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Original article

Outcome of Wide Laminectomy and Instrumented Fusion in Management of Degenerative Lumbar Spinal Stenosis

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ABSTRACT:

Background: One of the most frequent reasons for lumbar spine surgery in older individuals is degenerative lumbar spinal stenosis (LSS). This study aimed to assess the functional and radiographic outcomes of wide laminectomy and instrumented fusion in management of degenerative LSS. **Methods:** Twenty four patients who had degenerative lumbar spinal stenosis with low back pain and/or leg pain refractory to medical treatment; underwent wide laminectomy and instrumented fusion in this prospective study with follow up period of two years. Assessment was done in terms of Oswestry Disability Index (ODI), neurogenic symptoms, and visual analogue scale scores (VAS) for back and leg pain. Patient Satisfaction Index (PSI) was used as a measure to assess patients' experiences and satisfaction. Anteroposterior, lateral and dynamic views radiology of the lumbosacral spine to assess pre and post-operative instability and lumbar lordosis. Finally, computed tomography (CT) was done postoperatively to evaluate the degree of fusion. **Results:** Comparing preoperative, 2 months postoperative and final outcome of VAS for back pain, VAS for leg pain and ODI among the operated patients (N=24), there was significant change among them with follow up (p value < 0.05). The lumbar lordosis (LL) increased also from a mean of 53.08±11.78 to 59.25±10.77 with significant difference (p value <0.05). **Conclusion:** Wide laminectomy and instrumented fusion in degenerative LSS offers excellent functional and radiographic outcome with less risk of postoperative instability.

Keywords: Laminectomy; Instrumented fusion; Degenerative lumbar spinal stenosis.

INTRODUCTION:

The term lumbar spinal stenosis (LSS) refers to the anatomical narrowing of the lumbar spinal canal with diminished space available for the neural and vascular elements in the lumbar spine resulting in buttock or lower extremity pain with walking, which may occur with or without low back pain [1]. LSS can be divided into primary and secondary stenosis based on its cause. Congenital spinal canal constriction causes primary stenosis, while a variety of disorders can induce secondary stenosis, most frequently chronic degeneration of the ligamentum flavum, facet joints, and intervertebral discs. Rheumatoid disorders, osteomyelitis, trauma, and tumors are additional causes of secondary stenosis [2]. LSS typically manifests as neurological claudication, axial low back pain, or radiculopathy that is made worse by lumbar extension and walking. One significant aspect of LSS is neurogenic claudication. Although usually asymmetric, the symptoms are usually bilateral. Most patients experience tingling, numbness, and low back pain. In LSS,

tingling and numbness usually impact the entire leg, seldom affecting just one distribution of nerve roots. Weakness is reported in about 43% of those impacted [3].

The diagnostic tool of choice for evaluation of LSS is Magnetic resonance imaging (MRI); showing radiographic evidence of the spinal canal narrowing and classifying LSS type and severity [4]. Usually, surgical treatment of LSS is indicated when the trial of conservative management in the form of at least six months of medical treatment and physiotherapy failed [5]. In LSS, the optimal surgical technique is still a debatable subject, and we had no clear guidelines to make an easy decision in such cases [6]. Over the past decades, multiple lumbar spine decompression techniques have been described for the surgery of LSS [7]. Conventionally to obtain adequate decompression of LSS, laminectomy is the most commonly used technique removing the posterior elements, in spite of that, some studies documented the high rate of a second surgery after it as the patient after surgery may develop spinal instability and also weakness and atrophy of his muscles as a result of extensive removal of posterior stabilizing elements [8-10]. The alternative surgical techniques as microsurgical procedures took place for the management of LSS, in order to reduce the invasiveness of the classic laminectomy and to avoid postoperative possible instability [10].The clinical outcome of the classic lumbar laminectomy improved by the addition of fusion to it, but this was found to cause some complications as adjacent segment degeneration acceleration and complications related to the fixation system itself [11].

In situations of degenerative lumbar spinal stenosis, we hypothesize that combining instrumented fusion with broad laminectomy may result in good pain reduction outcomes without the danger of postoperative instability. The goal of our study is evaluation of the outcome of instrumented fusion when added to posterior decompression in degenerative lumbar spinal stenosis.

METHODS:

This prospective study was conducted on twenty-four patients who had degenerative LSS with low back pain and/or leg pain refractory to medical treatment in the spine unit of orthopedic department Zagazig university hospital from November 2023 to June 2025 with follow up period of at least 1 year. After institutional review board approval of IRB (ZU-IRB #1132128.11. 2023), All participants provided written informed consent. The study was conducted in accordance with the World Medical Association's Code of Ethics (Declaration of Helsinki) for human studies.

We included patients who had radiographic evidence of degenerative LSS with neurogenic claudication, Low back and/or leg discomfort that has not responded to conservative treatment for at least 6 months. We excluded patients with severe osteoporosis, previous spinal surgeries, spinal trauma, tumor and infections.

Preoperative evaluation:

We started our patient examination by taking their medical history, including their current condition and any related morbidities, such as diabetes mellitus (DM), hypertension (HTN), and ischemic heart disease (IHD). We then asked about the patient's history and the date of any previous general anesthesia. A thorough medical history was then obtained, including information on low back pain, sciatica, neurogenic claudication, signs of muscle weakness (foot drop), and sphincter issues. A neurologic examination was conducted after the general examination to evaluate the patient's back pain, lower limb motor function, sensory alterations, and reflexes, indications of nerve root compression, sacroiliitis, and abnormalities in gait. The anesthesiologist next reviewed the results of the chest X-ray, echocardiography, ECG, and standard laboratory testing to determine surgical fitness. Preoperative MRI and X-ray lumbosacral spines, including anteroposterior, lateral, and lateral maximal flexion and extension dynamic views, were obtained for every patient.

For clinical evaluation, Visual Analogue Scale (VAS) was recorded before surgery for assessment of low back pain and for leg pain for all patients and worth to be mentioned that in patients with bilateral leg pains, we only recorded the VAS of the most painful side.

For assessment of the functional outcome of our patients, Oswestry Disability Index (ODI) was recorded for all of them. The most widely used outcome-measure tool for low back pain is the ODI. To assess the constraints of various activities of daily living, it is separated into ten divisions. A 0–5 scale is used to grade each section. The ODI is calculated by dividing the sum of the scores by the total number of potential scores, multiplying the result by 100, and then expressing the result as a percentage. Therefore, the denominator is decreased by 5 for each question that remains unanswered.

Surgical technique:

In order to support the clavicle, rib cage, and iliac crest while maintaining an extended hip, the patients were put prone on a radiolucent table on firm rollers. A skin incision is made in the middle of the affected part or segments. The number of levels that need to be operated on determines the length of the incision. A cautery knife is used to cut the thoracolumbar fascia after the skin is cut in the midline above the spinous processes and the subcutaneous layers are separated. The paraspinal musculature is then subperiosteally separated from the spinous process and the laminae.

Pedicle screws were inserted under c-arm before decompression after completing the exposure. The ligamentum flavum, the supraspinous ligaments, and the spinous process and the laminae of the involved stenotic segment(s) were resected along with the superior facet joints. The traversing nerve root is mobilized and retracted medially, the inferior facet is extracted, and the pars interarticularis is excised. Access to the disc can then be obtained transforaminally. Following the exposure of the transforaminal zone, a nerve root retractor was inserted medially to protect the thecal sac. Minimal retraction was done to prevent incidental durotomy during the annulotomy. The discectomy was initiated using a pituitary rongeur and curettes once the annulotomy was finished.

The distraction was maintained by applying a temporary rod on the contralateral pedicle screws. A thorough discectomy and endplate preparation were essential. Adequate preparation of the host graft site and removal of the cartilaginous endplates were done to ensure successful fusion. Radiolucent straight PEEK (Polyetheretherketone) cages were used to enhance spinal fusion and reduce stress shielding because of their lower elastic modulus and visualize bone formation on radiographs after implantation. Care was made to tamp the trial implant properly medially and anteriorly after dilatation to the optimum size. After implant trialing, the cage should be bone grafted with the graft material from removed lamina and facet joint. the graft-containing cage is positioned using tamps to guide the cage medially and anteriorly. Within 48 hours following surgery, a drain was left in place and removed, and closure in layers was completed with appropriate hemostasis.

Post-operative stage:

At two weeks, two months, and six months, as well as then every six months for at least a year, the patients were monitored. Clinical evaluation of back and leg pain using the visual analogue scale (VAS), neurogenic symptoms, and the Ostwestry Disability Index (ODI). Anteroposterior and lateral radiological images are used to assess lumbar lordosis, degree of fusion, and postoperative instability. Computed Tomography (CT) scan was used to assess the final fusion. The researchers employed the modified Bridwell fusion criteria. I and II fusion grades were considered satisfactory [12]. The results were analyzed statistically.

Outcome Measures were conducted on a regular basis using the same clinical and radiological measurements as before the procedure. Patient's satisfaction index (PSI): The Patient Satisfaction Index was used as a measure to assess patients' experiences and satisfaction with the care they received. PSI involves 4 grades [13].

Statistical analysis*:*

Microsoft Office Excel 2010 for Windows (Microsoft Corp., Redmond, WA, USA) and SPSS 22.0 for Windows (IBM Inc., Chicago, IL, USA) were used to gather, tabulate, and statistically analyze all of the data. The mean ± SD and median (range) were used to express continuous quantitative data, while absolute frequencies (number) and relative

frequencies (%) were used to express categorical qualitative variables. The Shapiro Walk test was used to determine whether continuous data were normal. Mann-Whitney Two independent groups of non-normally distributed data were compared using the U test. Data that was not normally distributed was compared between two dependent groups using the Wilcoxon signed ranks test. When appropriate, Fisher's exact test or Pearson's chi-square test were used to compare the percentage of categorical variables. Every test had two sides. Statistical significance (S) was defined as a p-value < 0.05, high statistical significance (HS) as a p-value < 0.001, and statistical insignificant (NS) as a p-value ≥ 0.05.

RESULTS:

This study comprised 24 patients between November 2023 and June 2025, with an average follow-up length of 14.3 ± 2.1 months. Included were ten males and fourteen females, with a mean BMI of 29.50 ± 5 kg/m2 and an average age of 53 ± 4.22 years. With a prevalence of 25% for each, the most prevalent stenotic levels were L3-4, L4-5, and L4-5-S1. Every patient had leg and back pain **Table (1).**

The average volume of blood lost was 257.08 ± 35.95 cc, the average radiation exposure was 4 ± 0.85 minutes, and the average operating duration was 134.16 ± 23.82 minutes. Throughout the perioperative phase, none of the trial subjects needed blood transfusions. Two patients experienced superficial wound infections that were treated with systemic antibiotics and frequent dressing changes, while three patients experienced problems. One patient needed revision due to mal-directed screw. The duration of hospital stay for all patients was a mean of 6 ± 1.47 days **Table (2).**

We observed significantly improved functional outcome measures postoperatively (all p values < 0.05). The VAS for back and VAS for leg pain significantly decreased from 8.41 ± 0.79 and 7.50 ± 1 to 4.50 ± 0.67 and 3.25 ± 0.45 at 2 months and 2.16 ± 0.71 and 1.83 ± 0.71 at the final follow-up, respectively. Moreover, the ODI significantly decreased from severe disability 55.58 ± 10.48% to moderate disability 23 ± 3.77% at 2 months and continued to improve to mild disability 15.91 ± 1.97% at the final follow-up. Regarding PSI, 18 (75%) patients had PSI grade 1, 2 (8.3%) patients had PSI grade 2, 2 (8.3%) patients had PSI grade 3 and 2 (8.3%) patients had PSI grade 4 as shown in **Table (3)**.

Regarding radiographic outcome measures postoperatively, after 1 year, 21 (87.5%) patients had fusion grade 1, 1 (4.2%) patient had fusion grade 2, 1 (4.2%) patient had fusion grade 3 and 1 (4.2%) patient had fusion grade 4. Lumbar lordosis increased from 53.08 ± 11.78 degrees preoperatively to 59.25 ± 10.77 degrees at the final assessment. During the follow-up period, we had no radiological evidence of spondylolisthesis in any of our patients after added lumbar fixation and bone fusion regarding that instability is the most challenging issue following decompression surgery of more than one level of low lumbar canal stenosis when done without instrumented fusion **Table (4)**

Table 1: Demographic characteristics

Characteristic	Operated patients (N=24)
Follow up period (months) Mean ± SD Median (range) Age (years) Mean ± SD Median (range)	 14.3 ± 2.1 14 (12- 18) 53±4.22 52 (48 – 61)
Sex (n, %)	
Male	10 (41.7)
Female	14 (58.3)

BMI (kg/m^2) Mean ± SD Median (range)	 29.50±5 30.50 (19 – 35)
Comorbidities (n, %) Absent Diabetes mellitus Hypertension HCV	 12 (50) 4 (16.7) 4 (16.7) 8 (33.3)
Smoking (n, %) Smokers Non-smokers	 16 (66.7) 8 (33.3)
Levels of stenosis (n, %)	
L3-L4	6 (25)
L4-L5	6 (25)
L5-S1	2 (8.3)
L3-4-5	4 (16.7)
L4-5-S1 Number of levels (n, %) Single Multiple	6 (25) 14 (58.3) 10 (41.7)

Table 2: Operative data and perioperative complications

Item	Operated patients (N=24)
Operative time (min) Mean ± SD Median (range)	 134.16±23.82 135 (100-170)
Radiation exposure (min) Mean ± SD Median (range)	 4 ± 0.85 4 (3-5)
Blood loss (ml) Mean ± SD Median (range)	 257.08 ± 35.95 245 (210-330)
Hospital stay (days) Mean ± SD Median (range)	 6 ± 1.47 6 (4-8)
Complications (n, %) Absent Infection Maldirected screw	 20 (87.5) 2 (8.3) 1 (4.2)

Table 3: Functional outcome and PSI among the operated patients

Item	Preoperative	Postoperative		Test	p-value (sig.)
		2 months	Final		
VAS back pain Mean ± SD Median (range)	 8.41 ± 0.79 9 (7-9)	 4.50 ± 0.67 4 (4-6)	 2.16±0.71 2 (1-3)	-3.100[c1] -3.140[c2] -3.176[c3]	**0.002[p1] (S)** **0.002[p2] (S)** **0.001[p3] (S)**

VAS leg pain Mean ± SD Median (range)	7.50 ± 1 7.50 (6-9)	3.25 ± 0.45 3 (3-4)	1.83±0.71 2 (1-3)	-3.088^{c1} -3.095^{c2} -3.153^{c3}	**0.002^{p1} (S)** **0.002^{p2} (S)** **0.002^{p3} (S)**
ODI (%) Mean ± SD Median (range)	55.58±10.48 58 (38-67)	23±3.77 25 (18-26)	15.91±1.97 16 (13-18)	-3.064^{c1} -3.065^{c2} -3.108^{c3}	**0.002^{p1} (S)** **0.002^{p2} (S)** **0.002^{p3} (S)**
PSI grades (n. %)	Operated patients (N=24)				
Grade 1 Grade 2 Grade 3 Grade 4	18 (75) 2 (8.3) 2 (8.3) 2 (8.3)				

Continuous variables were expressed as mean ± SD; c: Wilcoxon signed ranks test; p-value<0.05 is significant; Sig.: Significance.

c1,p1: Preoperative versus 2 months postoperative.

c2,p2: Preoperative versus final postoperative.

c3,p3: 2 months postoperative versus final postoperative.

Categorical variables were expressed as number (percentage)

Table 4: Radiographic outcome among the operated patients

Item	Preoperative	Final postoperative	Test	p-value (sig.)
Lumbar lordosis (degrees) Mean ± SD Median (range)	53.08±11.78 51 (36-72)	59.25±10.77 61 (41-74)	3.033	**0.002 (S)**
Fusion grades (n. %)	Operated patients (N=24)			
Grade 1 Grade 2 Grade 3 Grade 4	21 (87.5) 1 (4.2) 1 (4.2) 1 (4.2)			

Continuous variables were expressed as mean ± SD; Wilcoxon signed ranks test; p-value<0.05 is significant; Sig.: Significance.

Categorical variables were expressed as number (percentage)

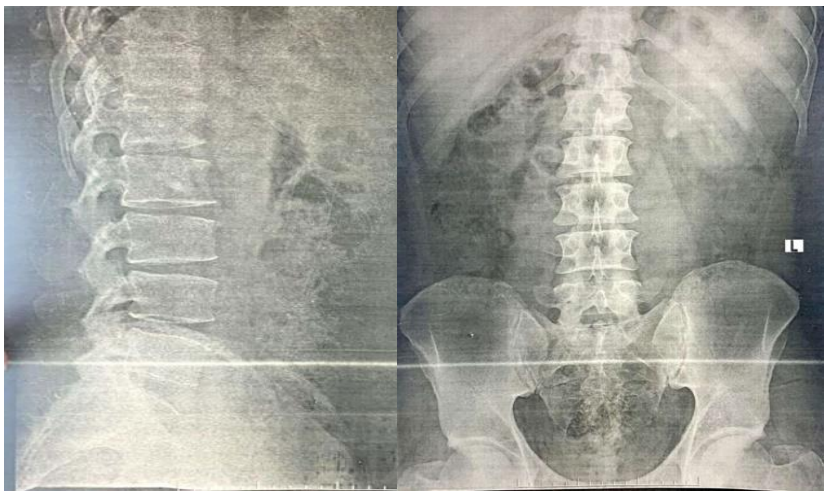


Figure 1: Preoperative plain x-ray AP and lateral views of lumbosacral spine.

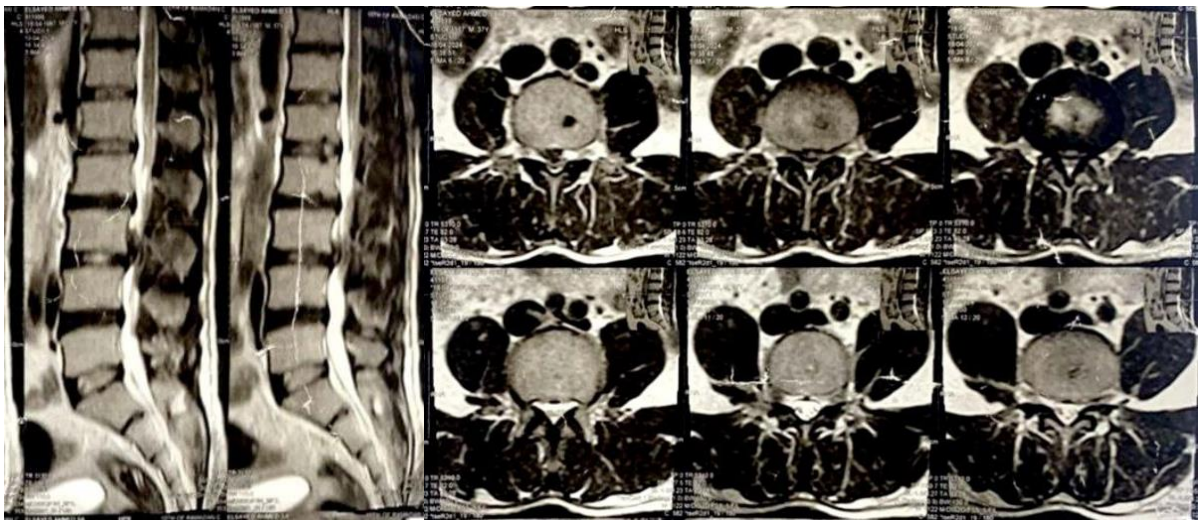


Figure 2: Preoperative MRI T2 lumbosacral spine sagittal and axial views showing L3-4 central stenosis and left lateral recess and forminal stenosis.

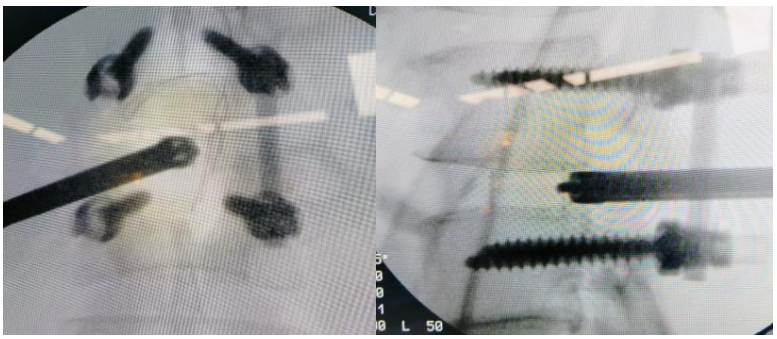


Figure 3: C-arm photos showing cage insertion after decompression and fixation.

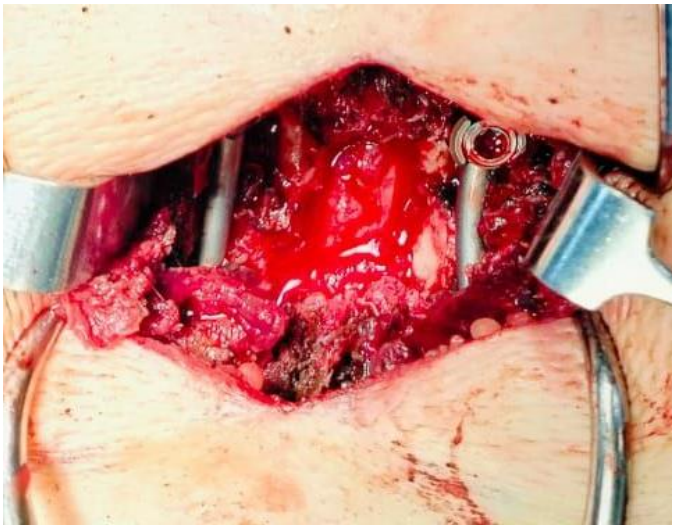


Figure 4: Intra-operative photo showing L3 wide laminectomy and L3-4 fixation by 4 pedicle screws and 2 rods.

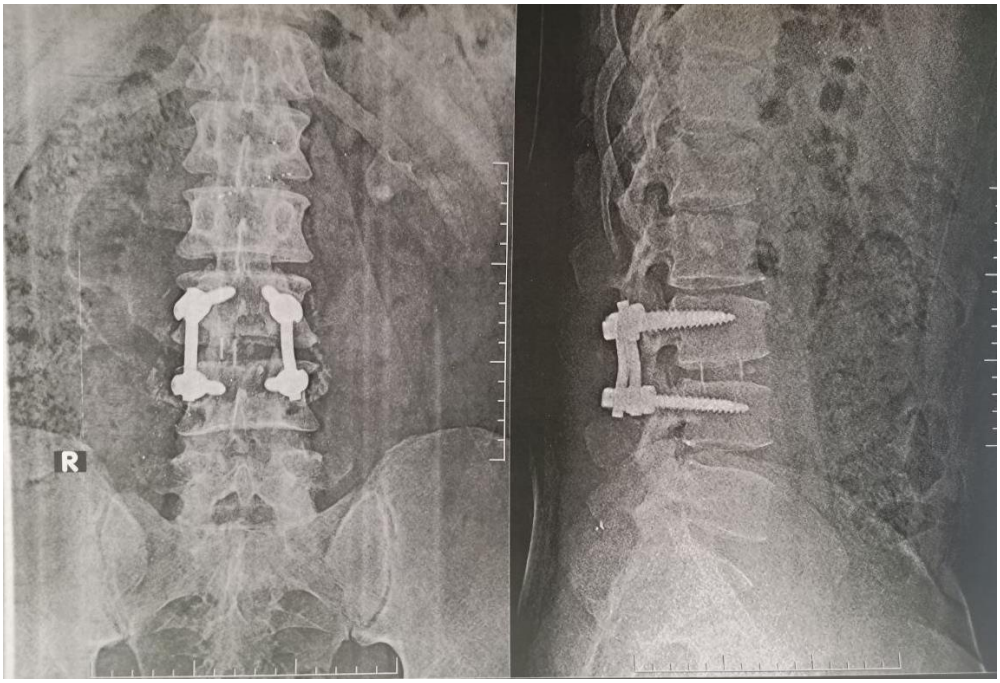
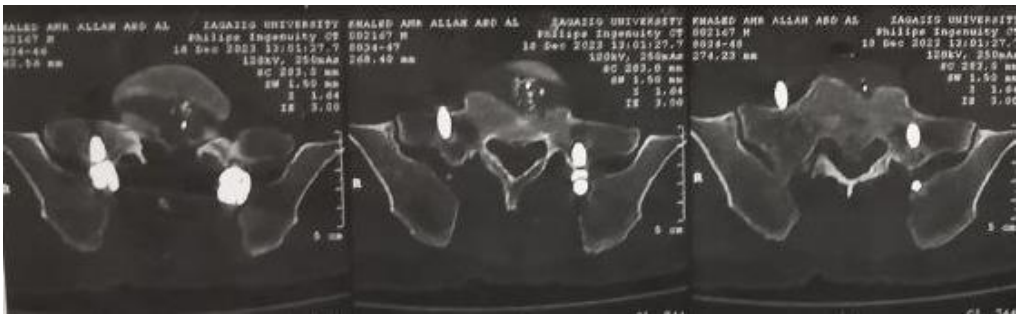


Figure 5: Final postopertaive x-ray AP and lateral views showing transpedicular lumbar screw fixation of L3, L4 by 4 screws and 2 rods with interbody fusion (TLIF) and L3 wide laminectomy.



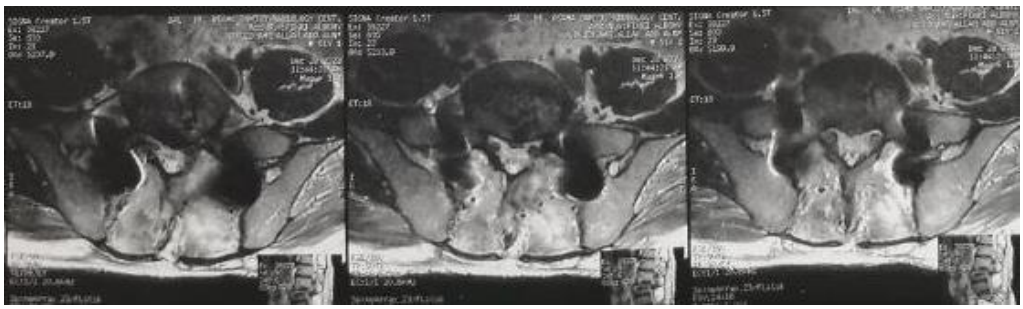


Figure 6: Immediate postoperative CT and MRI axial views showing screw maldirection.

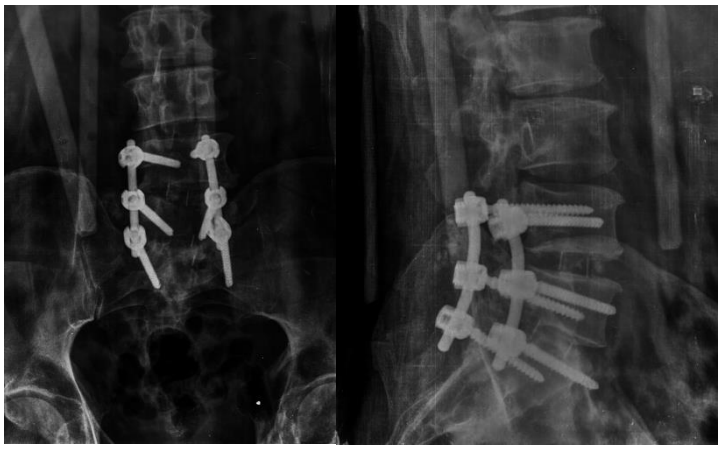


Figure 7: Immediate postoperative (after revision surgery) x-ray AP and lateral views.

DISCUSSION:

Degenerative lumbar spinal stenosis is the most common indication for lumbar spinal surgery in elderly patients (age > 65 years) and will continue to gain in importance as life expectancy increases and perioperative management improves [14]. Decompressive laminectomy is the standard surgical treatment in these patients, but according to the results of a meta-analysis, it was successful in only 64% of the cases [15]. Since extensive posterior decompression drastically changes the structure and biomechanics of the spine, many spine surgeons resort to fusion operations to address lumbar stenosis, which has been linked to surgical failures. Overall results following decompression alone have not been surpassed, despite the fact that many studies have been carried out to evaluate the impact of (instrumentation-augmented) fusion on outcome. The frequency of fusion surgery, however, has been steadily increasing in the treatment of degenerative lumbar disease despite numerous concerns**[16]**. Our goal was to evaluate the role that instrumented fusion and broad laminectomy play in improving the radiological and functional results for individuals with degenerative lumbar spinal stenosis.

24 individuals in this study had instrumented fusion and extensive laminectomy. The average age was 53 ± 4.22 years, which is a little younger than the literature's report that the lumbar spine's degenerative process starts at or after the seventh decade of life. Given that the majority of the patients included were heavy workers who needed to work to support themselves, we can explain why they experienced degenerative lumbar alterations early. Regarding sex, most of the patients were females (58.3%). Literature shows no significant statistical difference between genders regarding LSS. However, women with LSS have accentuated pain responses and greater related disability than men with LSS [17].

The most prevalent operated level was L4-L5 in 12 patients (50%). The L4-L5 segment is at a high risk of degeneration, as it bears significant portion of body’s weight also may be due to increased movement at the L4-L5 motion segment and decreased movement in the segments below as well as the more sagittal orientation of the L4-L5 facet joint complex which allows for more flexion and extension movements, making this level

susceptible to degenerative changes. In agreement with our results, Pietrantonio et al. [18] conducted a prospective study on 214 LSS patients with L4-5 being the most commonly stenosed level.

Two months and final assessment of VAS for low back pain and leg pain significantly decreased in comparison to the preoperative values. Those changes in the VAS confirm the good clinical outcome in such surgical procedures tailored for our patients and those results are comparable with the clinical trial of Zaghloul et al. [19] as they evaluated 64 patients with degenerative LSS who underwent laminectomy with instrumented fusion and reported a significant decrease of VAS for both low back pain and for leg pain.

The preoperative mean ODI score was 55.58 ± 10.48% that changed at 2 months postoperative to 23 ± 3.77% and at the final assessment the mean ODI score was 15.91 ± 1.97% and we found those improvements regarding ODI recorded at 2 months and the final follow up highly significant and reflect the excellent functional outcome of the surgery, we found our results matching with the clinical outcome of the patients in Aldahshory et al. [20] a clinical trial where their patients in the fusion group (25 patients) out of a total 50 patients included in their study had a preoperative mean ODI score of 46.76 ± 9.90% which showed initial improvement after 6 months follow up to be 29.16 ± 9.33% then more improvement was present after one-year postoperative to reach 19.52 ± 7.97%. Forsth et al. [21] reported that adding fusion to the decompression is a subject of debate in patients without spinal instability; in their study from a total of 247 patients with degenerative LSS without spondylolisthesis, 135 patients underwent decompression with fusion, and they found no ODI difference between the groups who underwent decompression alone and who had added fusion after 2 years post-operative.

The mean operative time in this study was 134.16 ± 23.82 min. In a clinical trial by Sun et al. [22] performing wide laminectomy with instrumented fusion for patients with degenerative LSS associated with spinal instability, the mean operative time was 198 ± 16 min. Aldahshory et al. [20] reported a mean operative time in the classic laminectomy with transpedicular screw fixation of 3.24 hours. The average blood loss in this study was 257.08 ± 35.95 ml, this volume is lower than that of Zaghloul et al. [19] that was 353.7±115.9 ml in laminectomy plus instrumented fusion. Aldahshory et al. [20] compared between minimally invasive lumbar decompression (MILD) versus laminectomy plus instrumented fusion and reported a mean of 422.00±185.45 ml blood loss for the fusion group compared to 298.00±116.76 ml in the (MILD) group, this difference was statistically significant. To prevent excessive blood loss, we carefully used subperiosteal dissection and electrocautery as well as using a controlled hypotensive anesthesia that lowers blood pressure during the procedure. The mean hospital stay in this study was 6 ± 1.47 days, which is comparable with the results of Aldahshory et al. [20] with a mean of 5.56 days. Munting et al. [23] reported prolonged hospital stay, increased blood loss and greater hospital costs in laminectomy plus instrumented fusion when compared to decompression alone. In this study, increased radiculopathy happened once due to screw maldirection (Figure 6). The patient presented with foot drop and severe left sciatic pain post-operatively. In that case, the patient underwent revision surgery (Figure 7) and regained full motor power 6 months postoperatively. Superficial skin infection was recorded in 2 patient (8.3%), those patients received antibiotic therapy then infection subsided with repeated dressing in the outpatient clinic. In agreement with our results, Forsth et al. [21] reported superficial skin infection in 10% of patients underwent laminectomy plus fusion. There were no perioperative deaths among the 24 patients who were operated on; this could be because patients who were deemed generally unsuited for surgery and those with general illnesses were excluded from the selection, preoperative planning, and postoperative care processes. Weinstein et al. [24] in an observational cohort study conducted on 304 patients suffering from LSS, treated with wide laminectomy, he reported a death rate of 1%.

In this investigation, at the final assessment a satisfactory fusion grade (grade 1) was seen in (21/24) patients; which accounts for 87.5% of the total. Lee et al. [25] reported a similar discovery, stating that the fusion rate in their instances rose from 52.2% after 6-month to 98.5% following a two-year follow-up. The fusion rates reported by several studies were as follows: 96.2% by Wang et al, [26] 95% by Lowe et al, [27] 94.8% by Lauber et al, [28] 93% by Potter et al, [29] 90% by Mohammad et al, [30] and 89% by Hackenberg et al. [31] Unlike Faundez et al, [32] who had a fusion rate of 76.9% (15 out of 65 patients experienced pseudarthrosis, with 12 of them requiring revision surgery), our results were superior[30]. Only one patient in this study had fusion grade 4, which was linked to long-term use of non-steroidal anti-inflammatory medicines and heavy smoking. The patient reported having chronic back pain. However, the patient refused to undergo any further surgeries. Two patients presented with grade 2 and 3 fusion, they were asymptomatic. Thus, no further intervention was warranted.

Regarding Patient Satisfaction Index (PSI) in the last follow up, 18 patients (75%) expressed that the surgery fulfilled their expectations (grade I), while two patients (8.3%) indicated that the procedure sufficiently improved their health to the extent that they would willingly undergo it again for the same outcome (grade II). Also, two patients (8.3%) reported that the operation had a positive effect on him. However, he expressed that he would not want to undergo the same procedure again if it resulted in the same outcome (grade III). Finally, two patients (8.3%) experienced no improvement or even a worsening of their condition compared to before the surgery (grade IV).

The main limitations of this study were the relatively small number of patients included and short-term follow up. Finally, the study was done at single medical center. these limitations are to be considered in future studies.

CONCLUSION:

Based on the results of the present study we recommend wide laminectomy with instrumented fusion regarding the significant pain reduction and excellent functional outcome without perioperative major complications to avoid the high possibility of spine instability and the need for second surgery with added risk and cost that may follow posterior decompression alone in such cases.

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Author contributions

All authors were involved in drafting the article and revising it for important intellectual content and all authors read and approved the final version to be published.

REFERENCES:

1. Bagley C, MacAllister M, Dosselman L, Moreno J, Aoun SG, El Ahmadieh TY. Current concepts and recent advances in understanding and managing lumbar spine stenosis. *F1000Res*. 2019;8:F1000 Faculty Rev-137.
2. Binder DK, Schmidt MH, Weinstein PR. Lumbar spinal stenosis. *Semin Neurol*. 2002;22(2):157-66.
3. Goh KJ, Khalifa W, Anslow P, Cadoux-Hudson T, Donaghy M. The clinical syndrome associated with lumbar spinal stenosis. *Eur Neurol*. 2004;52(4):242-9.
4. Schroeder GD, Kurd MF, Vaccaro AR. Lumbar Spinal Stenosis: How Is It Classified?. *J Am Acad Orthop Surg*. 2016;24(12):843-52.
5. Kovacs FM, Urrútia G, Alarcón JD. Surgery versus conservative treatment for symptomatic lumbar spinal stenosis: a systematic review of randomized controlled trials. *Spine (Phila Pa 1976)*. 2011;36(20):E1335-E51.
6. Zaina F, Tomkins-Lane C, Carragee E, Negrini S. Surgical Versus Nonsurgical Treatment for Lumbar Spinal Stenosis. *Spine (Phila Pa 1976)*. 2016;41(14):E857-E68.
7. Bae HW, Rajaee SS, Kanim LE. Nationwide trends in the surgical management of lumbar spinal stenosis. *Spine (Phila Pa 1976)*. 2013;38(11):916-26.
8. Alimi M, Hofstetter CP, Torres-Campa JM, Navarro-Ramirez R, Cong GT, Njoku Jr I,

et al. Unilateral tubular approach for bilateral laminotomy: effect on ipsilateral and contralateral buttock and leg pain. *Eur Spine J*. 2017;26(2):389-96.
9. Boehm H, Greiner-Perth R, El-Saghir H, Allam Y. A new minimally invasive posterior approach for the treatment of cervical radiculopathy and myelopathy: surgical technique and preliminary results. *Eur Spine J*. 2003;12(3):268-73.
10. Wu AM, Zheng YJ, Lin Y, Wu YS, Mao FM, Ni WF, et al. Transforaminal decompression and interbody fusion in the treatment of thoracolumbar fracture and dislocation with spinal cord injury. *PLoS One*. 2014;9(8):e105625.
11. Deyo RA, Martin BI, Kreuter W, Jarvik JG, Angier H, Mirza SK. Revision surgery following operations for lumbar stenosis. *J Bone Joint Surg Am*. 2011;93(21):1979-86.
12. Poh SY, Yue WM, Chen LT, Guo CM, Yeo W, Tan SB. Two-year outcomes of transforaminal lumbar interbody fusion. *J Orthop Surg (Hong Kong)*. 2011;19(2):135-40.
13. Vanhorn TA, Knio ZO, O'Gara TJ. Defining a Minimum Clinically Important Difference in Patient-Reported Outcome Measures in Lumbar Tubular Microdecompression Patients. *Int J Spine Surg*. 2020;14(4):538-43.
14. Gunzburg R, Szpalski M. The conservative surgical treatment of lumbar spinal stenosis in the elderly. *Eur Spine J*. 2003;12 Suppl 2(Suppl 2):S176-S80.
15. Turner JA, Ersek M, Herron L, Deyo R. Surgery for lumbar spinal stenosis. Attempted meta-analysis of the literature. *Spine (Phila Pa 1976)*. 1992;17(1):1-8.
16. Thomé C, Zevgaridis D, Leheta O, Bäzner H, Pöckler-Schöniger C, Wöhrle J, et al. Outcome after less-invasive decompression of lumbar spinal stenosis: a randomized comparison of unilateral laminotomy, bilateral laminotomy, and laminectomy. *J Neurosurg Spine*. 2005;3(2):129-41.
17. Kim HJ, Suh BG, Lee DB, Park JY, Kang KT, Chang BS, et al. Gender difference of symptom severity in lumbar spinal stenosis: role of pain sensitivity. *Pain Physician*. 2013;16(6):E715-E23.
18. Pietrantonio A, Trungu S, Famà I, Forcato S, Miscusi M, Raco A. Long-term clinical outcomes after bilateral laminotomy or total laminectomy for lumbar spinal stenosis: a single-institution experience. *Neurosurg Focus*. 2019;46(5):E2.
19. Zaghloul A, Deabes A, Mourad M, Elmeleigy S. Outcome of Decompression with Transpedicular Screw Fixation and posterolateral fusion in Stable Degenerative Lower Lumbar Canal Stenosis. *Zagazig University Med J*. 2024; 30(2): 307-16.
20. Aldahshory AR, Mashaly H, El Molla ST, Ismaiel IA, Saoud K. Comparative Study of Minimally Invasive Lumbar Decompression versus Decompressive Laminectomy with Posterolateral Transpedicular Fixation for the Treatment of Degenerative Lumbar Canal Stenosis. *Asian J Neurosurg*. 2020;15(2):293-301.
21. Försth P, Ólafsson G, Carlsson T, Frost A, Borgström F, Fritzell P, et al. A Randomized, Controlled Trial of Fusion Surgery for Lumbar Spinal Stenosis. *N Engl J Med*. 2016;374(15):1413-23.
22. Sun C, Tian WJ, Liu HX, Guan PG. Outcomes of multisegmental transforaminal enlarged decompression plus posterior pedicle screw fixation for multilevel lumbar spinal canal stenosis associated with lumbar instability. *Int J Surg*. 2018;50:72-8.
23. Munting E, Röder C, Sobottke R, Dietrich D, Aghayev E; Spine Tango Contributors. Patient outcomes after laminotomy, hemilaminectomy, laminectomy and laminectomy with instrumented fusion for spinal canal stenosis: a propensity score-based study from the Spine Tango registry. *Eur Spine J*. 2015;24(2):358-68.
24. Weinstein JN, Lurie JD, Tosteson TD, Hanscom B, Tosteson AN, Blood EA, et al. Surgical versus nonsurgical treatment for lumbar degenerative spondylolisthesis. *N Engl J Med*. 2007;356(22):2257-70.
25. Lee SH, Kim YB, Kim TS, Lee ST, Lee SY, Keum JS, et al. Transforaminal Lumbar Interbody Fusion for the Treatment of Nonunion after Posterolateral Lumbar Fusion. J Korean Soc Spine Surg. 2004 Dec;11(4):223-30.
26. Wang J, Zhou Y, Zhang ZF, Li CQ, Zheng WJ, Liu J. Minimally invasive or open transforaminal lumbar interbody fusion as revision surgery for patients previously treated by open discectomy and decompression of the lumbar spine. *Eur Spine J*. 2011; 20(4):623-8.
27. Lowe TG, Tahernia AD, O'Brien MF, Smith DA. Unilateral transforaminal posterior lumbar interbody fusion (TLIF): indications, technique, and 2-year results. *J Spinal Disord Tech*. 2002;15(1):31-8.
28. Lauber S, Schulte TL, Liljenqvist U, Halm H, Hackenberg L. Clinical and radiologic

2-4-year results of transforaminal lumbar interbody fusion in degenerative and isthmic spondylolisthesis grades 1 and 2. *Spine (Phila Pa 1976)*. 2006; 31(15):1693-8.
29. Potter BK, Freedman BA, Verwiebe EG, Hall JM, Polly DW Jr, Kuklo TR. Transforaminal lumbar interbody fusion: clinical and radiographic results and complications in 100 consecutive patients. *J Spinal Disord Tech*. 2005;18(4):337-46.
30. Mohammad Hassaan M, Ali Nassar I, Abd Al-Aleem Alsebaie A, Ibrahim Khamiss A, Ibrahim Akar A. transforaminal lumbar interbody fusion in management of degenerative lumbar spine disorders. *Al-Azhar Med J*. 2016;45(1):161-70.
31. Hackenberg L, Halm H, Bullmann V, Vieth V, Schneider M, Liljenqvist U. Transforaminal lumbar interbody fusion: a safe technique with satisfactory three to five year results. *Eur Spine J*. 2005;14(6):551-8.
32. Faundez AA, Schwender JD, Safriel Y, Gilbert TJ, Mehbod AA, Denis F, et al. Clinical and radiological outcome of anterior-posterior fusion versus transforaminal lumbar interbody fusion for symptomatic disc degeneration: a retrospective comparative study of 133 patients. *Eur Spine J*. 2009;18(2):203-11.

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