ORIGINAL ARTICLE

OUTCOMES OF TRANSFORAMINAL LUMBAR INTERBODY FUSION AND POSTERIOR LUMBAR INTERBODY FUSION IN MANAGING SINGLE-LEVEL LUMBAR SPONDYLOLISTHESIS

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Background There is significant discussion over the most effective surgical approach for treating lumbar spondylolisthesis, despite the recommendation of a number of surgical approaches. The aim of this study was to explore the Outcomes of transforaminal lumbar interbody fusion and posterior lumbar interbody fusion in managing single-level lumbar spondylolisthesis. M**ethods;** the current study was conducted at the department of orthopaedic and neurosurgery at Hayatabad Medical Complex, Peshawar from January 2022 to February 2023 after taking approval from the ethical committee of the institute. Those individuals who had experienced a single-level condition with a low-grade categorization (grades I or II) in the Meyerding grading system were included in the study. A total of 52 patients were enrolled in this study and were divided in to group A and B. 26 received PLIF, and were placed in group A while 26 had done TLIF and were placed in group B. The two groups' mean operating times, blood loss, VAS scores for back and leg discomfort, and complications were compared. **Results:** A total of 52 individuals were enrolled in this investigation, distributed evenly into two groups. The mean age of the participants was 35.14±7.76 years. Out of 52 patients male were 30(57.6% and 22(42.30) were females. Patients in group B underwent TLIF while patients in group A got PLIF. With respect to the results for the two groups, individuals in the group A had mean operative time 126.44±12.03 minutes and Group B had a considerably shorter duration of 113.32±8.48 minutes (p<0.05). In group A, the average blood loss was 440±76.33 cm^3 but Group B experienced a much lower value of 371.40±39.2 cm^3 (p<0.05). Concerning postoperative VAS leg pain, there was no difference between the two groups (p>0.05) while group B experienced considerably less postoperative pain in the back on the VAS than group A did (p<0.05)**.** Dural tear was noted in 4 participants in group A, while 2 in group B. 3 patients in group A experienced a neurologic impairment, but in group b there was no neurologic deficit noted. 3 individuals in group A experienced wound infections, whereas none of the patients in group B did. **Conclusion:** Based on our research, TLIF is better than PLIF in terms of functional result and rate of complications in patients with grade I/II single-level lumbar spondylolisthesis.

Keywords: Posterior lumbar interbody fusion (PLIF); Transforaminal lumbar interbody fusion (TLIF); spondylolisthesis

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INTRODUCTION

The forward sliding of one vertebra on another is known as spondylolisthesis.[1] Among its five kinds, the most prevalent in adulthood are isthmic and degenerative spondylolisthesis.[2] Both have a chance to cause compression and instability that can cause low back and radicular pain.[3] In individuals with persistent low back pain, surgical fusion is an essential technique for fixing the spine in instances of lumbar spondylolisthesis and for relieving pain.[4] There are now several surgical fusion methods accessible, such as posterolateral fusion, anterior interbody fusion, posterior interbody fusion, and pars interarticularis repair.[5] Posterior lumbar interbody fusion (PLIF) and Transforaminal lumbar interbody fusion (TLIF) can apply a single posterior technique for placing pedicle screws and an interbody spacer to achieve circumferential spinal stabilization.[6] As an alternative to conventional PLIF, (TLIF) is a minimally invasive surgical method. It involves employing a unilateral posterolateral technique to access the diseased spinal region, usually from the patient's symptomatic or affected side.[7] PLIF instead, is a more traditional surgical technique that entails removing the posterior part of the vertebral lamina through a midline incision.[8] The current study was conducted to

determine the Outcomes of transforaminal lumbar interbody fusion and posterior lumbar interbody fusion in managing single-level lumbar spondylolisthesis.

MATERIAL AND METHOD

The current study was conducted at the department of orthopaedic and neurosurgery at Hayatabad Medical Complex, Peshawar from January 2022 to February 2023 after taking approval from the ethical committee of the institute. Participants diagnosed with adult lumbar spondylolisthesis were subjected to lumbar interbody fusion and pedicle screw fixation treatment. Those individuals who had experienced a single-level condition with a low-grade categorization (grades I or II) in the Meyerding grading system and had major pain in their legs and back, which had not improved with conservative therapy approaches were included in the study while those individuals who had spondylolisthesis grades III and IV and had a previous history of lumbar spine fusion surgery and the coexistence of spine deformities were excluded. The body mass index, or BMI, was calculated for each participant before to the surgical operation and those having a BMI of 40 or more, indicating severe obesity, were not included in the study. A total of 52 patients were enrolled in this study and were divided in to group A and B. Twenty-six received PLIF by applying two cages and pedicle fixation, and were placed in group A while 26 had done TLIF through single cage and pedicle fixation and were placed in group B. A single, highly experienced consultant neurosurgeon with over five years of expertise carried out each surgery. Everyone who participated gave their informed consent, and the specific lumbar fusieechnique selected was determined by a number of factors, such as the patient's clinical needs, the surgeon's preferences, and the patient's informed consent after a thorough explanation of the various surgical procedures. The two groups' mean operating times, blood loss, VAS scores for back and leg discomfort, and complications were compared.

SPSS 24 was used for data analysis. While frequency and percentages were used to analyze categorical data, mean and standard deviation were used for analyzing numerical statistics. To compare numerical values between the two groups, the Independent Samples T-test was used, with the *p*-value significant at <0.05.

RESULTS

A total of 52 individuals were enrolled in this investigation, distributed evenly into two groups. The mean age of the participants was 35.14±7.76 years. Out of 52 patient's males were 30 (57.6% and 22 (42.30) were females. Patients in group B underwent TLIF while patients in group A got PLIF. With respect to the results for the two groups, individuals in the group A had mean operative time 126.44±12.03 minutes and Group B had a considerably shorter duration of 113.32±8.48 minutes ($p<0.05$). In group A, the average blood loss was 440±76.33 cm^3 but Group B experienced a much lower value of 371.40±39.2 cm^3 ($p<0.05$). Concerning postoperative VAS leg pain, there was no difference between the two groups ($p>0.05$) while group B experienced considerably less postoperative pain in the back on the VAS than group A did ($p<0.05$). (Table 1). Dural tear was noted in 4 participants in group A, while 2 in group B. 3 patients in group A experienced a neurologic impairment, but in group b there was no neurologic deficit noted. 3 individuals in group A experienced wound infections, whereas none of the patients in group B did as display in table 2.

Table-1: Evaluation of outcomes between both groups

Outcomes	Groups	N	Mean	Standard deviation	*p*- value
Operative time in minutes	A	26	126.43	12.02	0.0001
	B	26	113.31	8.47	
Loss of blood in cm3	A	26	441	76.34	0.0001
	B	26	371.42	39.3	
VAS leg pain Postoperative	A	26	2.15	1.01	0.112
	B	26	1.71	.890	
VAS back pain Postoperative	A	26	3.15	.897	0.001
	B	26	2.31	.801	

Table-2: Major Complications in both groups

Complications	Group A		Group B
	N (%)		N (%)
Dural tear	Yes	4(15.3)	2(7.6)
	No	22(84.6)	24(92.3)
Neurologic deficit	Yes	3(11.5)	0
	No	23(88.46)	26(100)
Wound infection	Yes	3(11.5)	0
	No	23(88.6)	26(100)

DISCUSSION

In recent years, there has been an increase in the occurrence of degenerative lumbar disease, which is characterized by lower back stiffness and possible issues with the limb nerves mostly linked to the ageing population. This illness presents serious difficulties for those who are affected. A well-recognized treatment strategy for treating degenerative spine conditions such disc degeneration, spondylosis, and spondylolisthesis is lumbar decompression and fusion surgery. The effectiveness of this therapy has revealed distinguished improvements during its advancement, chiefly recognized to the advancements in operating practices, predominantly interbody fusion techniques.[9] The TLIF and PLIF lumbar fusion techniques are two widely used techniques. In the past, PLIF has been seen to be the best option.[10] However, this surgical technique's substantial decompression may reduce the amount of viable surface area for successful bone fusion, hence limiting its effectiveness. Treatment for lumbar spondylolisthesis with TLIF is now more common than posterior lumbar fusion (PLF) due to the use of interbody techniques, which increase the area available for fusion.[11] Patients with degenerative spondylolisthesis treated with TLIF experienced a significant increase in frequency, rising from 13.6 percent in 1999 to 32 percent in 2011. A major factor in this transformation was the observed rise in fusion rates using TLIF compared to PLF, which in some cases reached up to 90%.

Many benefits come with using an interbody spacer, including as load distribution, indirect compression relief, biomechanical support for the anterior column, and reinforcement of the posterior pedicle screw and rod arrangement.[12] Spondylolisthesis often presents with symptoms such as nerve-related issues and back pain, which can be attributed to instability and compression, regardless of its aetiology—degenerative or isthmic.[13] Nevertheless, surgical treatment for spondylolisthesis includes not only relieving pressure on neural tissue and stabilizing the affected spinal segment, but it also priorities restoring disc space height and realigning the spine in terms of translation and rotation in the sagittal plane.[14] According to our research, the TLIF group had a significantly shorter mean operating time and blood loss than the PLIF group ($p<0.05$). Another study that found that the mean operational time and blood loss with TLIF were considerably lower than in PLIF ($p<0.05$) noticed a similar findings.[15]

We found that the TLIF group's back pain score on the VAS was significantly lower than the PLIP groups' ($p<0.05$); however, we did not find a significant difference in the leg pain score between the two groups ($p>0.05$), which is consistent with the findings of the previously mentioned study.[16] We found that the TLIF group had fewer post-operative complications.

CONCLUSION

Based on our research, TLIF is better than PLIF in terms of functional result and rate of complications in patients with grade I/II single-level lumbar spondylolisthesis.

AUTHORS' CONTRIBUTION

HAK, NG: Conceptualization of the study design. AK, MIUH: Data collection, data analysis, data interpretation. SN, SAK: Review, write-up.

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