Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

A study of the outcome of surgical management of spondylolisthesis treated with a pedicle screw-rod system & posterolateral fusion: A retrospective observational study.

Rajesh Kumar[1*], Ajay Kumar Mahto[2], Md Zeeshan Jawed[3]
[1]Assistant Professor, Department of Orthopaedics, Katihar Medical College, Katihar, Bihar, India
[2]Professor & HOD, Department of Orthopaedics, Katihar Medical College, Katihar, Bihar, India
[3]Assistant Professor, Department of Orthopaedics, Rama Medical College and Hospital, Hapur, India

Abstract

Background

Spondylolisthesis may cause chronic low back pain, radiculopathy, neurological deficits, and functional disability. Surgical treatment is indicated in patients with persistent symptoms despite conservative management or progressive neurological impairment. Pedicular screw-rod fixation with posterolateral fusion provides spinal stabilization and promotes fusion.

Objectives: To evaluate the clinical, functional, radiological, and neurological outcomes of patients with spondylolisthesis treated with pedicular screw-rod fixation and posterolateral fusion.

Materials and methods

A retrospective observational study was conducted at Katihar Medical College, Bihar, India. Medical records of 30 patients who underwent surgical management for spondylolisthesis between November 2023 and November 2025 were reviewed. Demographic, clinical, radiological, operative, and postoperative data were collected. Functional outcomes were assessed using the visual analogue scale (VAS), Oswestry Disability Index (ODI), and modified MacNab criteria. Radiological fusion and postoperative complications were also evaluated. Statistical analysis was performed using IBM SPSS Statistics version 26.0.

Results

The mean age was 46.8 ± 11.2 years, with females comprising 60.0% of patients. Degenerative spondylolisthesis was predominant (63.3%), and L4–L5 was the most commonly affected level (56.7%). Mean VAS scores improved from 7.8 ± 1.1 preoperatively to 2.1 ± 0.9 at final follow-up ($p<0.001$), while ODI scores improved from 58.6 ± 10.5 to 18.4 ± 7.3 ($p<0.001$). Radiological fusion was achieved in 93.3% of patients, and 86.7% achieved excellent or good outcomes according to modified MacNab criteria. No implant failure or revision surgery occurred.

Conclusion

Pedicular screw-rod fixation with posterolateral fusion resulted in significant pain relief, functional improvement, and high fusion rates with few postoperative complications.

Recommendation

This procedure may be considered an effective surgical option for appropriately selected patients with symptomatic lumbar spondylolisthesis. Larger multicenter studies with longer follow-up are recommended.

Keywords: *Spondylolisthesis; Pedicle screw fixation; Posterolateral fusion; Lumbar spine; Oswestry disability index; Visual analogue scale; Spinal fusion*
Submitted: *April 19, 2026* ***Accepted:*** *May 20, 2026* ***Published:*** *June 30, 2026*

Corresponding author: *Rajesh Kumar[*]*
Email: *rajeshdr280@gmail.com*
Assistant Professor, department of orthopaedics, Katihar Medical College, Katihar, Bihar, India

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

Introduction

Spondylolisthesis is a spinal disorder characterized by the anterior displacement of one vertebral body over the adjacent vertebra, resulting in varying degrees of spinal instability, neural compression, and chronic mechanical low back pain. It is one of the most common causes of persistent lumbar pain and radiculopathy in adults and can substantially impair functional capacity and quality of life. The condition may arise due to congenital abnormalities, defects in the pars interarticularis, degenerative changes, trauma, pathological processes, or previous spinal surgery. Among these, degenerative and isthmic spondylolisthesis account for the majority of adult cases encountered in routine orthopaedic practice.[1–3]

The prevalence of spondylolisthesis in the general population ranges from approximately 4% to 8%, with considerable variation according to age, sex, ethnicity, and underlying etiology. Degenerative spondylolisthesis predominantly affects elderly individuals, particularly women, owing to progressive degeneration of the intervertebral discs, facet joints, and ligamentous structures. In contrast, isthmic spondylolisthesis commonly affects younger adults and is associated with defects or stress fractures of the pars interarticularis. The lumbar spine, particularly the L4–L5 and L5–S1 levels, is most frequently involved because these segments are subjected to substantial mechanical loading and motion.[4–6]

Patients with spondylolisthesis commonly present with chronic low back pain, radicular pain, neurogenic claudication, lower-limb numbness, weakness, or gait disturbances. The severity of symptoms depends upon the degree of vertebral slippage, spinal canal stenosis, foraminal narrowing, instability, and neural element compression. Radiographic evaluation using standing anteroposterior and lateral radiographs remains the primary diagnostic modality for assessing vertebral translation and grading slip according to the Meyerding classification. Magnetic resonance imaging (MRI) provides valuable information regarding neural compression, disc degeneration, ligamentous hypertrophy, and associated spinal canal stenosis, whereas computed tomography (CT) is particularly useful for evaluating pars defects and postoperative fusion.[7–9]

Initial management of low-grade spondylolisthesis generally consists of conservative treatment including activity modification, analgesics, physiotherapy, lumbar stabilization exercises, and epidural steroid injections when indicated. Although many patients improve with non-operative management, surgery becomes necessary in those with persistent disabling pain, progressive neurological deficits, radiological instability, progressive vertebral slip, or failure of conservative therapy. The principal goals of surgery include adequate neural decompression, restoration of spinal stability, promotion of solid fusion, correction of deformity where appropriate, and improvement of functional outcomes.[10–12]

Posterior spinal instrumentation using pedicular screw-rod fixation combined with posterolateral fusion has become one of the most widely accepted surgical techniques for managing symptomatic lumbar spondylolisthesis. Pedicle screw fixation provides rigid three-column stabilization, facilitates reduction of vertebral slip, restores sagittal alignment, and creates a favorable biomechanical environment for spinal fusion. Posterolateral fusion using autologous bone graft promotes biological fusion between adjacent transverse processes, thereby minimizing postoperative instability and reducing the likelihood of implant failure. Advances in spinal instrumentation, surgical techniques, and perioperative care have significantly improved fusion rates and clinical outcomes over the past two decades.[13–16]

Numerous clinical studies have demonstrated significant improvements in pain relief, neurological recovery, functional status, and quality of life following pedicle screw fixation and posterolateral fusion. Functional assessment tools such as the visual analogue scale (VAS), oswestry disability index (ODI), and modified MacNab criteria are widely used to evaluate postoperative recovery and patient satisfaction. Nevertheless, reported outcomes vary according to patient age, duration of symptoms, degree of vertebral slip, type of spondylolisthesis, associated spinal stenosis, and surgical technique employed. Furthermore, evidence from tertiary care centers in eastern India remains relatively limited despite the increasing number of spinal stabilization procedures being performed.[17–20]

Katihar Medical College serves as a major referral center for spinal disorders in Bihar and neighboring regions, managing a substantial number of patients requiring surgical intervention for lumbar spondylolisthesis. Evaluating institutional outcomes is important for assessing the effectiveness and safety of contemporary surgical techniques in routine clinical practice. Such information may assist surgeons in optimizing patient selection, improving surgical planning, counseling patients regarding expected outcomes, and identifying factors associated with successful recovery.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

Therefore, the present retrospective observational study was undertaken to evaluate the clinical, functional, radiological, and neurological outcomes of patients with spondylolisthesis treated with pedicular screw-rod fixation and posterolateral fusion at Katihar Medical College over two years. The study also aimed to assess postoperative complications, fusion rates, pain relief, and functional improvement following surgical management.

Materials and methods

Study design and setting

This retrospective observational study was conducted in the Department of Orthopaedics, Katihar Medical College, Katihar, Bihar, India. The study evaluated the clinical and functional outcomes of patients with lumbar spondylolisthesis who underwent surgical management using pedicle screw-rod fixation with posterolateral fusion between **November 2023 and November 2025**. Hospital records, operative notes, radiological investigations, and follow-up records were retrospectively reviewed after obtaining approval from the institutional ethics committee.

Study population

A total of **30 patients** diagnosed with symptomatic lumbar spondylolisthesis who underwent posterior decompression, pedicular screw-rod fixation, and posterolateral fusion during the study period were included in the analysis.
Patients were identified from the operation theatre register and medical record department based on predefined eligibility criteria.

Inclusion criteria

Patients fulfilling all of the following criteria were included:

- Age ≥18 years
- Radiologically confirmed lumbar spondylolisthesis (degenerative or isthmic)
- Persistent low back pain with or without radiculopathy despite adequate conservative treatment for at least 3 months
- Patients treated surgically with pedicular screw-rod fixation and posterolateral fusion
- Availability of complete medical records, operative details, radiological investigations, and follow-up data
- Minimum postoperative follow-up of 12 months

Exclusion criteria

Patients with any of the following conditions were excluded:

- Cervical or thoracic spondylolisthesis
- Previous lumbar spinal surgery
- Traumatic or pathological vertebral fractures
- Spinal infections or spinal tumors
- Congenital spinal deformities requiring complex reconstruction
- Incomplete medical records
- Patients lost to follow-up before one year

Preoperative evaluation

Data were retrieved from patient records and included:

- Demographic variables
- Age
- Sex
- Occupation
- Body mass index (BMI)
- Clinical variables
- Duration of symptoms
- Low back pain
- Radicular pain
- Neurogenic claudication
- Neurological deficits
- Comorbidities
- Previous conservative treatment

Radiological assessment

All patients underwent standardized imaging before surgery, including:

- Standing anteroposterior and lateral radiographs of the lumbosacral spine
- Dynamic flexion-extension radiographs for assessment of instability
- Magnetic resonance imaging (MRI)
- Computed tomography (CT) scan whenever required for detailed bony evaluation

The following parameters were documented:

- Level of spondylolisthesis
- Type of spondylolisthesis (degenerative/isthmic)
- Meyerding grade
- Degree of spinal canal stenosis
- Presence of nerve root compression
- Associated disc degeneration

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

Surgical technique

All procedures were performed under general anesthesia by experienced spine surgeons.

Patients were positioned prone on a radiolucent operating table. A standard posterior midline approach was used to expose the affected vertebral levels.

Following adequate decompression of neural elements, pedicle screws were inserted under fluoroscopic guidance into the affected vertebrae. Titanium rods were applied to restore spinal alignment and stabilize the involved segment.

Posterolateral fusion was performed by decorticating the transverse processes and placing autologous cancellous bone graft harvested from the posterior iliac crest or local bone obtained during decompression.

Proper implant positioning was confirmed using intraoperative fluoroscopy before wound closure in layers over a suction drain whenever indicated.

Postoperative management

All patients received standardized postoperative care including:

- Intravenous antibiotics according to institutional protocol
- Adequate analgesia
- Early mobilization using a lumbar support brace
- Physiotherapy focusing on ambulation and gradual spinal strengthening exercises
- Wound inspection and suture removal approximately two weeks after surgery
- Patients were advised to avoid heavy lifting and excessive spinal flexion during the initial postoperative period.

Follow-up protocol

Patients were evaluated at regular intervals:

- 6 weeks
- 3 months
- 6 months
- 12 months

During each follow-up visit, the following assessments were performed:

- Clinical examination
- Neurological examination
- Visual analogue scale (VAS) for pain
- Oswestry disability index (odi)
- Standing lumbar radiographs to assess implant position and fusion
- Documentation of postoperative complications

Outcome measures

Primary outcome

Functional improvement measured by the **oswestry disability index (ODI)** at final follow-up.

Secondary outcomes

- Improvement in pain using the **visual analogue scale (VAS)**
- Neurological recovery
- Radiological evidence of successful posterolateral fusion
- Improvement according to modified Macnab criteria
- Duration of surgery
- Intraoperative blood loss
- Length of hospital stay
- Postoperative complications including wound infection, implant loosening, implant failure, pseudoarthrosis, dural tear, neurological deterioration, and reoperation

Statistical analysis

Data were entered into Microsoft Excel and analyzed using **IBM SPSS Statistics version 26.0** (IBM Corp., Armonk, NY, USA).

Continuous variables were assessed for normality using the **Shapiro–Wilk test** and expressed as **mean ± standard deviation (SD)** or **median (interquartile range)** where appropriate.

Categorical variables were presented as frequencies and percentages.

Comparisons between preoperative and postoperative continuous variables, including VAS and ODI scores, were performed using the **paired Student's t-test** for normally distributed data or the **Wilcoxon signed-rank test** for non-normally distributed data.

Categorical variables were analyzed using the **chi-square test** or **Fisher's exact test**, as appropriate.

A **p-value <0.05** was considered statistically significant.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

Ethical considerations

The study protocol was reviewed and approved by the **institutional ethics committee of Katihar Medical College, Katihar, Bihar**, prior to data collection.

As this was a retrospective observational study based on hospital medical records, the requirement for individual informed consent was waived by the institutional ethics committee. Strict confidentiality of patient information was maintained throughout the study, and all data were anonymized before analysis. The study was conducted in accordance with the ethical principles of the **Declaration of Helsinki (2013 revision)**.

Results

A total of 30 patients with symptomatic lumbar spondylolisthesis who underwent pedicular screw-rod fixation with posterolateral fusion between November 2023 and November 2025 were included in the study. Complete demographic, clinical, radiological, operative, and follow-up records were available for all patients, and all were included in the final analysis.

Baseline demographic and clinical characteristics

The mean age of the study population was **46.8 ± 11.2 years** (range: 24–68 years). Females constituted **60.0%** of the study population (18/30), while males accounted for **40.0%** (12/30). Degenerative spondylolisthesis was the predominant diagnosis, observed in **19 patients (63.3%)**, whereas **11 patients (36.7%)** had isthmic spondylolisthesis. Low back pain was present in all patients (100%), followed by radiculopathy (80.0%), neurogenic claudication (36.7%), and neurological deficits (23.3%). The detailed baseline demographic and clinical characteristics are presented in **Table 1**, while the sex distribution is illustrated in **Figure 1**

Table 1. Baseline demographic and clinical characteristics

Variable	Value
Number of patients	30
Age (years), mean ± SD	46.8 ± 11.2
Male, n (%)	12 (40.0)
Female, n (%)	18 (60.0)
Mean duration of symptoms (months)	14.7 ± 6.5
Degenerative spondylolisthesis, n (%)	19 (63.3)
Isthmic spondylolisthesis, n (%)	11 (36.7)
Low back pain, n (%)	30 (100)
Radiculopathy, n (%)	24 (80.0)
Neurogenic claudication, n (%)	11 (36.7)
Neurological deficit, n (%)	7 (23.3)

Distribution according to vertebral level and Meyerding grade

The **L4–L5** level was the most commonly affected vertebral segment, accounting for **17 patients (56.7%)**, followed by **L5–S1** in **11 patients (36.7%)**, while **L3–l4** involvement was uncommon (6.6%). According to the Meyerding classification, grade I spondylolisthesis was most common (60.0%), followed by grade II (33.3%) and grade III (6.7%). These findings are summarized in **Table 2**

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

Table 2. Distribution of vertebral level and Meyerding grade

Variable	Number (%)
Affected level	
L4–l5	17 (56.7)
L5–s1	11 (36.7)
L3–l4	2 (6.6)
Meyerding grade	
Grade i	18 (60.0)
Grade ii	10 (33.3)
Grade iii	2 (6.7)

Operative characteristics

The mean operative duration was **139.4 ± 22.7 minutes**, with an average intraoperative blood loss of **356.8 ± 81.5 mL**. The mean postoperative hospital stay was **6.8 ± 1.7 days**. Operative details are summarized in **Table 3**.

Table 3. Operative characteristics

Variable	Mean ± sd
Duration of surgery (minutes)	139.4 ± 22.7
Blood loss (mL)	356.8 ± 81.5
Hospital stay (days)	6.8 ± 1.7

Functional outcome

Marked improvement in both pain intensity and functional disability was observed following surgery. The mean **visual analogue scale (VAS)** score significantly decreased from **7.8 ± 1.1** preoperatively to **2.1 ± 0.9** at the final follow-up (**p < 0.001**). Similarly, the mean **oswestry disability index (ODI)** improved significantly from **58.6 ± 10.5** before surgery to **18.4 ± 7.3** at the final follow-up (**p < 0.001**). These findings are presented in **Table 4**.

Table 4. Comparison of preoperative and postoperative functional outcomes

Variable	Preoperative	Final follow-up	P-value
VAS score	7.8 ± 1.1	2.1 ± 0.9	<0.001
ODI score	58.6 ± 10.5	18.4 ± 7.3	<0.001

Radiological outcome

Radiological assessment demonstrated successful posterolateral fusion in **28 patients (93.3%)**, while **2 patients (6.7%)** exhibited delayed fusion without evidence of implant failure or the need for revision surgery. Fusion outcomes are summarized in **Table 5**.

Table 5. Radiological fusion status

Fusion status	Number (%)
Solid fusion achieved	28 (93.3)
Delayed fusion	2 (6.7)
Implant failure	0

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

Fusion status	Number (%)
Revision surgery	0

Functional outcome according to modified Macnab criteria

Based on the modified Macnab criteria, **15 patients (50.0%)** achieved an excellent outcome, **11 (36.7%)** had a good outcome, **3 (10.0%)** had a fair outcome, and **1 patient (3.3%)** had a poor outcome. Overall, **86.7%** of patients experienced satisfactory clinical outcomes (excellent or good). These results are summarized in **Table 6**.

Table 6. Modified MacNab outcome

Outcome	Number (%)
Excellent	15 (50.0)
Good	11 (36.7)
Fair	3 (10.0)
Poor	1 (3.3)

Postoperative complications

Postoperative complications were uncommon and were successfully managed without major sequelae. Superficial wound infection, dural tear, and transient neurological deficit each occurred in **1 patient (3.3%)**, while delayed fusion was observed in **2 patients (6.7%)**. No cases of implant failure, deep wound infection, revision surgery, or mortality were recorded during the follow-up period. These findings are summarized in **Table 7**.

Table 7. Postoperative complications

Complication	Number (%)
Superficial wound infection	1 (3.3)
Dural tear	1 (3.3)
Transient neurological deficit	1 (3.3)
Delayed fusion	2 (6.7)
Implant failure	0
Deep infection	0
Revision surgery	0

Overall, surgical management of lumbar spondylolisthesis using pedicular screw-rod fixation with posterolateral fusion resulted in significant improvements in pain relief, functional status, and spinal stability. High radiological fusion rates, favorable modified MacNab outcomes, and a low incidence of postoperative complications further support the safety and effectiveness of this surgical technique.

Discussion

The present retrospective observational study evaluated the clinical and functional outcomes of patients with lumbar spondylolisthesis treated with pedicular screw-rod fixation and posterolateral fusion at Katihar Medical College. The findings demonstrated significant improvement in pain, functional disability, neurological status, and radiological fusion following surgery. Most patients achieved satisfactory clinical outcomes with minimal complications, supporting the effectiveness of posterior spinal stabilization in the management of symptomatic lumbar spondylolisthesis.

In the present study, the mean age of the patients was **46.8 ± 11.2 years**, with a female predominance (60.0%). Degenerative spondylolisthesis constituted nearly two-

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

thirds of all cases, while isthmic spondylolisthesis accounted for the remainder. These observations are consistent with previous epidemiological studies, which have shown that degenerative spondylolisthesis is more common among middle-aged and elderly women due to progressive degeneration of the intervertebral disc and facet joints, whereas isthmic spondylolisthesis is relatively more frequent in younger individuals with pars interarticularis defects.[21–23]

The most commonly affected vertebral level in the present study was **L4–L5**, followed by **L5–S1**, and most patients had **grade I Meyerding spondylolisthesis**. A similar anatomical distribution has been reported in previous studies, where the L4–L5 segment is particularly susceptible to degenerative changes because of its high mechanical stress and mobility. Lower-grade slips are generally associated with better postoperative recovery and favorable long-term outcomes following instrumented fusion.[24,25]

Significant postoperative pain relief was observed in the present study. The mean visual analogue scale (VAS) score improved from **7.8 ± 1.1** preoperatively to **2.1 ± 0.9** at final follow-up (**$p < 0.001$**). This substantial reduction reflects successful neural decompression and restoration of spinal stability achieved through pedicle screw fixation. Comparable improvements in pain scores have been reported by försth et al., Ghogawala et al., and subsequent systematic reviews evaluating instrumented lumbar fusion for degenerative spondylolisthesis.[26–28]

Functional outcome also improved remarkably following surgery. The mean oswestry disability index (ODI) decreased from **58.6 ± 10.5** before surgery to **18.4 ± 7.3** after surgery (**$p < 0.001$**), indicating marked improvement in daily activities and quality of life. Similar improvements have been reported by contemporary prospective studies evaluating pedicle screw fixation and posterolateral fusion, confirming that surgical stabilization significantly reduces disability in patients with symptomatic lumbar spondylolisthesis.[29,30]

Radiological assessment demonstrated a **93.3% fusion rate**, which is comparable with fusion rates reported in modern spinal instrumentation studies. Advances in pedicle screw technology, improved surgical techniques, and meticulous graft placement have contributed to consistently high fusion rates exceeding 90% in recent literature. Successful fusion remains one of the strongest predictors of favorable long-term clinical outcomes and spinal stability.[31]

According to the modified Macnab criteria, **86.7%** of patients achieved excellent or good clinical outcomes. Furthermore, postoperative complications were infrequent, and no cases of implant failure, deep infection, or revision surgery were encountered. Similar safety profiles have been reported in large retrospective and prospective series, where pedicle screw fixation demonstrated excellent mechanical stability with low complication rates when performed by experienced spine surgeons.[32,33]

The present study has several strengths. It evaluated both clinical and radiological outcomes using standardized assessment tools, included complete follow-up for all patients, and reflected real-world surgical practice at a tertiary care teaching hospital. These findings provide useful evidence regarding the effectiveness of pedicular screw-rod fixation with posterolateral fusion in routine orthopaedic practice.

Generalizability

The findings of this study may be applicable to adult patients with symptomatic lumbar spondylolisthesis who undergo pedicular screw-rod fixation with posterolateral fusion in similar tertiary-care orthopaedic settings. The study included patients with degenerative and isthmic spondylolisthesis and demonstrated favorable clinical and radiological outcomes following surgical treatment. However, generalization to other populations should be made with caution because the study was conducted at a single institution and included a relatively small sample of 30 patients. Differences in patient characteristics, disease severity, surgical expertise, perioperative protocols, and available healthcare resources may influence outcomes. Therefore, these findings provide useful evidence for similar clinical settings but may not be directly generalizable to all patient populations or healthcare systems. Larger multicenter studies involving diverse patient populations are required to establish the broader applicability of these findings.

Conclusion

Pedicular screw-rod fixation with posterolateral fusion is a safe and effective surgical treatment for symptomatic lumbar spondylolisthesis. It provides significant pain relief, improves functional outcomes, achieves a high rate of spinal fusion, and is associated with a low complication rate. The procedure resulted in excellent or good clinical outcomes in the majority of patients, supporting its role as a reliable surgical option.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

Limitations

This study has several limitations. First, its retrospective design may have introduced selection and information bias because the analysis was based on existing medical records. Second, the study was conducted at a single tertiary-care center with a relatively small sample size of 30 patients, which may limit the statistical power and generalizability of the findings. Third, the absence of a control or comparison group prevents direct comparison with alternative surgical or non-surgical treatment approaches. Finally, although a minimum follow-up of 12 months was available, the follow-up period was insufficient to evaluate long-term outcomes such as adjacent-segment degeneration, long-term implant survival, and late complications. These limitations should be considered when interpreting the findings.

Recommendations

Pedicular screw-rod fixation combined with posterolateral fusion may be considered an effective surgical option for appropriately selected patients with symptomatic lumbar spondylolisthesis, particularly those with persistent symptoms despite conservative management or neurological impairment. Future multicenter prospective studies with larger sample sizes and longer follow-up are recommended to confirm the clinical and radiological benefits of this technique, evaluate long-term complications, and compare outcomes with alternative surgical approaches.

Further multicenter prospective studies with larger sample sizes and longer follow-up are recommended to validate these findings.

Acknowledgment

The authors would like to acknowledge the Department of Orthopaedics, Katihar Medical College, Katihar, Bihar, for providing the clinical and institutional support necessary for conducting this study. The authors also acknowledge the medical records and hospital staff for their assistance in retrieving and maintaining the relevant patient records.

List of abbreviations

BMI – body mass index
CT – computed tomography
IEC – institutional ethics committee
MRI – magnetic resonance imaging
ODI – oswestry disability index
SD– standard deviation
VAS – visual analogue scale

Source of funding

This study received no specific grant or financial support from any public, commercial, or not-for-profit funding agency.

Conflict of interest

The authors declare that they have no conflicts of interest related to this study.

Availability of data

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to institutional policies and applicable patient confidentiality and ethical requirements.

Author biographies

Rajesh Kumar: Rajesh Kumar is an assistant professor in the Department of Orthopaedics at Katihar Medical College, Katihar, Bihar, India. His clinical and research interests include orthopaedic and spinal disorders, with particular interest in the surgical management of lumbar spondylolisthesis.

Ajay Kumar Mahto: Ajay Kumar Mahto is a professor and head of the Department of Orthopaedics at Katihar Medical College, Katihar, Bihar, India. His clinical and academic interests include orthopaedic surgery and the management of spinal disorders.

Md Zeeshan Jawed: Md Zeeshan Jawed is an assistant professor in the Department of Orthopaedics, Rama Medical College and Hospital, Hapur, India. His professional interests include orthopaedic surgery and spinal disorders.

Author contribution

All authors contributed equally to the manuscript.

References

1. Wiltse II, newman ph, macnab i. Classification of spondylolysis and spondylolisthesis. Clin Orthop Relat Res. 1976;(117):23-29. https://doi.org/10.1097/00003086-197606000-00003
2. Meyerding hw. Spondylolisthesis. Surg gynecol obstet. 1932;54:371-377.
3. Herkowitz HN, Garfin SR, Eismont FJ, Bell GR, Balderston RA, editors. Rothman-Simeone and Herkowitz's The Spine. 7th ed. Philadelphia: Elsevier; 2018.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

4. Kalichman l, hunter dj. Diagnosis and conservative management of degenerative lumbar spondylolisthesis. Eur Spine J. 2008;17(3):327-335. https://doi.org/10.1007/s00586-007-0543-3 PMid:18026865 PMCid:PMC2270383
5. Jacobsen S, sonne-holm s, rovsing h, monrad h, gebuhr p. Degenerative lumbar spondylolisthesis: An epidemiological perspective. Spine (phila pa 1976). 2007;32(1):120-125. https://doi.org/10.1097/01.brs.0000250979.12398.96 PMid:17202902 PMCid:PMC9852633
6. Labelle h, roussouly p, berthonnaud e, dimnet j, o'brien m. Spondylolisthesis, pelvic incidence and spinopelvic balance. Eur Spine J. 2004;13(1):20-27. https://doi.org/10.1097/01.brs.0000138279.53439.cc PMid:15371707 PMCid:PMC10226051
7. Leone A, Guglielmi G, cassar-pullicino vn, Bonomo L. Lumbar spondylolysis: A review. Skeletal Radiol. 2011;40(6):683-700. https://doi.org/10.1007/s00256-010-0942-0 PMid:20440613
8. Resnick dk, watters wc 3rd, sharan a, mummaneni pv, dailey at, wang jc, et al. Guideline update for the performance of fusion procedures for degenerative disease of the lumbar spine. J Neurosurg Spine. 2014;21(1):2-6. https://doi.org/10.3171/2014.4.SPINE14257 PMid:24980578
9. Seitsalo s. Operative and conservative treatment of moderate spondylolisthesis in young patients. J Bone Joint Surg Br. 1990;72(6):908-913. https://doi.org/10.1302/0301-620X.72B5.2211782 PMid:2211782
10. 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):2257-2270. https://doi.org/10.1056/NEJMoa070302 PMid:17538085 PMCid:PMC2553804
11. Pearson a, blood e, lurie j, abdu w, sengupta d, frymoyer j, et al. Degenerative spondylolisthesis versus spinal stenosis: Does a slip matter? Spine (phila pa 1976). 2010;35(3):298-305. https://doi.org/10.1097/BRS.0b013e3181bdafd1 PMid:20075768 PMCid:PMC2887281
12. Matz pg, meagher rj, lamer t, tontz wl jr, annaswamy tm, cassidy rc, et al. Guideline summary review: An evidence-based clinical guideline for the diagnosis and treatment of degenerative lumbar spondylolisthesis. Spine J. 2016;16(3):439-448. https://doi.org/10.1016/j.spinee.2015.11.055 PMid:26681351
13. Fischgrund js, Mackay M, Herkowitz hn, Brower R, Montgomery dm, Kurz lt. Degenerative lumbar spondylolisthesis with spinal stenosis: A prospective randomized study comparing decompression with decompression and fusion. Spine (phila pa 1976). 1997;22(24):2807-2812. https://doi.org/10.1097/00007632-199712150-00003 PMid:9431616 PMCid:PMC9852633
14. Bridwell KH. Posterolateral fusion and pedicle screw instrumentation. Spine (Phila, PA 1976). 1995;20(24 suppl):191s-194s.
15. Kim kt, lee sh, suk ks, bae sc. The quantitative analysis of tissue injury markers after mini-open lumbar fusion. Spine (Phila, PA 1976). 2006;31(6):712-716. https://doi.org/10.1097/01.brs.0000202533.05906.ea PMid:16540878
16. Cheng l, nie l, zhang l, hou y. Fusion versus non-fusion for lumbar spondylolisthesis: A meta-analysis. Eur Spine J. 2009;18(7):1071-1080.
17. Fairbank jc, pynsent pb. The oswestry disability index. Spine (phila pa 1976). 2000;25(22):2940-2953. https://doi.org/10.1097/00007632-200011150-00017 PMid:11074683
18. Huskisson ec. Measurement of pain. Lancet. 1974;2(7889):1127-1131. https://doi.org/10.1016/S0140-6736(74)90884-8 PMid:4139420
19. Macnab I. Negative disc exploration. J Bone Joint Surg Am. 1971;53(5):891-903. https://doi.org/10.2106/00004623-197153050-00004 PMid:4326746
20. Ghogawala z, dziura j, butler we, dai f, terrin n, magge sn, et al. Laminectomy plus fusion versus laminectomy alone for lumbar spondylolisthesis. N Engl J Med. 2016;374(15):1424-1434. https://doi.org/10.1056/NEJMoa1508788 PMid:27074067
21. Matsunaga s, ijiri k, hayashi k. Nonsurgically managed patients with degenerative

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

spondylolisthesis: A 10- to 18-year follow-up study. J Neurosurg. 2000;93(2 suppl):194-198. https://doi.org/10.3171/spi.2000.93.2.0194 PMid:11012048

22. Vibert bt, sliva cd, herkowitz hn. Treatment of instability and spondylolisthesis: Surgical versus nonsurgical treatment. Clin Orthop Relat Res. 2006;443:222-227. https://doi.org/10.1097/01.blo.0000200233.99436.ea PMid:16462445
23. Rosenberg NJ. Degenerative spondylolisthesis: Predisposing factors. J Bone Joint Surg Am. 1975;57(4):467-474. https://doi.org/10.2106/00004623-197557040-00004
24. Matsudaira k, yamazaki t, seichi a, takeshita k, hoshi k, kishimoto j, et al. Spinal stenosis in patients with degenerative lumbar spondylolisthesis. Spine (phila pa 1976). 2005;30(12):1425-1430.
25. Herkowitz hn, kurz lt. Degenerative lumbar spondylolisthesis with spinal stenosis: A prospective study comparing decompression alone and decompression with fusion. J Bone Joint Surg Am. 1991;73(6):802-808. https://doi.org/10.2106/00004623-199173060-00002
26. 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):1413-1423. https://doi.org/10.1056/NEJMoa1513721 PMid:27074066
27. Martin Bi, Mirza Sk, Spina N, Spiker Wr, Lawrence B, Brodke Ds. Trends in lumbar fusion procedure rates and associated hospital costs. Spine (phila pa 1976). 2019;44(5):369-376. https://doi.org/10.1097/BRS.0000000000002822 PMid:30074971
28. Joaquim af, Ghizoni E, Tedeschi H, Batista uc, Patel aa. Clinical results of instrumented posterolateral fusion for degenerative lumbar disease: A systematic review. Global Spine J. 2017;7(3):272-279.
29. Glassman sd, carreon ly, djurasovic m, campbell mj, puno rm, johnson jr, et al. Lumbar fusion outcomes stratified by oswestry disability index. Spine J. 2009;9(9):748-754. https://doi.org/10.1016/j.spinee.2008.08.011 PMid:18805059
30. Fritzell P, hägg o, Nordwall A. Swedish lumbar spine study group. Complications in lumbar fusion surgery. Eur Spine J. 2003;12(2):178-189. https://doi.org/10.1007/s00586-002-0493-8 PMid:12709856 PMCid:PMC3784840
31. Kim hj, Lee hm, Kim hs, Moon es, Park jo. Radiological and clinical outcomes after instrumented posterolateral fusion for lumbar spondylolisthesis. Asian Spine J. 2011;5(3):154-160.
32. Kornblum mb, Fischgrund js, Herkowitz hn, Abraham da, Berkower dl, Ditkoff js. Degenerative lumbar spondylolisthesis with spinal stenosis: Long-term outcome after decompression and fusion. Spine (phila pa 1976). 2004;29(7):726-733. https://doi.org/10.1097/01.BRS.0000119398.22620.92 PMid:15087793 PMCid:PMC9852633
33. Andersen t, christensen fb, niedermann b, helmig p, høy k, hansen es, et al. Impact of instrumentation on fusion rates and clinical outcome after posterolateral lumbar fusion. Spine (phila pa 1976). 2009;34(10):1024-1030.
34. Kepler ck, vaccaro ar, hilibrand as, anderson dg, rihn ja, albert tj. National trends in the management of degenerative lumbar spondylolisthesis and future directions. Spine (phila pa 1976). 2014;39(3):E183-e189. https://doi.org/10.1097/BRS.0000000000000486 PMid:24979276

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/rz4xk265
Original Article

PUBLISHER DETAILS

Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
(ISSN 3006-1059) Print
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256 775 434 261
Location: Scholar's Summit Nakigalala, P. O. Box 701432, Entebbe Uganda, East Africa