

Incidence of Early Postoperative Complications Following PLIF with Cage and Decompression in the Management of Lumbar Spinal Canal Stenosis

Abul Kalam Azad¹, Mohammad Atiqur Rahman², Muhammad Sayeed Mahmud³, Md. Saklayen Hossain⁴, Ahmad Hussain Siddique⁵

1. Assistant Professor
Department of Spine Surgery
National Institute of Traumatology and
Orthopaedic Rehabilitation
Dhaka, Bangladesh
2. Senior Consultant
Department of Spine Surgery
National Institute of Traumatology and
Orthopaedic Rehabilitation
3. Assistant Professor
Department of Orthopaedic Oncology
and Musculoskeletal Tumor
National Institute of Traumatology and
Orthopaedic Rehabilitation
4. Junior Consultant
Department of Orthopaedic Surgery
National Institute of Traumatology and
Orthopaedic Rehabilitation
5. Junior Consultant
Department of Orthopaedic Surgery
National Institute of Traumatology and
Orthopaedic Rehabilitation

Correspondence to:

Abul Kalam Azad
Assistant Professor
Department of Spine Surgery
National Institute of Traumatology and
Orthopaedic Rehabilitation
Dhaka, Bangladesh
Email: ripon_dr@yahoo.com
Orcid Id: <https://orcid.org/0009-0001-1480-0290>



Submission Date : 02 April 2025
Accepted Date : 07 May 2025
Published Date : 30 September 2025
DOI: <https://doi.org/10.3329/jrpmc.v10i2.85610>

Introduction:

Lumbar spinal canal stenosis (LSCS) is a common degenerative condition affecting the aging population, characterized by narrowing of the spinal canal that leads to neural compression and neurogenic claudication. It significantly impairs mobility and quality of life, particularly in individuals over 60 years of age.¹ The etiology of LSCS is multifactorial, commonly involving intervertebral disc degeneration, ligamentum flavum hypertrophy, facet joint osteoarthritis, and

Abstract

Introduction:

Lumbar spinal canal stenosis (LSCS) is a common degenerative condition that leads to compression of neural elements, causing back pain, neurogenic claudication, and functional disability. When conservative treatments fail, surgical intervention becomes necessary.

Objective:

This study aimed to evaluate types of early postoperative complications observed in patients undergoing posterior lumbar interbody fusion (PLIF) with cage and decompression for lumbar spinal canal stenosis.

Methods:

This prospective study was conducted at the National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh, from September 2021 to August 2022, involving 15 patients diagnosed with lumbar spinal stenosis. The collected data were compiled and analyzed using SPSS version 25.0.

Results:

Among the 15 patients who underwent PLIF with cage and decompression for lumbar spinal canal stenosis, the majority were aged 31-45 years (53.33%), and slightly more were male (53.33%). Most had stenosis at the L4/L5 level (53.33%), and housewives formed the largest occupational group (46.67%). Postoperatively, only 4 patients (26.66%) experienced early complications-2 developed urinary tract infections and 2 had superficial wound infections.

Conclusion:

PLIF with cage and decompression appeared to be a safe and effective surgical option for lumbar spinal canal stenosis, with a low incidence of early complications. In this study, only minor issues like urinary tract infections and superficial wound infections were observed in a small number of patients, underscoring the procedure's overall safety in a controlled clinical setting.

Keywords: Early Postoperative Complications, PLIF, Lumbar Spinal Canal Stenosis, Disc Degeneration

Citation: Azad AK, Rahman MA, Mahmud MS, Hossain MS, Siddique AH. Incidence of Early Postoperative Complications Following PLIF with Cage and Decompression in the Management of Lumbar Spinal Canal Stenosis. J Rang Med Col. 2025 Sep;10(2):38-42. doi: <https://doi.org/10.3329/jrpmc.v10i2.85610>

spondylolisthesis.² When conservative management fails, surgical intervention becomes the treatment of choice to alleviate symptoms and improve functional outcomes. Among the available surgical techniques, posterior lumbar interbody fusion (PLIF) with cage insertion and decompression has gained widespread acceptance for its ability to restore spinal stability, increase foraminal height, and achieve solid interbody fusion.³ The use of cages in PLIF improves disc space restoration, maintains sagittal alignment, and provides better

biomechanical support compared to bone graft alone.⁴ Despite its effectiveness, PLIF is associated with a considerable risk of early postoperative complications. These complications, defined as occurring within 30 days postoperatively, include dural tears, wound infections, cerebrospinal fluid (CSF) leaks, implant-related issues, nerve root injuries, postoperative hematomas, and urinary tract infections.^{5,6} Although many of these complications can be managed effectively, they may prolong hospitalization, increase healthcare costs, and delay postoperative rehabilitation.⁷ The reported incidence of early complications following PLIF varies across studies, ranging from 10% to over 25%, depending on the population, surgical technique, and institutional expertise.^{8,9} Dural tear is one of the most common intraoperative complications, with an incidence reported between 5% and 10%.¹⁰ Postoperative infections are another major concern, particularly in diabetic or immunocompromised patients, and are associated with increased morbidity and potential reoperation.¹¹ Neurological deficits, though rare, can result from excessive retraction, malpositioned implants, or hematoma formation.¹² In recent years, technological advancements such as intraoperative navigation, minimally invasive PLIF, and enhanced perioperative care protocols have helped reduce complication rates in high-income settings.¹³ However, in many developing countries, including Bangladesh, open PLIF remains the standard of care due to limited resources and technical availability. Consequently, the incidence and spectrum of postoperative complications may differ in such settings due to variations in surgical expertise, perioperative protocols, and patient comorbidities. Despite the growing use of PLIF in managing LSCS in Bangladesh, there is a paucity of data on the frequency and types of early postoperative complications in this population. Most available literature comes from high-resource settings, making it difficult to generalize their findings to our healthcare context. Understanding local complication profiles is essential to improve surgical outcomes, optimize resource use, and refine patient selection criteria. This study aims to evaluate types of early postoperative complications observed in patients undergoing PLIF with cage and decompression for lumbar spinal canal stenosis at a tertiary care hospital.

Methods:

This prospective study was conducted at the National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh, from September 2021 to August 2022, involving 15 patients diagnosed with lumbar spinal stenosis. Inclusion criteria were symptomatic lumbar spinal canal stenosis confirmed by X-ray and MRI, radiologically proven instability, severe low back or leg pain, age between 18 and 65 years of both sexes, and failure of at least three months of conservative treatment. Exclusion criteria included a body mass index (BMI) greater than 40, severe systemic disease, and stenosis caused by neoplastic, traumatic, or infective conditions. Purposive sampling was used based on these criteria. Data were collected using a pretested and predesigned proforma capturing patient history, clinical examination, operative details, and follow-up findings. The collected data were compiled and analyzed using SPSS version 25.0. Written informed consent was obtained from all participants before inclusion in the study.

Results:

Most patients (53.33%) were in the 31–45 years age group. Males constituted a slightly higher proportion with 8 patients (53.33%), while females accounted for 7 patients (46.67%). Among the 15 study patients, housewives represented the largest group (46.67%), followed by businesspersons (20%), students and farmers (each 13.33%), and labourers (6.67%) (Table-I).

Table-I: Demographics of the participants (N=15)

Demographics	no. (%)
Age group (years)	
15–30	4(26.67)
31–45	8(53.33)
45–60	3(20.00)
Sex	
Male	8(53.33)
Female	7(46.67)
Occupation	
Student	2(13.33)
Housewife	7(46.67)
Labourer	1(6.67)
Farmer	2(13.33)
Business	3(20.00)

The preoperative grading of stenosis among the 15 study patients showed that 8 patients (53.33%) had stenosis at the L4/L5 spinal level, while 7 patients (46.66%) had stenosis at the L5/S1 level. This indicated that stenosis at L4/L5 was slightly more prevalent in this cohort (Figure-1).

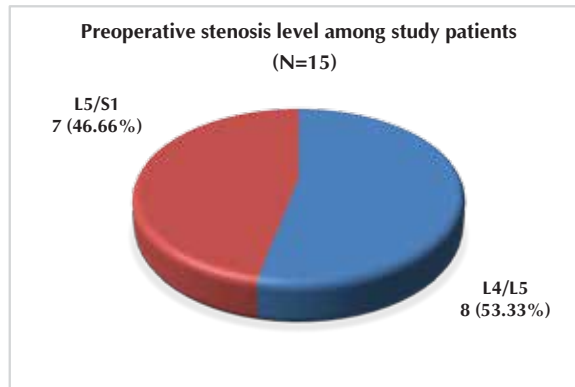


Figure-1: Distribution of preoperative stenosis level among study patients (N=15)

Out of the 15 patients studied, postoperative complications were observed in a minority of cases. Both urinary tract infection (UTI) and superficial infection occurred in 2 patients each, accounting for 13.33% of the cases, respectively (Table-II).

Table-II: Distribution of study patients according to postoperative complications (N=15)

Postoperative Complication	no. (%)
Urinary tract infection (UTI)	2(13.33)
Superficial infection	2(13.33)

Discussion:

This study evaluated the early postoperative complications following posterior lumbar interbody fusion (PLIF) with cage and decompression in patients diagnosed with lumbar spinal canal stenosis (LSCS). The demographic distribution revealed that most patients (53.33%) were in the 31–45 years age group, which is relatively younger compared to populations in other studies, where the majority of patients undergoing PLIF are often above 60 years.^{13,14} For example, Deyo et al. reported the highest surgical utilization in individuals aged 65 years and older, reflecting the degenerative nature of LSCS in elderly populations in Western countries.¹⁵ The younger demographic in the present study may reflect differences in occupational hazards,

healthcare-seeking behavior, or earlier onset of degenerative changes due to manual labor common in low-resource settings.¹⁶ In terms of sex distribution, the present study showed a slight male predominance (53.33%), consistent with the findings of Hayashi et al, who reported a male predominance in surgically treated LSCS cases.¹⁷ However, other studies, such as those by Ahn et al, noted a higher prevalence of LSCS among women, particularly in older age groups.¹⁸ This variation may be attributed to regional and lifestyle differences affecting spinal biomechanics and degeneration rates. Regarding occupational status, housewives comprised the largest proportion (46.67%), followed by businesspersons and students. This may highlight a potential relationship between limited physical activity, weight-bearing tasks at home, and lumbar spine issues, particularly in females. However, more robust socioeconomic data are needed to further validate this observation. Radiological findings in this study demonstrated that L4/L5 was the most commonly affected level (53.33%), followed closely by L5/S1 (46.66%). This is in agreement with numerous studies which consistently report L4/L5 and L5/S1 as the most frequently involved levels in lumbar stenosis and degenerative disc disease.¹⁹ These segments bear a significant amount of axial load and demonstrate the greatest range of motion, predisposing them to early degenerative changes. Early postoperative complications in this cohort included urinary tract infections (UTI) and superficial wound infections, each observed in 13.33% of patients. No cases of deep infection, dural tear, hematoma, or implant-related complications were noted. These findings are encouraging, suggesting a relatively low complication rate; however, it is essential to interpret these results cautiously due to the small sample size. Previous studies have reported a wide range of early complication rates following PLIF. For instance, Yoshihara and Yoneoka, in a large national database analysis, reported an overall early complication rate of approximately 18% in spinal fusion surgeries, with urinary tract infection being the most frequent at 6.4%.⁶ Similarly, Ghobrial et al. found that surgical site infection occurred in about 3.4% of lumbar fusion patients, while UTI was noted in 4.8%.¹² The higher infection rates in our study may reflect limitations in perioperative infection control practices or patient comorbidities. Superficial surgical site

infections, though relatively minor, are clinically significant because they may progress to deep infections if not promptly managed. McClelland and Goldstein emphasized that strict perioperative protocols, including antibiotic prophylaxis and sterile techniques, significantly reduce infection risks.⁷ Minimally invasive techniques have been increasingly adopted to reduce the risk of early complications, with evidence showing reduced blood loss, shorter hospital stays, and fewer infections compared to traditional open techniques.²⁰ However, in resource-constrained settings like ours, open PLIF remains the mainstay due to its accessibility and surgeon familiarity, despite the slightly higher risk profile.

Limitations:

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion:

PLIF with cage and decompression appears to be a safe and effective surgical option for lumbar spinal canal stenosis, with a low incidence of early complications. In this study, urinary tract infections and superficial wound infections were observed in a small number of patients, underscoring the procedure's overall safety in a controlled clinical setting. Proper perioperative care, including strict aseptic protocols and early infection monitoring, is recommended to further reduce minor complications following PLIF with cage and decompression. Larger, multi-center studies are also advised to confirm these findings and guide best practices.

Conflict of interest: None declared

References:

1. Katz JN, Harris MB. Lumbar spinal stenosis. *New England Journal of Medicine*. 2008 Feb 21;358(8):818-25. doi: 10.1056/NEJMcp 0708 097
2. Kalichman L, Cole R, Kim DH, Li L, Suri P, Guermazi A, et al. Spinal stenosis prevalence and association with symptoms: the Framingham Study. *The spine journal*. 2009 Jul 1;9(7):545-50. doi: 10.1016/j.spinee.2009.03.005
3. Chang SY, Nam Y, Lee J, Chang BS, Lee CK, Kim H. Clinical significance of radiologic improvement following single-level oblique lateral interbody fusion with percutaneous pedicle screw fixation. *Orthopedics*. 2020 Jul 1;43(4):e283-90. doi:10.3928/01477447-20200521-02
4. Zhang HQ, Wang YX, Wu JH, Chen J. Debridement and interbody graft using titanium mesh cage, posterior monosegmental instrumentation, and fusion in the surgical treatment of monosegmental lumbar or lumbosacral pyogenic vertebral osteomyelitis via a posterior-only approach. *World Neurosurgery*. 2020 Mar 1;135:e116-25. doi: 10.1016/j.wneu.2019.11.072
5. de Kunder SL, van Kuijk SM, Rijkers K, Caelers IJ, van Hemert WL, de Bie RA, et al. Transforaminal lumbar interbody fusion (TLIF) versus posterior lumbar interbody fusion (PLIF) in lumbar spondylolisthesis: a systematic review and meta-analysis. *The spine journal*. 2017 Nov 1;17(11):1712-21. doi: 10.1016/j.spinee.2017.06.018
6. Yoshihara H, Yoneoka D. Incidental dural tear in spine surgery: analysis of a nationwide database. *European Spine Journal*. 2014 Feb;23(2):389-94. doi: 10.1007/s00586-013-3091-z
7. McClelland III S, Goldstein JA. Minimally invasive versus open spine surgery: what does the best evidence tell us?. *Journal of neurosciences in rural practice*. 2017 Apr;8(2):194. doi: 10.4103/jnrp.jnrp_472_16
8. Kwon BK, Fisher CG, Boyd MC, Cobb J, Jebson H, Noonan V, et al. A prospective randomized controlled trial of anterior compared with posterior stabilization for unilateral facet injuries of the cervical spine. *Journal of Neurosurgery: Spine*. 2007 Jul 1;7(1):1-2. doi: 10.3171/SPI-07/07/001
9. Lebude B, Yadla S, Albert T, Anderson DG, Harrop JS, Hilibrand A, et al. Defining "complications" in spine surgery: neurosurgery and orthopedic spine surgeons' survey. *Clinical Spine Surgery*. 2010 Dec 1;23(8):493-500. doi: 10.1097/BSD.0b013e3181c11f89
10. Guerin P, El Fegoun AB, Obeid I, Gille O, Lelong L, Luc S, et al. Incidental durotomy during spine surgery: incidence, management, and complications. A retrospective review. *Injury*. 2012 Apr 1;43(4):397-401. doi: 10.1016/j.injury.2010.12.014
11. Ter Gunne AF, Cohen DB. Incidence,

- prevalence, and analysis of risk factors for surgical site infection following adult spinal surgery. *Spine*. 2009 Jun 1;34(13):1422-8. Doi: 10.1097/BRS.0b013e3181a03013
12. Ghobrial GM, MauluCCi CM, Maltenfort M, Dalyai RT, Vaccaro AR, Fehlings MG, et al. Operative and nonoperative adverse events in the management of traumatic fractures of the thoracolumbar spine: a systematic review. *Neurosurgical focus*. 2014 Jul 1;37(1):E8. doi: 10.3171/2014.4.FOCUS1467
 13. Sigmundsson FG, Joelson A, Strumqvist F. Additional operations after surgery for lumbar disc prolapse: indications, type of surgery, and long-term follow-up of primary operations performed from 2007 to 2008. *The Bone & Joint Journal*. 2022 May 2;104(5):627-32. doi: 10.1302/0301-620X.104B5.BJJ-2021-1706.R2
 14. Kuittinen P, Sipola P, Saari T, Aalto TJ, Sinikallio S, Savolainen S, et al. Visually assessed severity of lumbar spinal canal stenosis is paradoxically associated with leg pain and objective walking ability. *BMC Musculoskeletal Disorders*. 2014 Oct 16; 15(1):348. doi: 10.1186/1471-2474-15-348
 15. Deyo RA, Mirza SK, Martin BI, Kreuter W, Goodman DC, Jarvik JG. Trends, major medical complications, and charges associated with surgery for lumbar spinal stenosis in older adults. *Jama*. 2010 Apr 7;303(13):1259-65. Doi: 10.1001/jama.2010.338
 16. Zhang YG, Sun Z, Zhang Z, Liu J, Guo X. Risk factors for lumbar intervertebral disc herniation in Chinese population: a case-control study. *Spine*. 2009 Dec 1;34(25): E918-22. doi:10.1097/BRS.0b013e3181a3c2de
 17. Lee JC, Lee SH, Peters C, Riew KD. Risk-factor analysis of adjacent-segment pathology requiring surgery following anterior, posterior, fusion, and nonfusion cervical spine operations: survivorship analysis of 1358 patients. *JBJS*. 2014 Nov 5;96(21):1761-7. doi: 10.1055/s-0036-1578806
 18. Ahn DK, Park HS, Choi DJ, Kim KS, Yang SJ. Survival and prognostic analysis of adjacent segments after spinal fusion. *Clinics in Orthopedic Surgery*. 2010 Aug 3;2(3):140. doi: 10.2106/JBJS.M.01482
 19. Menezes-Reis R, Bonugli GP, Dalto VF, da Silva Herrero CF, Defino HL, Nogueira-Barbosa MH. Association between lumbar spine sagittal alignment and L4-L5 disc degeneration among asymptomatic young adults. *Spine*. 2016 Sep 15;41(18):E1081-7. doi: 10.1097/BRS.0000000000001568
 20. Peng CW, Yue WM, Poh SY, Yeo W, Tan SB. Clinical and radiological outcomes of minimally invasive versus open transforaminal lumbar interbody fusion. *Spine*. 2009 Jun 1;34(13):1385-9. doi: 10.1097/BRS.0b013e3181a4e3be