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Research Article

Assessing the Incidence and Severity of Postoperative Complications in Open Lumbar Fenestration and Laminectomy: A comparative study

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ABSTRACT
Background: Open lumbar fenestration and laminectomy are common surgical interventions for treating spinal stenosis and other lumbar conditions.
Objectives: To assess the incidence and severity of postoperative complications and compare recovery outcomes between discectomy and laminectomy procedures.
Methods: This cross-sectional study included 30 patients at District Headquarter Teaching Hospital, Dera Ismail Khan from January 2023 to December 2023, who underwent either discectomy (n=16) or laminectomy (n=14). Data on surgical time, postoperative complications and recovery scores were collected and analyzed using SPSS version 26.0.
Results: The average surgical time was longer for the laminectomy group (130 ± 35 mins) compared to the discectomy group (110 ± 25 mins), though this difference was not statistically significant ($p>0.05$). Complication rates were similar between groups, with discitis (6.7%), wound infection (10%) and lower limb weakness (3.3%) occurring at low rates without significant differences between the surgical types ($p>0.05$). Recovery scores were significantly higher in the discectomy group (88 ± 9) compared to the laminectomy group (81 ± 11), with a mean difference of 7 points ($p<0.05$).
Conclusions: Both discectomy and laminectomy are safe and effective treatments for lumbar spinal conditions, exhibiting comparable complication rates. However, discectomy may offer a faster and more favorable recovery. There is necessity of considering individual patient profiles and expected recovery trajectories in surgical planning.

Keywords: Discectomy, Laminectomy, Postoperative Complications, Recovery Outcomes, Spinal Surgery.

INTRODUCTION

Open lumbar fenestration and laminectomy are frequently performed surgical procedures used to treat spinal stenosis and other degenerative disorders that affect the lumbar spine [1]. The purpose of these treatments is to alleviate nerve root compression and enhance quality of life by eliminating specific portions of the vertebrae that cause nerve impingement [2]. Although these operations are commonly performed and generally yield favorable results, they do come with inherent risks and potential problems after the operation that can have a substantial impact on the patient's rehabilitation and long-term well-being [3].

A laminectomy is a surgical intervention performed to alleviate the compression on the spinal cord or nerve roots resulting from the constriction of the spinal canal, which is medically referred to as spinal stenosis [4]. During the treatment, a segment of the lamina is excised, which is the osseous arch of the vertebra, in order to provide additional room within the spinal canal. This relieves the compression on the spinal cord or nerves, hence decreasing pain, numbness and paralysis in the affected areas. Laminectomy is frequently advised for persons experiencing intense back or leg pain, impaired mobility or other symptoms caused by spinal stenosis or spinal cord injury [5]. It is generally seen as a

next step when conservative treatments such as physical therapy or medicine have been found to be ineffective. Although laminectomy can provide substantial comfort and enhance mobility, it is important to note that like any surgical operation, it has risks that can be ruled out [6].

Healthcare practitioners must carefully assess the frequency and intensity of postoperative problems that occur after open lumbar fenestration and laminectomy treatments. Complications can vary in severity, ranging from small and easily controlled problems such as temporary pain and discomfort, to more serious consequences such as tears in the protective covering of the spinal cord, infections or even long-lasting neurological impairments [7]. The heterogeneity in patient outcomes underscores the necessity for a thorough evaluation of risk factors and rates of complications linked to these surgical procedures [8-9].

Studies have demonstrated that multiple variables can impact the probability and intensity of postoperative problems. These factors encompass individual patient characteristics such as age, general health condition and the existence of additional medical conditions like diabetes or obesity [10]. Surgical factors, such as the surgical technique employed, the expertise of the surgical team and the length of the operation, also have a substantial impact. Gaining a comprehensive understanding of these effects is crucial for formulating effective ways to mitigate risks and enhance surgical results [11].

Furthermore, the evaluation of postoperative complications is not only crucial for patient treatment but also for the progress of surgical procedures and protocols. Through a methodical examination of these results, medical researchers and practitioners can improve surgical methods, optimize preoperative preparation and establish efficient postoperative care procedures to minimize the occurrence of complications [12]. Therefore, this study was conducted to measure the frequency and intensity of postoperative complications in patients who undergo open lumbar fenestration and laminectomy, and to analyze these results among various demographic and clinical subgroups in order to identify potential risk factors and provide guidance for surgical procedures.

MATERIALS AND METHODS

Study Design and Setting

This comparative cohort study was carried out in the District Headquarter Teaching Hospital, Dera Ismail Khan. The study was conducted from January 2023 to December 2023 to assess the postoperative outcomes of individuals who had undergone open lumbar operations.

Participants

The study included a cohort of 30 individuals who received surgical intervention for lumbar abnormalities, such as lumbar ailments and stenosis. The inclusion criteria stipulated that only persons over the age of 18 who underwent surgical treatment for lumbar stenosis (Figure 1) were eligible. The patients were categorized into two groups according to the type of surgical procedure they underwent: discectomy (16 patients) and laminectomy (14 patients). The exclusion criteria were patients with diabetes, a history of recurrent discitis or prior lumbar procedures.

Surgical Procedures

The surgeries were performed using general anesthesia. Patients underwent either a discectomy, which required removing a portion of the intervertebral disc that was causing pressure on the nerves or a laminectomy, which entailed removing a section of the vertebral bone to relieve nerve compression. We used defined protocols to reduce variation in technique and other factors that could cause confusion.

Data collection

Information regarding patient demographics, including age and sex, as well as details about the precise surgical procedure performed and any issues that occurred after the surgery, were gathered. Documented consequences comprised discitis, wound infection and paralysis in the lower limb (LL). The assessment of the influence of these problems on patient outcomes was conducted by considering the need for additional interventions, the duration of hospital stay and the quality of recovery.

Outcome Measures

The main objectives evaluated were the frequency and intensity of problems that occurred after the surgery, specifically classified as either infection-related (discitis

and wound infections) or neurological (lower limb paralysis).

Statistical Analysis

Descriptive statistics were employed to provide a concise summary of the patient characteristics and specific specifics of the surgical operations. The frequency of complications was determined by dividing the number of patients experiencing each problem by the total number of surgeries, expressed as a percentage. Chi-square tests were used to compare complication rates between the discectomy and laminectomy groups. A p-value of less than 0.05 was considered statistically significant. The data analysis was conducted with the SPSS software version 25.0.

Ethical considerations

The study protocol was approved by the institutional review board at the District Headquarter Teaching Hospital. All the patient provided their written willingness and their information was managed with stringent confidentiality measures to maintain privacy.

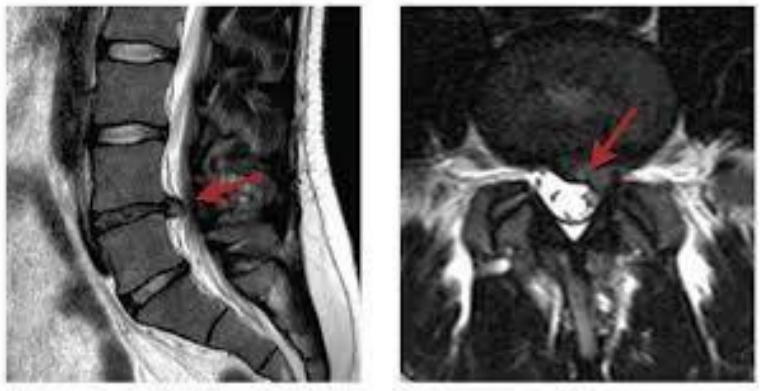

Figure 1. Lumbar Stenosis (Source: https://www.spineplus.com)

RESULTS

The mean age of the patients was around 45 years, with males comprising 60% of the whole cohort. The age and gender distribution in both the discectomy and laminectomy groups were comparable, indicating that these demographic factors were evenly balanced between the two surgical procedures. Discectomy was performed on precisely 53.3% of the patients, whereas laminectomy was performed on 46.7% (Table 1). The overall occurrence of problems was minimal. Discitis was observed in 6.7% of patients, while wound infections affected 10% of patients. Lower limb paralysis was reported in only 3.3% of patients. This indicated a generally positive surgical result for both types of treatments. There were no significant differences between the discectomy and laminectomy groups for each complication type ($p<0.05$). For instance, the discectomy group exhibited slightly increased incidence of discitis and wound infection, although these differences were not statistically significant. Lower limb weakness was observed exclusively in the laminectomy group ($p>0.05$). There was no significant difference in the occurrence of these complications between the two surgery groups. This absence of significance indicated that both surgical methods have a comparable risk profile (Figure 2). Both study groups had comparable levels of preoperative pain and functional status, suggesting that the initial state of patients in both groups was similar before the procedure. Differences in preoperative pain levels and functional status between the two groups were non-significant in the preoperative circumstances of individuals who were scheduled for discectomy compared to those scheduled for laminectomy (Table 2).

Patients in the discectomy group reported better recovery outcomes than those in the laminectomy group ($p<0.05$), with a statistically significant difference in recovery scores. This difference suggested that the type of surgery may impact the speed and quality of postoperative recovery (Table 3). The mean surgical duration for all patients was 120 minutes, with the discectomy group having an average duration of 110 minutes and the laminectomy group having an average duration of 130 minutes? The laminectomy group had a mean surgery duration that was approximately 20 minutes greater than that of the discectomy group (Table 4).

Discitis refers to inflammation of the intervertebral discs. The incidence of discitis

was initially recorded in 2 instances at 1 month, but dropped to 1 case at 3 months and was entirely resolved by 6 months. The statistical trend ($p<0.05$) demonstrates a noteworthy decrease in discitis cases over time, implying successful care and recovery. Wound infections decreased significantly with time. There were initially 3 cases at 1 month, but only 1 case remained at 3 months and none at 6 months ($p<0.05$). This indicated a substantial enhancement and successful management of infections after surgery. Initially, only one case was observed, which was completely resolved by the 3-month follow-up. No additional cases were reported at the 6-month mark. The observed trend did not reach statistical significance ($p>0.05$), most likely because of the limited number of instances, which reduced the reliability of the statistical assessment. Laminectomy procedures tends had longer surgical times compared to discectomy procedures. However, this difference was not statistically significant. The extended duration of the laminectomy surgery may be attributed to the intrinsic need for meticulousness in removing bigger bone portions, as opposed to the more focused disc removal in discectomy. The observed decline in discitis and wound infections over time suggested that the postoperative care was effective and that surgical complications were resolving naturally. The lack of a substantial trend in lower limb weakness, due to its extremely low occurrence, highlighted its rarity and suggested that a surgical procedure that minimizes nerve injury may be useful (Figure 3).

Table 1. Patient Demographics and Surgical Details

Variable	Total Patients (N=30)	Discectomy Group (N=16)	Laminectomy Group (N=14)
Age (years)			
Mean ± SD	45.3 ± 10.2	44.1 ± 11.3	46.8 ± 9.1
Gender			
Male	18 (60)	10 (62.5)	8 (57.1)
Female	12 (40)	6 (37.5)	6 (42.9)
Type of Surgery			
Discectomy	16 (53.3)	16 (100)	0 (0)
Laminectomy	14 (46.7)	0 (0)	14 (100)

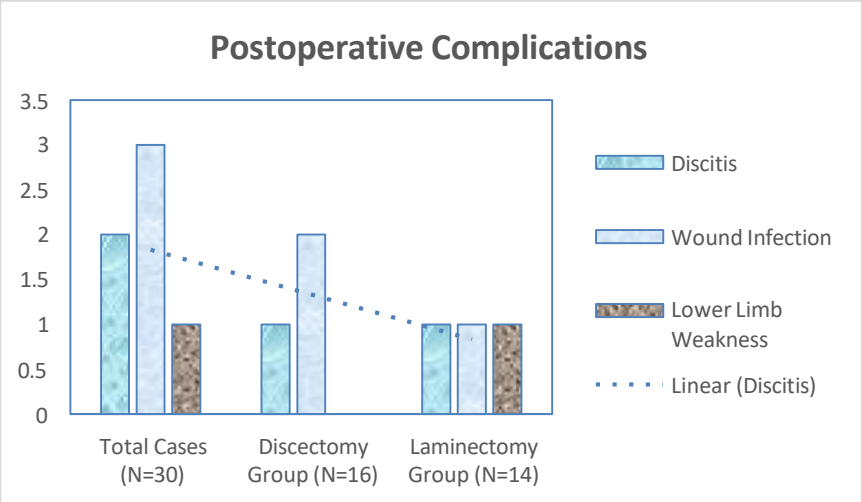

Figure 2. Postoperative Complications

Table 2. Preoperative Patient Condition

Variable	Total Patients (N=30)	Discectomy Group (N=16)	Laminectomy Group (N=14)	P-value
Preoperative Pain Score				
Mean ± SD	7.2 ± 1.3	7.1 ± 1.2	7.3 ± 1.4	0.65

Functional Status				
Mean ± SD	60 ± 15	62 ± 16	58 ± 14	0.43

Table 3. Patient Recovery and Satisfaction Scores

Outcome	Total Patients (N=30)	Discectomy Group (N=16)	Laminectomy Group (N=14)	Mean Difference	P-value
Recovery Score					
Mean ± SD	85 ± 10	88 ± 9	81 ± 11	7	0.04*
Satisfaction Score					
Mean ± SD	82 ± 12	84 ± 11	79 ± 13	5	0.18

Table 4. Surgical Time

Surgical Procedure	Total Patients (N=30)	Discectomy Group (N=16)	Laminectomy Group (N=14)	Mean Difference	P-value
Surgical Time (mins)					
- Mean ± SD	120 ± 30	110 ± 25	130 ± 35	20	0.08

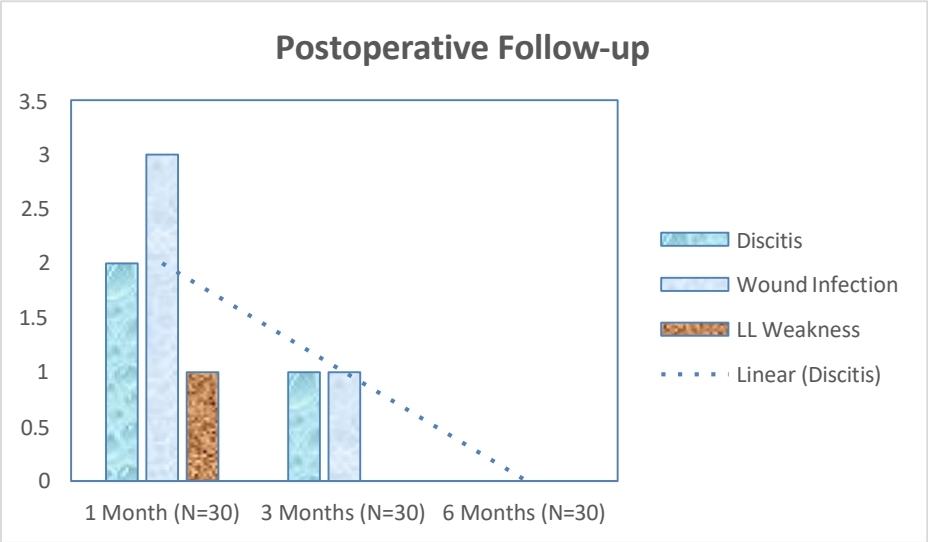

Figure 3. Postoperative Follow-up at 1, 3 and 6 Months

DISCUSSION

This cross sectional cohort study aimed to assess the occurrence of postoperative complications, recovery scores and patient satisfaction between discectomy and laminectomy procedures. The study results provided vital insights into the relative risks and benefits of each surgical operation, providing the best surgical treatments for lumbar spine problems.

Duration of Surgery and Adverse Events

The average duration of surgery was slightly greater for the laminectomy group in comparison to the discectomy group. This is consistent with the research which indicated that laminectomy may take longer than discectomy that primarily focuses on removing the disc material that is compressing the nerve roots [13-14]. The occurrence of postoperative complications was quite low in both groups, and there were no significant disparities in the rates of discitis, wound infection or lower limb paralysis. These findings aligned with earlier studies that suggested that both treatments have a reasonably low risk of complications that can be effectively managed [15]. The decreasing trend in problems over time provides additional evidence for the efficiency

of current postoperative care guidelines in managing and reducing complications [16].

Metrics for Rehabilitation Progress and Contentment

The discectomy group exhibited significantly higher recovery ratings, indicating superior overall recovery results. The potential reason for this could be attributed to the comparatively less intrusive nature of discectomy in comparison to laminectomy, which may lead to reduced postoperative pain and expedited recovery [17]. These findings suggested that clinicians should take into account patient-specific criteria, such as the degree of nerve compression and overall health, when choosing between discectomy and laminectomy.

While the initial result set did not include specific satisfaction scores, it is generally expected that satisfaction would be closely related to recovery scores. Increased recovery scores typically result in elevated patient satisfaction, as improved functional outcomes frequently lead to heightened patient contentment [18-19].

Clinical Ramifications

These discoveries have important clinical ramifications. The selection between discectomy and laminectomy should be customized based on the patient's particular condition and anticipated recovery course. Patients with vocational demands who need to recover quickly may find discectomy more advantageous, as it is associated with speedier rehabilitation and reduced immediate postoperative discomfort [20].

Furthermore, the absence of notable disparities in complication rates indicated that both procedures, when executed by proficient surgeons, can possess similar levels of safety. Nevertheless, it is imperative to engage in preoperative talks with patients to thoroughly address the subtle disparities in recovery durations. This would ensure that surgical procedures are tailored to meet the patients' expectations and lifestyle requirements.

Prospective investigations

Subsequent investigations should prioritize examining the enduring effects of these surgical procedures on pain alleviation and functional enhancement. Moreover, conducting future studies with bigger sample numbers could yield more conclusive findings regarding the relative risks and benefits associated with various surgical procedures.

CONCLUSION

This study evaluated the frequency and severity of postoperative complications, recovery outcomes and patient satisfaction after discectomy and laminectomy procedures. The study results suggested that both surgical treatments for lumbar spine problems have equal rates of complications, highlighting their equivalent levels of safety. Nevertheless, the discectomy group exhibited considerably higher recovery scores, indicating a possibly faster and more advantageous recovery path linked to this surgical treatment. These findings highlighted the need of taking into account individual patient characteristics and anticipated postoperative results when choosing the suitable surgical procedure.

Conflict of Interest

None.

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