates that a minimally invasive approach to segment removal is only one effective way to treat lumbar disc (15).

Also in a similar study that McGirst et al., 2009 in Maryland, USA, compared the results of two limited discectomy surgeries with an aggressive discectomy. Searching Medline collected all the studies from 1980 to 2007. In a total of 54 studies, 35913 patients underwent discectomy, of which 6135 had limited discectomy and 7224 had aggressive discectomy. Results showed that 14.5% of these patients had short recurrent and leg pain in limited discectomy and 14.1% had in aggressive discectomy. Also, 2 years after surgery, the rate of recurrence or leg pain was 11.6% in patients with limited discectomy and 27.8% in aggressive discectomy. The results of our studies show that the rate of recurrence in long-term in aggressive discectomy surgery is more than limited (16).

Regarding the risk of operative infections in the form of discitis and osteomyelitis, this study did not find a significant difference between the two methods. These results are consistent with many previous studies. Both methods have been found to be useful in improving the patient's clinical status by reducing pain, but no significant difference was found between the two groups. Further studies have been performed, some of which have shown the efficacy of the sequestrectomy method to be more effective in reducing pain, while others have not made a significant difference. Among these was a 2015 study by Ledick et al., Which examined the results of limited surgery and its complications in patients. A total of 75 men and 40 women with mean age of 40 years were enrolled in the study. Repair, maintenance, and disk location infections were reported in 90% of cases at 24 months with positive results. In general, repair, maintenance, and infection of the disk site were less associated with nucleus removal. Patient disability, back pain, and leg pain were significantly improved compared to preoperatively at 6 weeks. Limited lumbar surgery over a 24-month period after surgery results in excellent disc maintenance and sustained disability, leg pain, and improved back pain (17).

Finally, it can be used to increase study power by increasing the sample size. Also, the VAS criterion does not adequately reflect patients' recovery status due to inherent errors in patient education and response. Given the

DOI: 10.37200/IJPR/V24I5/PR2020782
Received: 23 Apr 2020 | Revised: 30 Apr 2020 | Accepted: 24 May 2020

high likelihood of the patient referring to a primary care physician for complications or recurrence of herniation, some patients may also not be referred to a previous treatment center. Using a single surgeon to make the procedure more similar to each group and also to statistically match the groups by age, gender, and even mental status, adds some careful study, some of which, including age and gender, are included in this study.

V. CONCLUSION

The two surgical techniques used to relieve the nerve root that have been studied in this study have shown both known therapeutic effects in research. The routine surgical procedure of each person is mainly teaching style in the resident system and depends on personal experience. Using newer research based on the validity of the data obtained and evidence-based articles will help the therapist employ a better approach that results from greater collective experience to reduce error rates and complications and increase treatment efficacy. Based on the results of this study, which have been mentioned in the previous sections, as well as focusing on the data obtained from previous studies in the treatment of lumbar disc herniation with high evidence, it can be concluded that the surgical method of sequestrectomy is due to the shorter operating time, less manipulation of the region's natural elements and the lack of a clear difference in the incidence of disc recurrence, it is preferable to the invasive method. However, some searches showed an increased recurrence rate in these patients, but extensive Meta-analyzes rejects this finding.

REFERENCES

1. Zargar S, Nazemi Rafie A, Sosanabadi A, Kamali A. Addition of dexmedetomidine and neostigmine to 1.5 % lidocaine and triamcinolone for epidural block to reduce the duration of analgesia in patients suffering from chronic low back pain. J Med Life. 2019; 12(3): 260–265.
2. Gilbert FJ. Influence of early MR Imaging or CT on treatment and outcome. Radiology. 2004; 231(2): 343- 51.
3. Williams KD, Park AL. Lower back pain and disorders of ntervertebral discs. In: Canale ST, editor. Campbell's Operative Orthpaedics. 10th ed. Philadelphia: Mosby. 2003; 12(34): 1955-2050.
4. Ohya J, Oshima Y, Chikuda H, Oichi T, Matsui H, Fushimi K, et al. Does the microendoscopic technique reduce mortality and major complications in patients undergoing lumbar discectomy? A propensity score-matched analysis using a nationwide administrative database. Neurosurg Focus. 2016; 40(2): 114-9.
5. Hardy RW. Estradural cauda equine and nerve root compression from benign lesions of lumbar spine. In: Youmans JR, editor. In: Youmans JR, ed. Neurological Surgery. 4th ed. Philadelphia: WB Saunders. 1996; 13(4): 2357-74.
6. Basu S, Ghosh J, Malik F, Tikoo A. Postoperative discitis following single-level lumbar discectomy: Our experience of 17 cases. Indian J Orthop. 2012; 46(4): 427-33.
7. Guo JJ, Yang H, Tang T. Long-term outcomes of the revision open lumbar discectomy by fenestration: A follow-up study of more than 10 years. Int Orthop. 2009; 33(5): 1341-5.
8. Fu TS, Lai PL, Tsai TT, Niu CC, Chen LH, Chen WJ. Long-term results of disc excision for recurrent lumbar disc herniation with or without posterolateral fusion. Spine (Phila Pa 1976). 2005; 30(24): 2830-4.
9. Saruhashi Y, Mori K, Katsuura A, Takahashi S, Matsusue Y, Hukuda S. Evaluation of standard nucleotomy for lumbar disc herniation using the Love method: results of follow-up studies after more than 10 years. Eur Spine J. 2004; 13(7): 626-30.
10. Oosterhuis T, Costa L, Maher C, Vet H, van Tulder M, Ostelo R. Rehabilitation after lumbar disc surgery. Cochrane Database Syst Rev. 2014; 12(4): 137-44.
11. Fakouri B, Shetty N, White T. Is sequestrectomy a viable alternative to microdiscectomy? A systematic review of the literature. ClinOrthop Relat Res. 2015; 473(6): 1957-62.
12. Agarwal P, Pierce J, Welch W. Cost analysis of spinal versus general anesthesia for lumbar discectomy and laminectomy spine surgery. World Neurosurg. 2016; 14(9): 1342-9.
13. Speed C. Low back pain. BMJ. 2004; 32(8): 1119-1121.

DOI: 10.37200/IJPR/V24I5/PR2020782
Received: 23 Apr 2020 | Revised: 30 Apr 2020 | Accepted: 24 May 2020

14. Panagis JS. Research on low back pain and common spinal disorders. NIH Guide. 1997; 26(16): 2.
15. Soliman J, Harvey A, Howes G, Seibly J, Dossey J, Nardone E. Limited microdiscectomy for lumbar disk herniation: a retrospective long-term outcome analysis. J Spinal Disord Tech. 2014; 27(1): 8-13.
16. McGirt MJ, Ambrossi GL, Datoo G, Sciubba DM, Witham TF, Wolinsky JP, et al. Recurrent disc herniation and long-term back pain after primary lumbar discectomy: review of outcomes reported for limited versus aggressive disc removal. Neurosurgery. 2009; 64(2): 338-44.
17. Ledic D, Vukas D, Grahovac G, Barth M, Bouma G, Vilendecic M. Effect of anular closure on disk height maintenance and reoperated recurrent herniation following lumbar diskectomy: two-year data. J Neurol Surg A Cent Eur Neurosurg. 2015; 76(3): 211-8.

DOI: 10.37200/IJPR/V24I5/PR2020782
Received: 23 Apr 2020 | Revised: 30 Apr 2020 | Accepted: 24 May 2020