

Clinico-Epidemiological Study of Patients with Lumbar Intervertebral Disc Herniation Treated By Minimally Invasive Microdiscectomy.

Bhaskar Bhandary¹, Amlan Mohapatra², Kartik Raj K³

¹Associate Professor, Department of Orthopedics, AJ Institute of Medical Sciences, Mangalore, Karnataka.

²Senior Resident, Department of Orthopedics, AJ Institute of Medical Sciences, Mangalore, Karnataka.

³Junior Resident, Department of Orthopedics, AJ Institute of Medical Sciences, Mangalore, Karnataka.

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ABSTRACT

Background: This study was aimed at understanding the clinical and epidemiological characteristics of patients diagnosed with disc herniation and operated with minimally invasive microdiscectomy at our institute. **Methods:** After taking approval of the institutional ethics committee, all patients aged more than 18 years, who presented to the outpatient clinic of the Department of Orthopedics, AJ Institute of Medical Sciences, Mangalore, Karnataka with complaints of leg or back pain, or other neurological symptoms, supported by Magnetic Resonance Imaging (MRI) suggestive of disc from August 2014 till August were included in the study. Those patients who did not respond to conservative management were selected for minimally invasive microdiscectomy. Descriptive analysis was done using appropriate statistical tests. **Results:** During the study period we enrolled 52 patients for the study; average age 40.17 years, 32 males. When patients were assessed for leg and back pain, we found that 59% had leg pain more than back pain. 53% of the patients had symptoms of pain for less than 6 months from the time of presentation. On performing the SLR test preoperatively, 64% of the patients were found to report pain at less than 30 degree leg raise. Slight weakness of motor system and sensory system was noted in 62% and 72% of the patients respectively. Intraoperatively, majority of the patients had less than 100 ml of blood loss and less than 1 hour of surgery. Intraoperative cerebrospinal fluid leak was reported in only 1 patient. **Conclusion:** Our study describes the patient population with disc herniations operated with minimally invasive microdiscectomy at our institution.

Keywords: Disc herniation, microdiscectomy, back pain, epidemiology.

INTRODUCTION

Lumbosacral radiculopathy is a condition in which the function of one or more lumbosacral nerve roots are affected. Studies have shown that the most common cause of lumbosacral radiculopathy is nerve root compression, which is either caused by a disc herniation or spondylosis. Relationship between disc disease and lumbosacral radiculopathy was first described in 1934 by Mixter and Barr. Clinically, disc herniation is defined as

fragmented annular tissue beyond the intervertebral disk space. Different levels of nerve root compression can be caused by the disc protrusion, depending on the orientation of spinal nerve roots as they leave the spinal cord. Roots may be injured at any disc level in the spine as it depends on the nature and site of compression. To understand anatomically, the lumbosacral spine is susceptible to disc herniations because of its mobility to cause flexion, extension, and torsion. It has been seen that from routine movements of the spine L4-L5 and L5-S1 levels are most susceptible to injuries, and as a result about 90% of compressive radiculopathies occur at these levels. However, lateral herniations are seen more often at the L2-4 levels and they may affect the rostral root. This is seen rarely, as only 10% of far lateral herniations will result in nerve root compression. This study was aimed at understanding the clinical and epidemiological characteristics of patients diagnosed with disc

Name & Address of Corresponding Author

Dr. Amlan Mohapatra,
Senior Resident
Department of Orthopedics
AJ Institute of Medical Sciences,
Mangalore,
Karnataka.

herniation and operated with minimally invasive microdiscectomy at our institute.

MATERIALS AND METHODS

Study Design and Setting

We designed a prospective study in the Department of Orthopedics, AJ Institute of Medical Sciences, Mangalore, Karnataka from August 2014 till August 2016. Approval of the institutional ethics committee was sought before enrolling the patients for the study. For this prospective study, we designed a patient case report form which had questions regarding demographic and clinical information of the patient. Informed written consent was taken from all the patient prior to collecting patient related information. Mangalore is a port city in the state of Karnataka, with an estimated metropolitan population of 623,000. AJ Institute of Medical Sciences is one of the primary healthcare providers in Mangalore. It is a tertiary level teaching hospital with more than 1000 beds.

Sample population

During the study period, all patients aged more than 18 years, who presented to the outpatient clinic of the Department of Orthopedics, AJ Institute of Medical Sciences, Mangalore, Karnataka with complaints of leg or back pain, or other neurological symptoms, supported by Magnetic Resonance Imaging (MRI) suggestive of disc herniation, were included in the study. All patients were advised non-operative conservative measures first. Those patients who did not respond to conservative management were selected for minimally invasive microdiscectomy. All patients included in the final sample population had a confirmed diagnosis of disc herniation and unilateral straight leg raise (SLR) test positive. We excluded patients aged more than 50 years because of their unsuitability for undergoing a surgery procedure, those with asymptomatic or recurrent disc herniation, bilateral disc herniation, history of lumbar spinal surgery, operative site infections, spinal infections, medically unfit for surgery, not willing for surgery or those with psychiatric illness. We also excluded patients with back pain due to tumors, vertebral fractures, spinal canal stenosis, cauda equina or listhesis.

Data Collection and Data Analysis

Using the pre-designed semi-structured questionnaire we collected patient related information like demographics, socio-economic history, clinical history and clinical signs and symptoms. Some of this information was collected directly from the patient and some from their medical records. After the patient was diagnosed with disc herniation, we noted the summary of investigations performed on the patient and interventions done. Patient's

occupation was categorised into significant (heavy work) and not significant (light work). Light work was defined as occasionally lifting objects (8-10 kg) and performing walking or standing activities for 2 hours in an 8 hour work period and retirement activities. Heavy work was defined as pushing, pulling or lifting 30 - 40 kg weight or greater and or carrying weights up to 20 kg during an 8 hour work day. We assessed pre-operative pain using Japanese Orthopedic Association questionnaire. SLR was performed on every patient preoperatively and the findings were noted. Preoperative motor and sensory assessment was also conducted on all patients using Japanese Orthopedic Association score. We noted the level of lesion involved in disc herniation as well.

Once fit for surgery, the patients were operated under general anaesthesia and under aseptic precautions by senior consultants through minimally invasive micro lumbar discectomy approach in our tertiary level operating theatres. The patients were observed throughout the surgery and findings were recorded. On the day of surgery patient was kept on complete bed rest. Patient is mobilized and made to ambulate starting from first post-operative day. Post-operative intravenous antibiotics were given till 5th post-operative day. Adequate analgesia was given. Patient was discharged once he/ she was pain free and able to ambulate on their own (usually on 5th post-operative day). Suture removal was performed after 10 days post-operative (after wound inspection). Patient was advised to refrain from bending, lifting heavy weights and strenuous labour activities for atleast for 6 - 12 weeks. Patients with jobs requiring prolonged sitting activities were advised to join back duty only after 4 - 6 weeks from surgery. Collected data was entered in Microsoft excel sheets and later imported in the Statistical Package for Social Sciences software for appropriate analysis.

RESULTS

During the study period we enrolled 52 patients for the study. Average age of the patients was 40.17 years and 32 patients were males (60%). Majority of them did light work at the time of presentation (53%). When patients were assessed for leg and back pain, we found that 59% had leg pain more than back pain [Table 1]. 53% of the patients had symptoms of pain for less than 6 months from the time of presentation. Left side was seen to be more commonly affected than right in our patient population. On performing the SLR test preoperatively, 64% of the patients were found to report pain at less than 30 degree leg raise. Slight weakness of motor system and sensory system was noted in 62% and 72% of the patients respectively. Motor and sensory weakness were scored based on

Japanese Orthopedic Association score. On further examination and imaging investigations, level L4-L5 was found to be most commonly involved (68%) in our patient population. Intraoperatively, majority of the patients had less than 100 ml of blood loss and less than 1 hour of surgery. Intraoperative cerebrospinal fluid leak was reported in only 1 patient.

Table 1: Baseline clinico-epidemiological variables of patients

Variable	n (%)
Total number of patients	53
Average age	40.17±8.5 years
Males	32 (60%)
Type of work	
Heavy	25 (47%)
Light	28 (53%)
Preoperative pain	
Leg pain less than back pain	5 (9%)
Leg pain equal to back pain	17 (32%)
Leg back more than back pain	31 (59%)
Duration of symptoms	
0 to 6 months	28 (53%)
7-12 months	20 (38%)
More than 12 months	5 (9%)
Side of lesion	
Right	22 (42%)
Left	31 (58%)
Preoperative straight leg raising test	
Positive	34 (64%)
Negative	19 (36%)
Preoperative motor disturbance*	
Marked weakness	13 (24%)
Slight weakness	33 (62%)
Normal	7 (14%)
Preoperative sensory deficit*	
Marked weakness	13 (24%)
Slight weakness	38 (72%)
Normal	2 (4%)
Levels involved in the lesions	
L3-L4	7 (13%)
L4-L5	36 (68%)
L5-S1	10 (19%)

* Scored as per Japanese Orthopedic Association score

Table 2: Intraoperative findings of patients undergoing minimally invasive microdiscectomy.

Intraoperative blood loss	n (%)
Less than 100 ml	41 (77%)
More than 100 ml	12 (23%)
Duration of surgery	
Less than equal to 1 hour	38 (72%)
More than 1 hour	15 (28%)
Intraoperative cerebrospinal fluid leak	
Present	1 (2%)
Absent	52 (98%)

DISCUSSION

The syndrome of low back and low extremity pain, weakness and numbness results from the compression of the nerve root. Due to dehydration, flexibility decrease and severe damage to the normal function, while the pressure loaded on the lumbar spine increases could cause annular fibrosus damage and intervertebral disc herniation. The

prevalence of symptomatic herniated lumbar disc is about 1–3% depending on age and sex. The highest prevalence is among people aged 30–50 years with a male to female ratio of 2:1. The mean age of participants in our study was 40.17 years and ranged from 20 to 50 years. This is similar to the findings of Heliovaara et al and Deyo et al , which reported the mean age of patients undergoing surgery for lumbar disc herniation at 40 and 43 years, respectively. Majority, 32 of our patients were in the 40 to 50 years age group. This was in correlation with Deyo et al study, in which it was reported that the majority of lumbar disc herniations occurred in the age group of 30 to 50 years. In our study, 47 % of the patients had heavy work which was involved in the etogenesis. These findings contrast Heliovaara’s study which reported the risk of disc herniation to be lowest among the professional and white collar occupation workers. However, our findings are comparable with and can be explained by the findings of study by Kelsey et al , in which it was hypothesized that since physical activity is known to increase the diffusion of nutrients into the disc, sedentary occupations could be associated with an increased risk of disc degeneration and disc herniation.

The main presenting symptoms in our study were radicular leg pain and low back pain, in which 31 patients had radicular pain predominant than back pain. Akbar et al investigating lumbar disc prolapse, found 47% of patients reporting low back pain plus leg pain and 18% of patients with leg pain only. Different studies have suggested that longer the symptom duration due to lumbar disc herniation, less favourable is the operative outcome. Our average duration of symptoms was 7.60 months ranging from 2 months to 24 months. On examination, a positive SLR test was the most common finding followed by restricted movements and neurological deficits in our study. This was consistent with Vroomen et al study, which showed that SLR was a consistently sensitive examination for sciatica due to disc herniation. Supik and Broom showed SLR to be the most sensitive preoperative physical diagnostic sign for lower lumbar disc herniation. However, this study did not establish the sensitivities of SLR but showed the trends of SLR being predictive of lumbar disc herniation. Motor and sensory deficits were reported in 46 (88%) and 51 (96%) patients in our study, respectively. A study by Iwasaki et al showed a preponderance of 72.6% of sensory disturbance.

A doctoral dissertation by Jacob in Tanzania showed a majority of disc herniation occurring at the lower lumbar level, with the highest prevalence at L4-L5 at 47.3%, followed by L5-S1 at 30.9%. Ongeti’s retrospective study in Kenya showed similar figures, with the majority of patients having a lower lumbar disc herniation, most commonly at the L4-L5 level (156 patients), followed by L5-S1

(93 patients). L4-5 disc herniation was the commonest in our study with 68 % of the herniation occurring at this level, followed by L5-S1 (19 %). The increased frequency of lumbar disc herniation at lower lumbar levels as reflected in our study could be explained by the increased mobility and workload of lower segments, resulting in earlier disc degeneration and subsequent disc prolapse.

CONCLUSION

Our study describes the patient population with disc herniations operated with minimally invasive microdiscectomy at our institution. Understanding the clinico-epidemiological characteristics of these patients will help us in planning the budget and infrastructure for managing patients with disc herniation. Future research should focus on long term clinical outcomes in these patients.

REFERENCES

1. Mixter WJ, Barr JS. Rupture of the intervertebral disc with involvement of the spinal cord. *N Engl J Med* 1934; 211:210.
2. Fardon DF, Milette PC. Nomenclature and classification of lumbar disc pathology: recommendations of the combined task forces of the North American Spine Society, American Society of Spine Radiology, and American Society of Neuroradiology. *Spine*. 2001 Mar 1;26(5):E93-113.
3. Deyo RA, Weinstein JN. Low back pain. *N Engl J Med* 2001; 344:363.
4. Kikuchi S, Sato K, Konno S, Hasue M. Anatomic and radiographic study of dorsal root ganglia. *Spine (Phila Pa 1976)* 1994; 19:6.
5. Mangalore Metropolitan Urban Region Population 2011 Census website.
6. <http://www.census2011.co.in/census/metropolitan/391-mangalore.html> Accessed June 17, 2017
7. Fukui M, Chiba K, Kawakami M, Kikuchi SI, Konno SI, Miyamoto M, Seichi A, Shimamura T, Shirado O, Taguchi T, Takahashi K. Japanese orthopaedic association back pain evaluation questionnaire. Part 3. Validity study and establishment of the measurement scale. *Journal of Orthopaedic Science*. 2008 May 1;13(3):173.
8. Japanese Orthopaedic Association. Scoring system for cervical myelopathy. *J Jpn Orthop Assoc*. 1994;68:490-503.
9. Postacchini F, Cinotti G. Etiopathogenesis. In *Lumbar disc herniation 1999* (pp. 151-167). Springer Vienna.
10. Heliövaara M, Knekt P, Aromaa A. Incidence and risk factors of herniated lumbar intervertebral disc or sciatica leading to hospitalization. *Journal of chronic diseases*. 1987 Jan 1;40(3):251-8.
11. Deyo RA, Tsui-Wu YJ. Descriptive epidemiology of low-back pain and its related medical care in the United States. *Spine*. 1987 Apr 1;12(3):264-8.
12. Kelsey JL, Githens PB, O'conner T, Weil U, Calogero JA, Holford TR, WHITE III AA, Walter SD, Ostfeld AM, Southwick WO. Acute Prolapsed Lumbar Intervertebral Disc An Epidemiologic Study with Special Reference to Driving Automobiles and Cigarette Smoking. *Spine*. 1984 Sep 1;9(6):608-13.
13. Akbar A, Mahar A. Lumbar disc prolapse: management and outcome analysis of 96 surgically treated patients. *JOURNAL-PAKISTAN MEDICAL ASSOCIATION*. 2002 Feb;52(2):62-5.
14. Sabnis AB, Diwan AD. The timing of surgery in lumbar disc prolapse: A systematic review. *Indian journal of orthopaedics*. 2014 Mar 1;48(2):127.
15. Vroomen PC, De Krom MC, Knottnerus JA. Diagnostic value of history and physical examination in patients suspected of sciatica due to disc herniation: a systematic review. *Journal of neurology*. 1999 Oct 1;246(10):899-906.
16. Supik LF, Broom MJ. Sciatic tension signs and lumbar disc herniation. *Spine*. 1994 May 1;19(9):1066-9.
17. Iwasaki M, Akino M, Hida K, Yano S, Aoyama T, Saito H, Iwasaki Y. Clinical and radiographic characteristics of upper lumbar disc herniation: ten-year microsurgical experience. *Neurologia medico-chirurgica*. 2011;51(6):423-6.
18. Jacob M. Pattern of spine degenerative disease among patients referred for lumbar magnetic resonance imaging at Muhimbili National Hospital, Dar es salaam, Tanzania March-September-2010 (Doctoral dissertation, Muhimbili University of Health and Allied Sciences).
19. Ongeti KW, Ogeng'o JA, Bundi PK, Gakuu LN. Treatment and outcome of herniated lumbar intervertebral disk in a referral hospital in Kenya. *East African Orthopaedic Journal*. 2009;3(2).

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