

Which is Better in Laborers? A Comparison Between Open and Micro Endoscopic Discectomy

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Abstract

Introduction: None of the studies compared the results of open lumbar discectomy (OLD) and microendoscopic discectomy (MED) surgeries in laborers. The aim of this study was to compare the clinical and functional impact of OLD versus MED surgery in laborers to find out which is better.

Materials and Methods: This retrospective study was performed in 91 laborers (54 males and 37 females) who underwent OLD (n = 41) versus MED (n = 50) for the single- or double-level lumbar disc herniation (LDH). All patients were operated at a single institute after a failure of conservative trial for 6 weeks. Patients with associated severe disc degeneration, stenosis, instabilities, or other pathologies were excluded from the study. The clinical results were evaluated with Oswestry Disability Index (ODI), visual analog score (VAS), and duration of return back to work.

Results: The average age of the study group was 39.8 ± 12.1 years. Average follow-up was 50.2 ± 13.9 months. The entire study group comprised manual labor work such as farming or loading work with an average income of US \$53.6 ± 14.6 (approximately INR 4000) per month. The patients belonged to low socioeconomic status as per modified Kuppusswamy scale. The post-operative VAS scores were significantly reduced in both MED (7.6–2.0) and open discectomies (7.2–2.1). Improvement ODI scores also showed similar trends for MED (57.3–20.6) and for open discectomies (55.1–20.1). Average duration to return to work was significantly less in the MED group in comparison to the OLD group (18.0 vs. 25.5 days). There were total 4 (4.4%) complications perioperatively. There were one superficial wound infection in the OLD and one dural tear in the MED group. Both were managed conservatively. There was one patient from each group having recurrent disc herniation that was managed conservatively. There were one patient from the MED and two patients from the OLD group who could not return to their previous work or had to modify their work due to back pain.

Conclusion: Although clinical improvement after discectomy surgery in laborers is similar, MED is a promising alternative to OLD in laborers with respect to return to work earlier. Such studies may further throw light in differential management of laborer population with MEDs versus OLD.

Keywords: Lumbar disc herniation; Laborers; Discectomy technique; Early return to work.

Introduction

Low back pain is an emerging world public health issue plaguing the population in general and a burden on the health-care industry. According to the literature, lifetime prevalence for low back pain is 84% and for chronic low back pain is 23%,

with 11–12% of the population being disabled due to chronic low back pain [1]. Lumbar disc herniation (LDH) is one of the most common spinal degenerative disc disorders associated with low back pain and radiculopathy [2, 3]. Some of the studies have reported the association of lumbar disc disease with heavy manual labor such as dockworkers who are involved in lifting heavy loads [4]. Mechanical disorders of the lower back are thought to result from a combination of constitutional weakness and physical stress to the spine. Lumbar discectomy for lumbar disc disease is about 70–90% successful in disc prolapse [5, 6]. Traditional open surgery or microdiscectomy, which is known as open lumbar discectomy (OLD), is still the gold standard for surgical intervention for LDH. Lumbar microendoscopic discectomy (MED) is also a

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Table 1: Number of patients in each group with single- or double-level disc herniation

Group	OLD group	MED group	Total
No. of patients	41	50	91
single-level disc	31	40	71
Double-level disc	10	10	20
Average age (years)	37.7±7.8	41.5±14.5	39.8±12.1
Male/female	22/19	32/18	54/37
Average FU (months)	50.3±14.4	50.2±13.7	50.2±13.9

Table 2: Pre-operative and post-operative VAS and ODI scores in both groups

Group	OLD group	MED group	Total
Pre-operative VAS	7.2±1.1	7.6±1.4	7.4±1.3
Post-operative VAS	2.1±0.9	2.0±0.8	2.1±0.8
Pre-operative ODI	55.1±9.7	57.3±8.6	56.3±9.1
Post-operative ODI	21.0±8.9	20.6±8.8	20.8±8.8

well-established procedure with low surgical morbidity and similar success rates [7]. The standard surgical treatment of LDH has been open discectomy but there has been a trend toward minimally invasive procedures. MED for the LDH is a well-reported surgical technique, which is increasingly popular in the past few years [5, 6]. It is becoming an effective alternative to standard OLD as almost all types of disc herniation can be treated with MED [7].

There are different post-operative protocols followed up worldwide after the discectomy procedures. Based on the recommendation of the North American Spine Society (NASS), most people with jobs that are not physically challenging can return to work in 2–4 weeks or less. According to Rompe et al., what is more important as a prognostic criteria for patient selection for discectomy are the strongest possible objective success parameter, that is, return to work, after a surgery in their series with 9-year follow-up [8]. Yadav et al. reported that MED entailed shorter hospital stay, less morbidity, earlier return to work, less blood loss, and shorter operation time comparing to OLD [5]. However, which operative technique facilitates encouraging results with early return to work in manual workers or laborers who are involved in daily work such as farming or manual labor is not reported in the literature. As these people in developing countries have to rely on their daily earnings for their daily living, and therefore, it is important for them to regain their functionality as soon as possible. Primary aim of our study was to compare operative outcomes between two techniques OLD and MED in patients with LDH and involved in labor work for their daily living. Our purpose was to find out which technique should be implemented in such patients for LDH that helps them earning and returning to productivity.

Materials and Methods

This retrospective analytical study was conducted in patients who were operated for LDH between January 2014 and December 2017. There were 91 unskilled laborers comprising 54 men and 37 women belonging to low socioeconomic status according to the modified Kuppaswamy scale included in the study [9]. The average age of the study population was 39.8 ± 12.1 years (range, 21–78 years). Operating surgeon randomly

had selected patients for OLD (n = 40) or MED (n = 45) in a government institute (Table 1). All patients were operated by a single surgeon and followed in outpatient clinic regularly postoperatively for a minimum period of 2 years. There were 71 and 20 patients with single-level and double-level disc herniation, respectively (Table 1). Patients who had persistent radicular symptoms or worsening of symptoms after 6 weeks of conservative treatment, along with straight leg raising (SLR) and crossed straight leg raising tests (CSLR) positive with the absence of corresponding neurological deficits, were included in the study. Patients with severe disc degeneration, canal stenosis, spinal instabilities, cauda equina syndrome, or other pathologies were excluded from the study. All patients were selected for surgery from the outpatient department (OPD) after failure of conservative trial. Patients who were admitted and operated through the emergency room (ER) with the same problem were not included in the study.

All patients were followed preoperatively and postoperatively at an interval of 6 weeks, 3 months, 6 months, 1 year, and 2 years after surgery. The clinical results were analyzed and compared preoperatively and postoperatively using the visual analog score (VAS) and Oswestry Disability Index (ODI) questionnaire which was duly noted down by the patients with assistance from resident doctors preoperatively and at 6 weeks and at the final follow-up postoperatively. MacNab's criteria postoperatively, intraoperative estimated blood loss (EBL), operation time, hospital stay, and duration of return back to work were also measured and compared between the OLD and MED groups. Paired and unpaired t-tests were used to find out statistically significant differences (SPSS, version 12, Chicago, Illinois); and P < 0.05 kept to be significance value.

Results

Average follow-up was 50.2 ± 13.9 months. In both groups, there was significant improvement in pre-operative VAS score of 7.2 ± 1.1 to post-operative score of 2.1 ± 0.9 in the OLD group (P < 0.0001, paired t-test) and pre-operative 7.6 ± 1.4 to post-operative 2.0 ± 0.8 in the MED group (P < 0.001, paired t-test) (Table 2). Similarly, the improvement in the ODI scores was significant from pre-operative 55.1 ± 9.7 to post-operative 21.0 ± 8.9 in the OLD group (P < 0.001, paired t-test) and pre-

Table 3: MacNab's criteria in both groups

MacNab's criteria	Excellent	Good	Fair	Poor
OLD% (n)	63.4 (26)	29.3 (12)	4.9 (2)	2.4 (1)
MED% (n)	68 (34)	22 (11)	8 (4)	2 (1)

Table 4: Average operation time, blood loss, hospital stay, and return to work in both groups

Group	OLD group	MED group	Total
Operation time (min)	62.4±18.7	64.0±19.5	63.3±19.0
Estimated blood loss (mL)	66.1±24.1	32.1±12.5	47.4±25.1
Hospital stay (days)	5.0±0.9	2.5±0.6	3.6±1.4
Return to work (days)	25.5±7.3	18.0±4.0	21.4±6.8

operative 57.3 ± 8.6 to post-operative 20.6 ± 8.8 in the MED group ($P < 0.0001$, paired t-test) (Table 2). MacNab's criteria postoperatively for the OLD and MED groups were significant showing more than 90% of patients had excellent and good outcome, which was similar and comparable in both groups (Table 3). Hospital stay was significantly ($P < 0.05$) higher in the OLD group than the MED group (5.0 ± 0.9 vs. 2.5 ± 0.6 days; $P < 0.05$, Fisher's test). Similarly, estimated blood loss during operation was also higher in the OLD group than the MED group (66.1 ± 24.1 mL vs. 32.1 ± 12.5 mL, $P < 0.05$, Fisher's test). Average operation time, however, was similar in both groups (62.4 ± 18.7 min vs. 64.0 ± 19.5 min, $P > 0.05$, Fisher's test). However, there was significantly higher period for returning to work in the OLD group than the MED group (25.5 ± 7.3 days vs. 18.0 ± 4.0 days, $P < 0.05$, Fisher's test) from the day of discharge from the hospital (Table 4). If we add further longer hospital stay in the OLD group, this gap between two groups is even wider.

There were total 4 patients (4.4%) with complications in perioperative period. There was one superficial wound infection in the OLD group and one dural tear in the MED group. Both were managed conservatively. Patient with superficial wound infection had *Staphylococcus aureus* growth on culture, which was treated with 1 week of intravenous and 2 weeks of oral antibiotics with local dressing without any further sequel. One patient with intraoperative dural leak from the MED group was treated conservatively with packing of leak with local fat graft and gelfoam. Patient was given bed rest for 5 days before mobilization. There was one patient from each group having recurrent disc herniation that was managed conservatively with anti-inflammatory medicines and nerve root block. Both patients presented with recurrent disc herniation at least 3 months after the index surgery. Symptoms were relieved with conservative treatment in both patients within 6 weeks period. There were one patient from MED and two patients from the OLD group who could not return to their previous work or had to modify their work due to back pain.

Discussion

LDH is the most common cause of low back and leg pain. It affects significantly the quality of the life [10]. If the patients who have serious or typical symptoms cannot be healed more than 6–8 weeks by conservative treatment, operation should be indicated as the only one effective method [11]. Two main surgical methods are used commonly: OLD and MED. OLD has been proved to be effective and also was widely used. As a new minimally invasive operative method, MED was initially introduced by Smith and Foley in 1997 [12]. The advantages of MED over OLD are small incision, better cosmetic appearance, early ambulation, less post-operative pain, less intraoperative blood loss, shorter hospital stay, and shorter time to return to work [13, 14, 15]. MED is less traumatizing to the skin and the paraspinal muscles, resulting in reduced fibrosis of the canal [16]. These all advantages in MED indirectly lead to early return to work and thereby reducing the financial loss. However, it is really important in laborers as they need to earn daily living for their family and therefore even a single day of jobless would count significantly to their living. We have included 91 individuals who were involved in manual labor work or farm working for their daily earning and their financial status was in lower socioeconomic class by modified Kuppaswamy classification [9]. Our study focused on this issue that was not reported before.

The ODI and VAS, preoperatively and postoperatively in both the study groups, were significant and similar, these results of our study were similar to other studies comparing OLD and MED. Improvements in ODI postoperatively in both MED and OLD groups were similar when compared across studies in India [17, 18]. However, Bock et al. also reported that the postsurgical analgesic consumption is significantly less if a tubular retractor is inserted through a transmuscular approach [19]. The reason behind is that the open surgery includes extensive retraction and dissection of paraspinal muscles, longer operative time, longer incisions, and bone resection [20]. Garg et al. in their prospective randomized trial comparison between OLD and MED in 112 patients mentioned that both methods are equally effective in relieving radicular pain and there is similar improvement in ODI as well as complications [17]. However, MED entailed shorter hospital stay, less morbidity, and earlier return to work as an advantage over OLD. Kulkarni et al. reported their outcome in 188 consecutive patients who were operated with tubular retractor system (MED) for LDH [6]. Their mean operation time was 50 min/per level and average blood loss was 30 mL. Improvement in VAS and ODI score postoperatively was significant. They have encouraged their patients to return to their work in 3 weeks. Our results are quite similar to the published reports suggesting similar clinical outcome in both OLD and MED. There was a significant improvement in VAS

and ODI score in both groups in our series of 91 patients which proves that MED is equally effective as OLD in clinical results. Operation time in our series was 62.4 ± 18.7 min in the OLD group and 64.0 ± 19.5 min in the MED group, which were similar. We had 10 patients in each group with double-level LDH that resulted slightly higher average operation time compared with Kulkarni et al. [6]. However, there was significantly less hospital stay (5.0 ± 0.9 vs. 2.5 ± 0.6 days), less blood loss (66.1 ± 24.1 mL vs. 32.1 ± 12.5 mL), and earlier return to work after the discharge (25.5 ± 7.3 days vs. 18.0 ± 4.0 days) in the MED group proves its benefits over OLD.

Bookwalter et al. reported that 40% of their patients returned to work in fewer than 5 weeks proving its cost-effectiveness [21]. Caspar et al. reported a mean return-to-work time of 18.6 weeks [22] and Perez-Cruet et al. reported a mean return-to-work time of 17.6 days [23]. Our protocol was encouraging patients to resume work within 2 weeks following discharge from the hospital. Fujii et al. reported an interesting study in six health-care professionals who were operated for percutaneous endoscopic discectomy for LDH [24]. Postoperatively, five out of the six physician patients returned the original job within a week because they had clinical duties. The shortest duration to return to work was reported by a 63-year-old orthopedic surgeon resumed working in his clinic 2 days after the surgery because he had scheduled clinical duty. The longest duration to return to work occurred in general medicine resident who took almost 2 weeks for the sick leave because he did not have clinical duties. The mean duration for the returning to work was 5.8 days after the surgery. At final follow-up ranging from 6 to 30 months, all physician patients were working without any residual pain. In the hands of the authors, the full endoscopic transforaminal decompression surgery is the preferred surgical option and allowed early return to work. These all reports again emphasize that although MED has faster rate of returning to daily activity or work, it again depends on the need of urgency

to work as well. Fujii et al. noticed same thing as one orthopedic surgeon returned to work due to their work and other physician returned to work after 2 weeks due to no pending work [24]. Similarly, if we discuss about laborers who were the primary study population in our series from a developing nation did not have any social security or health-care compensation, and their family was dependent on their daily earning for their living. This made them similar to pending work in case of a surgeon suggested by Fujii et al. in their report [24]. Therefore, we believe even a week earlier to return to their previous work in the MED group of patients would mean a lot for these laborers as they start earning earlier than the OLD group of patients. Such reports have not been published earlier, and therefore, we believe that our experience would guide further regarding choice of treatment option in laborers when they have to undergo for operation for LDH.

There may be a few limitations in this study. First is about the selection of patients, which were as per surgeon's preference in outpatient clinic. Therefore, there might be some selection bias while selecting patients for OLD or MED. Second, we have found less complications, especially regarding recurrent disc herniation in the series. However, we believe that our patients were from labor group and unless they had severe symptomatic disc herniation, they tend to ignore it. The patients who had reported recurrent disc were having significant symptoms, which were luckily managed conservatively.

Conclusion

We would like to suggest although clinical improvement after discectomy surgery in laborers is similar between the OLD and MED groups, MED proved as an effective alternative to OLD in laborers with respect to return to work earlier. Such studies may further throw light in differential management of laborer population with MED versus OLD.

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