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Original Research Article

An assessment of the clinical and radiological outcomes of microscopic discectomy in patients with lumbar disc herniation

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Abstract

Aim: To correlate clinical and radiological outcomes of microscopic discectomy in patients with lumbar disc herniation.

Methodology: This was a prospective study conducted in the department of orthopedics period of 24 months on 60 patients scheduled for microlumbar discectomy for lumbar disc herniation. All patients first underwent conservative for the minimum period of three weeks, after which they were counseled for operative option. Those patients were included who had an unremitting sciatica, with or without back pain, and/or a neurological deficit that correlated with appropriate level and side of neural compression revealed on CT or MR imaging. We did not exclude patients who presented with other spinal degenerative conditions such as stenosis or arthritis with herniated disc because their symptoms were suggestive of the herniated disc. Patients with associated bony canal stenosis and spondylolisthesis were excluded. As with all surgical procedures, informed consent, demographic details, and clinical history were obtained and an explanation of risks, alternatives, and benefits was given.

Results: Out of 60 patients, majority of the patients were males (66.7%) and 33.3% were females. Average age of the patients was 43.75 years (21-68 years). All surgeries were single level microdiscectomy including L3-L4 (10%), L4-L5 (60%), and L5-S1 (30%). All the cases of L4-L5 and L3-L4 discectomy required fenestration of L4 and L3 lamina respectively while only 2 cases of L5-S1 required fenestration of the L5 lamina for the proper exposure of the disc space. Operative time on the average was 79 minutes (range 50 to 150 minutes). 80% of the patients had a stay of less than 5 days in the hospital, while 20% of patients had a stay of more than 5 days in the hospital. Disc sequestration (30%) and disc exclusion (26.7%) were the most commonly seen types of prolapse followed by central disc bulge (20%), disc protrusion (13.3%), and lateral disc bulge (10%). On assessing the outcome in patients in terms of returning to activities of daily living and satisfaction with surgery, 86.7% and 76.7% had score less than 2 respectively, while only 13.3% and 23.3% patients had a score more than two respectively.

Conclusion: Lumbar discectomy with microscopes is very safe and effective means of treating disc herniation related sciatic pain. But conservative management should be done first. If there is no improvement, lumber microdiscectomy can act as a gold standard option.

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Keywords: Lumber, Discectomy, fenestrations, sequestrations.

Introduction

Herniated lumbar discs are a common source of discogenic low back pain, affecting an estimated 60%-80% of the population at some point in their lives [1]. When non-invasive methods fail to alleviate a patient's problems, surgery may be the next best option [2]. When it comes to intervertebral disc surgery, there are two primary options. First described by Mixter and Barr in 1934 [3], typical open discectomy entails partial laminectomy and disc removal.
Percutaneous endoscopic lumbar discectomy and microendoscopic discectomy (MED), which were pioneered in 1977 by Yasargil and Caspar [4, 5], fall within the category of minimally invasive discectomy. The first surgery for lumbar disc herniation was performed by Oppenheim and Kruse [1909]. Mixter and Barr performed laminectomy and removed the disc via the transdural approach. Love introduced the intraluminal-extradural approach for discectomy between 1937 and 1939. Caspar and Yasargil introduced microsurgery for lumbar disc disease in 1977 [6], which was later refined by Williams in 1978. In 1997, Foley and Smith introduced endoscopic discectomy, a technique that involved use of an operative endoscope with a tubular system. With time, the tubular retractors were modified to include a microscope instead of an endoscope. This alternative approach was introduced by Foley *et al.* in 2003, and termed as microendoscopic discectomy (MED).
Lumbar microdiscectomy has been associated with high rates of success and low postoperative morbidity. The procedure is generally effective for lumbar radicular pain and the success rates in the treatment of sciatic pain has been reported to range from 50-98% [7].
Over the past few years, minimally invasive techniques for posterior spinal surgery have evolved. Newer surgical techniques like digital fluoroscopy, image guidance and high resolution endoscopy have helped with the advancement [8].
Microendoscopic discectomy is one of the treatment modality for lumbar disc disease and it is an alternate for traditional microscopic lumbar discectomy. The difference between conventional open surgeries and minimally invasive surgeries is the mode of access. Minimally invasive surgeries should have comparable or better outcome than conventional surgeries, but the access pathway should be less traumatic and should preserve the normal anatomy as much as possible [9].

Materials and Methods

This was a prospective study conducted in the department of orthopedics for the period of 24 months on 60 patients scheduled for microlumbar discectomy for lumbar disc herniation. All patients first underwent conservative for the minimum period of three weeks, after which they were counselled for operative option.
Those patients were included who had an unremitting sciatica, with or without back pain, and/or a neurological deficit that correlated with appropriate level and side of neural compression revealed on CT or MR imaging. We did not exclude patients who presented with other spinal degenerative conditions such as stenosis or arthritis with herniated disc because their symptoms were suggestive of the herniated disc. Patients with associated bony canal stenosis and spondylolisthesis were excluded. As with all surgical procedures, informed consent, demographic details, and clinical history were obtained and an explanation of risks, alternatives, and benefits was given.
All patients underwent X-ray lumbo-sacral spine anterior–posterior and lateral view on their first visit to the hospital. When improvement in signs and symptoms were not satisfactory with conservative method in three weeks of time the Computed Tomography (CT)-myelography or Magnetic Resonance Imaging (MRI) of lumbo-sacral spine was done. MRI

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was preferred investigation of choice. The disc prolapse was classified according to the herniation of nucleus pulposus and its anatomic zone. Intra-operatively, level of prolapse and operative time was noted. We also noted the length of hospital stay and any complications experienced by the patient.

For assessing the patients, instruments like Visual Analog Scale (VAS) for pain at the end of first week and return to normal activity of daily living (ADL) and satisfaction with the result of surgery at the end of six months were used. The ability to perform normal activities and work were rated according to a four-part scale in which a grade of 1 was considered excellent (no limitations); 2, good (one or more limitations but most work can be accomplished); 3, fair (one or more limitations that interfere seriously with ADL or work); 4, incapacitated (unable to perform ADL or to work at all). Furthermore, a four-point scale was administered to ascertain a patients satisfaction with the results of surgery and were ranked as very satisfied; satisfied hut with minor reservations; partly satisfied but with major reservations; and not satisfied at all. VAS scores were grouped according to successes (scores 0-4) or failures (scores 5-10). For other two four-part scales, scores were counted as successes (1 or 2) or failures (3 or 4). The data was compiled and analyzed.

Results

Out of 60 patients, majority of the patients were males (66.7%) and 33.3% were females. Average age of the patients was 43.75 years (21-68 years). All surgeries were single level microdiscectomy including L3-L4 (10%), L4-L5 (60%), and L5-S1 (30%). All the cases of L4-L5 and L3-L4 discectomy required fenestration of L4 and L3 lamina respectively while only 2 cases of L5-S1 required fenestration of the L5 lamina for the proper exposure of the disc space.

Table 1: Demographic details, clinical, surgical details and complications of all the patients

Variables		**Number (%)**
Average age (range)		43.75 years (21 to 68 years)
Gender	Males	20 (66.7%)
	Females	10 (33.3%)
Level of prolapse	L3-L4	3 (10%)
	L4-L5	18 (60%)
	L5-S1	9 (30%)
Operative time	Less than 60 mins	4 (13.3%)
	60 to 90 mins	16 (53.3%)
	More than 90 mins	10 (33.4%)
Length of hospital stay	Less than 5 days	24 (80%)
	More than 5 days	6 (20%)
Classification of prolapse	Central disc bulge	6 (20%)
	Lateral disc bulge	3 (10%)
	Disc protrusion	4 (13.3%)
	Disc extrusion	8 (26.7%)
	Disc sequestration	9 (30%)
Complications	Dural tear	1 (3.3%)
	Wrong level of exposure	0 (0%)
	Superficial wound infection	1 (3.3%)

Operative time on the average was 79 minutes (range 50 to 150 minutes). 80% of the patients had a stay of less than 5 days in the hospital, while 20% of patients had a stay of more than 5 days in the hospital. Disc sequestration (30%) and disc exclusion (26.7%) were the most

commonly seen types of prolapse followed by central disc bulge (20%), disc protrusion (13.3%), and lateral disc bulge (10%).

Table 2: Pain assessment of patients preoperatively based in Visual Analogue Scale (VAS)

	Scale	Back pain	Leg pain
Preoperative	0-2	0	0
	3-4	6	0
	5-6	13	3
	7-8	10	23
	9-10	1	4
Postoperative	0-2	16	8
	3-4	12	20
	5-6	2	2
	7-8	0	0
	9-10	0	0

Table 3: Outcome assessment of the patients

Likert scale scores (1-4)	1 or 2	3 or 4
Return to Activities of Daily Living	26 (86.7%)	4 (13.3%)
Satisfaction with surgery	23 (76.7%)	7 (23.3%)

On assessing the outcome in patients in terms of returning to activities of daily living and satisfaction with surgery, 86.7% and 76.7% had score less than 2 respectively, while only 13.3% and 23.3% patients had a score more than two respectively.

Discussion

Prior to the introduction of minimally invasive techniques, open discectomy was considered as the gold standard treatment of herniation. The various disadvantages of this technique were destruction of the normal anatomy of the posterior elements of the spine, segmental instability, and long-term distress [10, 11]. To avoid these complications of open surgeries, minimally invasive spinal surgeries were introduced and gradually new instruments to aid this procedure were developed [12].

The mean hospital stay of patients in our hospital was 4.5 days. This was observed to be much shorter than the duration of stay for open discectomies in our hospital. This was also observed in a meta-analysis by Chang *et al*. [1]. The shorter period of postoperative stay may be attributed to the absence of epidural fibrosis and tethering of the nerve roots that commonly ensue after open techniques. The epidural venous systems are not disturbed during MED. This helps to prevent venous stasis and chronic nerve root edema. Furthermore, there is minimal trauma on the paraspinal muscles and the ligamentous structures, which facilitates early recovery. Other factors which contribute to early recovery are lesser traumatic nerve root dissection, lesser bone removal, and smaller skin incisions [13, 14].

The various complications documented in literature are wound infection, cerebrospinal fluid (CSF) leakage due to intraoperative dural tear, nerve injury, vascular injury and bleeding, and postoperative epidural hematoma. Many studies have mentioned a disadvantage of potential nerve root injury and recurrence because of limited exposure [15]. The recurrence rate is expected to be higher than conventional open discectomy since less disc material is retrieved.

In our study, there was a case of minor dural tear for which flowing was done except that patient was kept lying down for 5 days. Such tears should be promptly recognized and immediately repaired. Once repair is completed, the integrity of the repair should be tested with Valsalva maneuver. Other complications mentioned in the literature are haemorrhage

requiring perfusion, thrombophlebitis, cauda equine syndrome, superficial wound infection, nerve root injury, disc space infection and pulmonary infection [16].
As the study progressed, the operating time, dural tears, and bleeding decreased. This was due to improvement in knowledge and skill with increasing number of cases. Other variables that influence the learning curve are familiarity with the instruments, apprehension of the three-dimensional orientation, and better knowledge of the anatomical structures [2].

Conclusion

Lumbar discectomy with microscopes is very safe and effective means of treating disc herniation related sciatic pain. But conservative management should be done first. If there is no improvement, lumber microdiscectomy can act as a gold standard option.

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