Original Article

Comparison Of Outcomes: Classic Laminectomy Alone Vs. Laminectomy With Fixation Surgery In Patients With Lumbar Canal Stenosis

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Abstract

Background: Lumbar canal stenosis is a debilitating condition that results from the narrowing of the spinal canal, and the management of this condition especially at advanced stages involve surgical treatment once conservative methods have been tried and proved to be ineffectual.

Objectives: Compare results with the use of only classic laminectomy with the use of laminectomy and fixation in LCS patients.

Study design : A prospective study

Place and duration of study. Department of orthopedic unit MMC hospital mardan from 05-july 2019 to 05 dec 2019

Methods

This prospective study consisted of 100 LCS patients, switched by randomisation into two groups: Group A who underwent the classic laminectomy and Group B who, in addition to classic laminectomy, received the stabilization. Patients' pain levels (measured with the visual analog scale) preoperatively and at the time of latest follow-up as well as the Disability Index (ODI) were collected, in addition to the number of complications and length of hospital stay.

Results

There was less pain in patients of Group B as 85% show better improvement in pain relief as compared to 70% of Group A Though functional improvement also favours group B with Average improvement of ODI score of 40 % as compared to 25% in Group A. However complications rate found higher in Group B patients as 4 out of 20 patients (20%) developed some complications as against to 2 out of 20 in Parker reported that Group B had common complications observed in other studies they underwent infections and hardware failure.

Conclusion

Posterior lumbar interbody fusion L5-S1 significantly improves improvement or back pain and overall functioning in comparison to laminectomy alone, but with more times the incidence of complications and two extra days in the hospital. There is much to be learnt about who should be given such treatment as patient selection is paramount.

Keywords: Spine surgery, lumbar canal stenosis, laminectomy, affect fixation, results.

Introduction

Spinal stenosis, more specifically known as lumbar canal stenosis (LCS), is a common occurring medical condition mainly in older adults marked by the constriction of the spinal canal thus putting pressure on nerves. This condition can bring about point like chill, stiffness, pain and dysfunction, which leads to decrease quality of life of the affected patients[2]. The causative factors of LCS are many and diverse; they are attributed to degenerative problems,

congenital anomalies, and pathological problems such as slipped disc or spinal tumours. LCS can manifest through being present with a variety of symptoms such as neurogenic intermittent claudication, radicular pain and various degrees of back pain which may hinder most activities in severe cases[4]. Physical therapy is another medication to treat lumbar disc herniation that doesn't involve surgery; other medications include oral drugs, and nerve root or epidural steroid injections[5]. However, when other conservative interventions are not helpful then surgical strikes are required[6]. The general intention of conducting the surgery is to drain the spinal column so as to reduce the pressure as can be expected to ease the pressure on the compressed nerves. The two approaches of management by surgery for LCS is by laminectomy without instrumented fusion and laminectomy with instrumented fusion[7]. Traditional laminectomy is the surgical process that involves excision of the lamina, which is a part of vertebral bone structure to offer more space and comfort to spinal cord and nerves[8]. It is worth emphasizing that this technique helps unloading of the compressed nerve roots, but may fail to treat spinal instability that can exacerbate the manifestations and cause complications in the future[9]. To address this problem, laminectomy with fixation places spinal instruments that are used to fix the affected segment in a bid to decrease the possibility of having undesirable long-term effects such as postoperative instability[10]. The evidences regarding the safety and outcomes of these surgical approaches have been explored extensively but remain ambiguous[11]. Several papers show that combined with the fixation in laminectomy leads to the enhanced clinical result, on the other hand, some papers describe the augmentation of complication frequency and a longer time to recovery with the use of this more radical operation[12]. Thus, comparing the postoperative outcomes of these two approaches to management would facilitate its rational application and improve the quality of care offered to patients with this pathology[13]. Therefore, the purpose and objective of this study is to compare between this group and the control group being to compare the outcome of laminectomy only with laminectomy with fixation in LCS patient who was treated in the department of Orthopedic unit, Qazi Hussain Ahmed Hospital Nowshera.

Methods

The present study opens with a prospective sample of 100 patients diagnosed with LCS who have undergone surgical resection in the study period between January 2022 and January 2023. Patients were randomly assigned to one of two groups: The patient population was randomly divided into two groups Group A in which the patients underwent only laminectomy (n=50) and Group B in which the patients underwent laminectomy and fixation (n=50). Eligibility criteria included patients aged between 40 and 70 years, MRI-proven LCS, and prior failure of conservative management at least for half a year. Inclusion criteria are as follows: Patients who have provided informed consent, have a unilateral radicular pain with or without low back pain for at least 4 weeks, aged 18 years or older, have lux-spine MRI and mono-symptomatic sciatica, and have been treated conservatively for at least 6 weeks. Patients who have any conditions stated as follows will be excluded: Previous lumbar spine surgery, severe comorbid conditions Evaluation of the results included preoperative and postoperative data regarding the pain severity (measured using Visual Analog Scale and Oswestry Disability Index) as well as complication rates and length of stay.

Data Collection

Data was obtained directly from the patients with the help of interviews, from the clinical assessment of the patients along with cross verifying it with the medical records. Subjective assessments of pain and functional ability were made pre-operatively and then at 1, 3, 6, and 12 months after surgery.

Statistical Analysis

Descriptive analysis was done using statistical analysis system of which software used was 'SPSS version 18. 0'. Tabulated descriptive statistics were used to describe demographics and baseline characteristics of the patients. The difference in continuous variables between two groups was compared by independent-sample t-test; for categorical variables, chi-square test was used. Chi square test was used for comparison of proportions and an exact p-value of <0. 05 was regarded as statistically significant.

Results

Altogether, the study required 100 patients, and their mean age was 40 years with equal distribution of males and female patients in both the study groups. Mean age was 55 ± 7. 5 in Group A and 56 ± 8. 2 in Group B Individual group data for VAS has illustrated the pain relief in both the groups, however results indicate of improved outcomes were significantly better in Group B showing reduction in pain score of 8. 0 ± 1. 1 preoperatively to 1. 5 ± 0. 8 at

12months on AG Group A have reduced ODI improvement was also significantly larger in Group B with an average improvement of 40% vs 25 % in Group A. Overall complication rates are slightly higher in Group B with 20% compared with Group A with 10% of the patients. Within the Group B infection rate reached 7 patients (14%) while in Group A it were three patients (6%).Functional improvement (ODI) was also greater in Group B, with From the above table, it has become evident that surviving patients in Group B were hospitalized for a longer period of 6 days as compared to the 4 days hospitalized in Group A. Finally, despite superior pain and functional efficacy in laminectomy with fixation, there are increased postoperative complications and hospital admissions. The results of this study indicate that there is need to pay particular emphasis on patient characteristics especially during the choice of the surgical option to carry out LCS. However, these findings are preliminary since they are derived from a relatively small group of patients assessed during the early phase of their postoperative rehabilitation period.

Table 1: Patient Demographics and Baseline Characteristics

Parameter	Group A: Laminectomy Alone (n=50)	Group B: Laminectomy with Fixation (n=50)
Age (mean ± SD)	55 ± 7.5	56 ± 8.2
Gender (M/F)	28/22	30/20
BMI (mean ± SD)	27.3 ± 3.2	28.1 ± 3.5
Duration of Symptoms (months)	24 ± 6.4	26 ± 7.1
Preoperative VAS Score (mean ± SD)	7.8 ± 1.2	8.0 ± 1.1
Preoperative ODI Score (mean ± SD)	55 ± 9.5	57 ± 10.2

Table 2: Preoperative and Postoperative VAS Scores

Time Point	Group A: Laminectomy Alone (mean ± SD)	Group B: Laminectomy with Fixation (mean ± SD)
Preoperative	7.8 ± 1.2	8.0 ± 1.1
1 Month Postoperative	4.5 ± 1.3	3.5 ± 1.2
3 Months Postoperative	3.8 ± 1.1	2.8 ± 1.0
6 Months Postoperative	3.2 ± 1.0	2.0 ± 0.9
12 Months Postoperative	2.8 ± 0.9	1.5 ± 0.8

Table 3: Preoperative and Postoperative ODI Scores

Time Point	Group A: Laminectomy Alone (mean ± SD)	Group B: Laminectomy with Fixation (mean ± SD)
Preoperative	55 ± 9.5	57 ± 10.2
1 Month Postoperative	40 ± 8.7	35 ± 7.9
3 Months Postoperative	35 ± 8.2	30 ± 7.4
6 Months Postoperative	30 ± 7.5	25 ± 6.9
12 Months Postoperative	28 ± 6.8	22 ± 6.4

Table 4: Complication Rates Between Groups

Complication Type	Group A: Laminectomy Alone (n=50)	Group B: Laminectomy with Fixation (n=50)
Infection	2 (4%)	5 (10%)
Dural Tear	3 (6%)	4 (8%)
Hardware Failure	N/A	3 (6%)
Reoperation	1 (2%)	2 (4%)
Total Complications	5 (10%)	10 (20%)

Table 5: Average Hospital Stay in Days

Group	Average Hospital Stay (days)
Group A: Laminectomy Alone	4
Group B: Laminectomy with Fixation	6

Discussion:

The results from the present work indicated that there were significant favourable effects on the postoperative improvement of patients who received laminectomy with fixation rather than laminectomy only. This is in cognisance with the evidence of Ghogawala et al. (2016) who observed that patients receiving attempted laminectomy with fusion, which is a type of fixation, had better results in terms of pain relief and mobility. K_args from laminectomy with fusion had improved ODI scores at two- and, more so, at four-year follow-up after operation than the patients who underwent laminectomy only in their RCT[14]. This implies that in regard to the spine, the stabilization process is very critical in determining the improvement of the surgical success rates of LCS patients. Likewise, a meta-analysis by Machado and collagues (2015) also stated that Istanbul has better overall clinical benefits than laminectomy; especially in the pain reduction and mobility improvements submenu [15]. The current meta-analysis comprised of several studies and proposed compelling findings that enhanced the fusion benefit overall laminectomy. Such considered benefits however come with the costs by our study observed, pointing out the risks linked with such gains. On the other hand, there is limited high-quality evidence available to inform clinicians and patients about the long-term outcomes of laminectomy with and without instrumented fusion. A randomized controlled trial by Försth et al. (2016) compared laminectomy with instrumented fusion and laminectomy without fusion and observed no variation in the 2-year clinical course of patients[16]. According to their study, the effectiveness claims made in support of fusion strategies indicated a stronger short-term gain but a reduced efficiency over the long haul when compared to traditional training approaches. This suggests that the kind of surgery that will be advised or performed may hinge on the nature of the presenting ailment and the experience of the practitioner. In our study, we identified 20% rate of complications involving the laminectomy with fixation group, while the laminectomy alone group had a 10% rate of complications. As per the study's findings, this result is in line with the observations made by Deyo et al, (2010) whereby they stated that mor e invasive spinal surgeries involving instrumentation were characterized by enhanced perioperative complications and increased time of recovery[17]. In their research, they said that risk and benefit assessment should be cautiously done, most especially for patients who are aged and those with chronic disorders. Moreover, the SPORT trial conducted for three years by Weinstein et al helped identify various complications that may occur due to spinal surgical intervention. The trial also determined that procedures performed under the use of instrumentation and which are more complex will have high proportions of emergent complications such as infections, dural tears and reoperations[18]. These complications are in line with the findings of our study, and thus must be taken into consideration when patients are in decision making regarding laminectomy with fixation. This is shown by the prolonged hospital stay noted in the present study in patients posted for laminectomy with fixation at 6 days compared to the 4 days in patients, undergoing just laminectomy. These might be as a result of the nature and type of surgery that patients are capable of undergoing, as well as the likelihood of needing medical help for postoperative issues. Weinstein et al. (2008) also reconnoitered that patients who were operated upon with more invasive spinal surgeries required more days of hospitalization and they stressed on the fact that more intensive postoperative attention becomes required[19]. Although our investigation was concerned with short- to mid-term consequences only, that is consequences up to one year after the surgery, other investigation has looked at the long-term impacts of these surgical procedures. Ghogawala et al. (2016) and Försth et al. (2016) gave relevant information in relation to the surgical benefit amelioration. I learned from Ghogawala et al that the positive points of laminectomy with fusion were preserved for years while Försth's study pointed out that the differentiation between the two techniques fades with time[20]. Such conclusions presuppose that, even though fusion may result in better first-year changes than non-fusion, the value of sustained improvements remain to be researched. Proposing an individual approach can be considered as one of the key findings and the literature findings derived from this study. It important for the patient to understand that not all patients with LCS will benefit from laminectomy with fixation. It is important to note that decisions on which approach to use are made based on factors like the degree of instability of the spine, the age, health status and the presence or absence of other illnesses in the patient. In their study Deyo et al. (2010) underlined that aggressive treatment, achieved through more invasive methods should be covered by individual risk/benefit analysis[21].

Conclusion:

Therefore, the studies done place this work side by side with other research that indicates patients who undergo laminectomy with fixation experience better pain relief and functional improvement than patients subjected to laminectomy only. While being competitive in terms of reoperation rate, it also has disadvantages, including higher complications rates and longer hospitalization. Some of these findings parallel data published in several prior investigations with certain disparities, particularly in terms of the longitudinal prognoses. Thus, laminectomy with or without fixation should be taken after taking into account the circumstances of the particular patient under consideration. More investigations with higher clients' samples and duration of follow-up are required to carry out better surgical approaches and maximal patiemnt benefit for LCS.

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