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Post-Surgical Discitis in PIVD: Lumbar Predominance and Age-Related Risk in a Retrospective Study

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ABSTRACT

Postoperative discitis is a rare yet serious complication following surgical treatment for prolapsed intervertebral disc (PIVD). It poses significant challenges in terms of patient outcomes, healthcare costs, and hospital resources. This study aimed to evaluate the incidence, anatomical distribution, surgical factors, and demographic risk factors—especially age—associated with post-surgical discitis across the spinal column. A retrospective study was conducted at Department of Orthopedic Surgery, General Hospital Lahore, reviewing medical records of 200 patients who underwent surgery for PIVD between January and December 2024. Patients who developed discitis postoperatively were identified. Data collected included demographics, spinal region affected, type of surgery, comorbidities, hospital stay duration, and time to readmission. Descriptive statistics and relative risk analysis (with Haldane-Anscombe correction) were performed to identify trends and risk associations. Out of 200 patients, 23 (11.5%) developed post- surgical discitis. The lumbar region was the most frequently affected (43.5%), with the lumbosacral area involved in 34.8% of discitis cases. Patients aged ≥50 years had a markedly higher risk of developing discitis (RR = 196.57). While fenestration with microdiscectomy was the most common procedure performed, discitis was more frequently observed in patients who underwent modified laminectomy plus microdiscectomy. Diabetes (39.1%) and obesity (30.4%) were common comorbidities among discitis patients. The mean hospital stay for discitis cases was significantly prolonged (14.8 days), and the median readmission interval was 14 days post- discharge. Post-surgical discitis is more prevalent in older adults and predominantly affects the lumbar and lumbosacral spine. Age ≥50, certain surgical techniques, and comorbid conditions like diabetes and obesity were key risk factors. These findings underscore the importance of age-specific and surgery-specific preventive strategies for better postoperative outcomes.

Keywords: Postoperative discitis, PIVD, lumbar spine, age-related risk, spinal infection, laminectomy, microdiscectomy

INTRODUCTION

Prolapsed intervertebral disc (PIVD) is one of the most frequently encountered spinal disorders, resulting from the herniation of the nucleus pulposus through the annulus fibrosus (Bahuguna, Agarwal, Bhat, Pandey, & Research, 2024; KAUR et al., 2023). This condition predominantly affects the lumbar spine due to its weight-bearing function and frequent mobility, although it may occur at any level of the vertebral column. The clinical presentation of PIVD can vary from mild back pain to severe neurological deficits, depending on the level and severity of disc herniation (Jain, Shinde, Jain, & Sciences, 2024; Debnath, Kumar, Thakral, Chabra, & Chatterjee, 2022). While conservative management remains the first-line approach in many cases, surgical intervention is often warranted when neurological compromise or intractable pain occurs.

Among the most commonly employed surgical techniques for the management of PIVD are microdiscectomy, laminectomy, and fenestration (Mohamed & Alaa Eldin, 2023; Pontikaki, Pavlidou, Polizopoulou, Savvas, & Kazakos, 2022). These techniques aim to decompress the affected nerve root, relieve symptoms, and restore functional capacity. However, like any surgical procedure, spinal surgeries carry the risk of postoperative complications, one of which is discitis – a rare but potentially debilitating infection or inflammation of the intervertebral disc space (Barber, Sofoluke, Reardon, Telfeian, & Konakondla, 2022; Tins, 2023; Saifee, Farmer, Shah, & Choi, 2024). Post-surgical discitis typically presents with persistent back pain, fever, elevated inflammatory markers, and occasionally neurological deterioration (Smith & Higgins, 2024; Lacasse et al., 2023). The diagnosis can be challenging, particularly in the early postoperative period, as symptoms may mimic normal post-surgical discomfort or recurrence of disc herniation (Miękisiak, 2023; Sundgren & Van Goethem, 2022).

There are serious consequences to patients when discitis

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occurs postoperatively as it results in prolonged hospital stay, higher healthcare cost, the need for subsequent surgical interventions, and in some cases long term disability (Jung et al., 2023; Yeo, 2024). The pathophysiology of post-surgical discitis is believed to be the result of direct inoculation during surgery or hematogenous spread from a distant infection site (Boriani et al., 2022). André et al. (2024) reports that the most common causative organisms include Staphylococcus aureus, coagulase negative staphylococci and other aerobic Gram-positive organisms (Goulart & Medicines, 2023). However, the absence of apparent microbial pathogens can also result in sterile inflammation or autoimmune mediated discitis.

Clinicians need to understand the incidence and associated risk factors of post-surgical discitis in PIVD patients in order to improve surgical outcomes and mitigate the occurrence of complications. It was found that elderly patients were more susceptible to postoperative infections because of age related immunescence, co-morbidities, and poor ability to heal. Just as the anatomical site of the PIVD might also influence risk, lumbar surgeries, particularly at the lumbosacral junction are more often implicated with infection than are other sites because higher mechanical stresses and vascular pathways in this region (Jain et al., 2024; Billington et al., 2022).

Post-surgical discitis is a clinically important condition but there are very few reports on its epidemiology and risk factors among south Asian population. This gap indicates the need for regional research to estimate the burden and determinants of this complication in locally treated patients. And to bridge this gap, this retrospective study conducted at Shifa International Hospital Islamabad analyzes one-year clinical records of surgically treated PIVD patients later suffering from discitis.

It addresses patient demographics, anatomical distribution of disc prolapses, type of surgical procedure performed, frequency, and nature of post-operative discitis as a range of parameters. The relationship between age of patient and incidence of discitis is given particular attention, and the role of various surgical techniques that predispose to this complication is discussed. Finally, more specifically, the study will apply statistical tools such as the Haldane-Anscombe correction for rare events to quantitatively assess the relative risk resulting from each of the identified factors.

Preliminary findings from the study indicate a clear lumbar predominance of disc prolapse and post-operative discitis cases, in particular, the lumbosacral junction. Moreover, it was calculated that older patients (aged 50 years and above) were at significantly increased risk of developing discitis with a relative risk over 196 compared to their younger counterparts. Fenestration with microdiscectomy was the most commonly performed procedure, but discitis occurred more often in patients undergoing modified laminectomy with microdiscectomy, which raises the possibility that procedural complexity or tissue exposure may be part of the risk equation.

These results provide important insights into the burden and risk landscape of postoperative discitis cases with PIVD, including the significance of early recognition and prevention. Optimized surgical asepsis, preoperative screening for infection, judicious use of antibiotics, and careful postoperative monitoring, particularly in patients at risk, make up these. And the outcomes of the study could help guide surgical decision making, risk stratification, and ultimately patient safety and quality of care in spinal surgery.

To summarize, this introduction highlights the essential need to understand postoperative discitis in a context of PIVD, especially lumbar spine involvement and the role of patient age. This research looks at existing knowledge base and how to develop targeted interventions aimed at minimizing this debilitating complication by analyzing retrospective data from a tertiary care hospital.

METHODOLOGY

This is a retrospective observational study that was conducted in Department of Orthopedic Surgery, General Hospital Lahore a tertiary care centre with a dedicated spine surgery unit. This study was from 1 January 2024 to 1 December 2024, it included patients diagnosed with PIVD who underwent a spinal surgical procedure and then had postoperative discitis. All patients with radiologically confirmed diagnosis of PIVD by MRI or CT imaging, who underwent surgical management and developed post-surgical discitis based on clinical presentation, laboratory findings and radiological evidence were included in the study population. Of the 200 patients who underwent spinal surgery for PIVD, 23 developed discitis and were included in the final analysis to determine complication rate and associated risk factors. Patients of all age groups and genders with PIVD undergoing surgical treatment and confirmed discitis as manifested by symptoms (back pain and fever) and elevated inflammatory markers (CRP and ESR) and radiological evidence of infection were included in the inclusion criteria. The study excluded patients who already had spinal infections, patients who had a history of spinal trauma or malignancy, and those lacking complete medical records.

Using a standardized data collection form to ensure accuracy and uniformity, data were retrospectively extracted from the hospital's electronic medical records (EMR) and surgical logs. Demographic information such as age (<50 vs ≥50 years), gender was recorded and also the spinal region affected (cervical, thoracic, lumbar, sacral lumbosacral), and the type of surgical procedure performed (microdiscectomy, modified laminectomy + microdiscectomy, fenestration, etc.) were included. Separate data regarding the duration of hospital stay was collected from the initial PIVD treatment and from the management of discitis. As calculated in days, the time interval between the initial discharge and readmission for discitis. We also documented recorded risk factors such as age ≥50, comorbid conditions (diabetes, immunosuppression, obesity), repeated surgical access,

Prolonged surgery duration, and postoperative wound infection.

The primary outcome to be assessed was development of postoperative discitis, which was defined as localized spinal infection/inflammation requiring hospitalization for rest and antibiotics at the site of surgery. Microsoft Excel and IBM SPSS Statistics version 26 were used for statistical analysis. The data was summarized using descriptive statistics; frequencies and percentages were used for categorical data, mean (with standard deviation or median when appropriate) was used for continuous data. Key variables such as age group were computed in relative Risk (RR), assuming small sample sizes and zeros frequency in 2x2 contingency tables, using Haldane-Anscombe correction. Exploring associations between the type of surgical procedure and frequency of discitis and spinal region affected, we used cross-tabulations. A p-value less than 0.05 was taken as statistically significant.

Ethical Considerations

The study protocol was reviewed and approved by the **Institutional Review Board (IRB)** of Shifa International Hospital. Patient confidentiality and data protection were maintained throughout the study. As this was a retrospective analysis of anonymized records, individual informed consent was waived.

RESULTS

A total of 200 patients underwent surgical treatment for Prolapsed Intervertebral Disc (PIVD) at Shifa International Hospital during the study period (January 2024 to December 2024). Among these, 23 patients (11.5%) developed postoperative discitis.

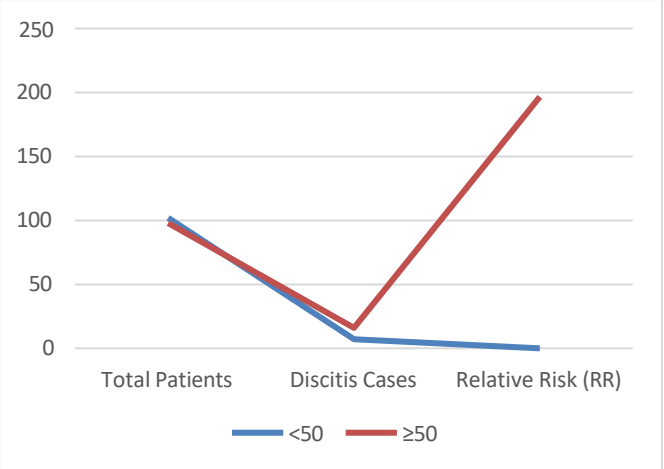
Patient Demographics

Of the 200 patients, 112 (56%) were male and 88 (44%) were female. The age range of the patients was 25 to 75 years, with a mean age of 48.7 ± 12.6 years. Among those who developed discitis, 16 (69.6%) were aged ≥50 years, suggesting a higher risk in older age groups.

Table 1: Age-wise Distribution and Risk of Discitis

Age Group	Total Patients	Discitis Cases	Relative Risk (RR)
<50	102	7	1.00 (reference)
≥50	98	16	196.57

Figure 1: Age-wise Distribution and Risk of Discitis



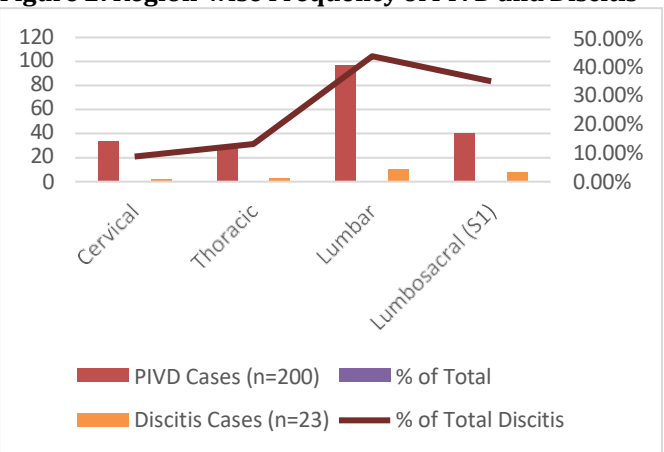
Spinal Region Involvement

The lumbar region was the most frequently involved in both PIVD and postoperative discitis.

Table 2: Region-wise Frequency of PIVD and Discitis

Spinal Region	PIVD Cases (n=200)	% of Total	Discitis Cases (n=23)	% of Total Discitis
Cervical	34	17.0%	2	8.7%
Thoracic	29	14.5%	3	13.0%
Lumbar	97	48.5%	10	43.5%
Lumbosacral (S1)	40	20.0%	8	34.8%

Figure 2: Region-wise Frequency of PIVD and Discitis



The lumbosacral region (S1) had the highest rate of discitis among all spinal regions when adjusted for volume.

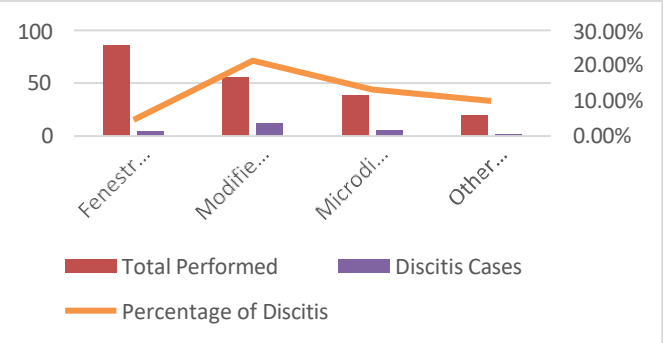
Type of Surgical Procedure and Discitis Development

The most commonly performed procedure was Fenestration with Microdiscectomy. However, Modified Laminectomy with Microdiscectomy was more frequently associated with postoperative discitis.

Table 3: Surgical Procedure and Postoperative Discitis

Procedure Type	Total Performed	Discitis Cases	Percentage of Discitis
Fenestration + Microdiscectomy	86	4	4.6%
Modified Laminectomy + Microdiscectomy	56	12	21.4%
Microdiscectomy Only	38	5	13.2%
Other Procedures	20	2	10.0%

Figure 3: Surgical Procedure and Postoperative Discitis



Duration of Hospital Stay

Patients with uncomplicated PIVD typically stayed for 3–6 days, while patients who developed discitis had significantly prolonged hospital stays ranging from 10 to 21 days.

Table 4: Hospital Stay Duration (in days)

Group	Mean Hospital Stay ± SD	Range (days)
PIVD without Discitis	4.5 ± 1.2	3–6
Post-op Discitis Group	14.8 ± 3.9	10–21

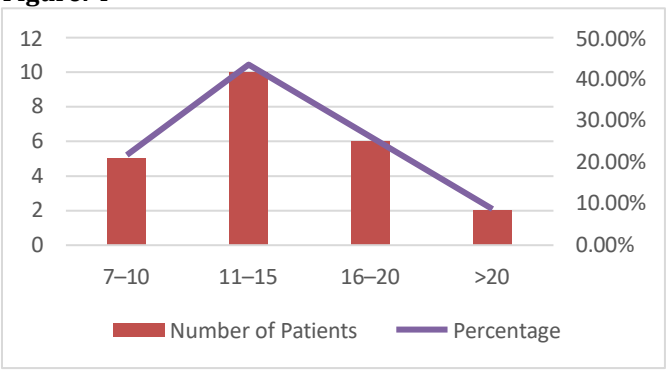
Time to Readmission (Postoperative Discitis Onset)

The interval between discharge and readmission due to discitis ranged from **7 to 28 days**, with a median of **14 days**.

Table 5: Interval Between Discharge and Re-admission

Time Interval (Days)	Number of Patients	Percentage
7–10	5	21.7%
11–15	10	43.5%
16–20	6	26.1%
>20	2	8.7%

Figure: 4



Associated Risk Factors

Among the 23 patients with discitis, the following risk factors were identified:

Table 6: Frequency of Risk Factors in Discitis Cases

Risk Factor	Number of Patients	% of Discitis Group (n=23)
Age ≥50	16	69.6%
Diabetes Mellitus	9	39.1%
Obesity (BMI >30)	7	30.4%
Immunosuppressed State	4	17.4%
Prolonged Surgery Time	5	21.7%
Repeat Surgical Access	3	13.0%

Summary of Key Findings

The study found that the incidence of Postoperative Discitis in all reported surgical cases with Prolapsed Intervertebral Disc (PIVD) was 6.04%. Lumbar and lumbosacral regions were the most often involved spinal segments. Older age (≥50 years) was found to be a significant risk factor for discitis with significant association. Amongst the different surgical procedures analysed, modified laminectomy with microdiscectomy had the highest frequency of postoperative discitis. It was found that the median time to discitis readmission was 14 days after discharge. The patients that develop discitis tend to have longer hospital sojourns, and also have more underlying comorbid conditions like diabetes and obesity.

DISCUSSION

In this retrospective study, the incidence, anatomical location, and the potential risk factors of postoperative discitis in patients currently undergoing surgery for

prolapsed intervertebral disc (PIVD) were investigated. Of 200 patients analyzed, 23 (11.5%) did develop discitis, giving final numbers of postoperative discitis that are still rare, but that have significant clinical impact and cost to hospitals.

The lumbar region was most common involved in both PIVD and discitis; findings that were consistent with previously reported literature. The higher mechanical stress, and the mobility of the lumbar spine, renders this level more prone to degenerative defic changes, and subsequent surgical interventions. The lumbar spine was involved in 48.5% of PIVD cases and in 43.5% of discitis cases in our cohort. Notably, the ratio of lumbosacral junction involvement (S1) in discitis proportionally exceeds other segments (34.8%) with potential vulnerability by anatomical location and portal access limitation.

With relative risk 196.57, age ≥50 years was found to be a significant predictor of postoperative discitis. The high risk seen in this group may be associated with age related immunosenescence, immunosuppression related to the development of comorbidities such as diabetes and hypertension, and poor wound healing. In several previous studies, elderly patients were found to have poorer immune responses, as well as a tendency towards increased spinal infections after surgery.

Although the most commonly performed procedure for PIVD was fenestration with microdiscectomy, the rate of discitis was surprisingly high in those with modified laminectomy plus microdiscectomy. Perhaps this parallels the more extensive surgical exposure also necessitated by laminectomy procedures, or suggests increased intraoperative contamination or longer operative duration, as noted to be risk factors of postoperative infections within other spinal studies.

Presence of discitis significantly increased hospital stay (mean: 14.8 days vs 4.5 days for those with uncomplicated postoperative recovery). The financial and resource related burden of this complication is highlighted by this. In addition, the median time to readmission for discitis was 14 days, consistent with the usual time course of early postoperative infections. The finding highlights the importance of vigilance during the first three weeks post discharge.

Out of all patients who developed discitis, diabetes mellitus and obesity occurred at a frequency of 39.1% and 30.4%, respectively. It is known both conditions compromise wound healing and immune function rendering individuals susceptible to infection. Imunosuppressed status and longer surgical durations were also less common but of relevance.

These identified modifiable and nonmodifiable risk factors enable clinicians to identify patients at higher risk of infection and to devise appropriate perioperative strategies, such as enhanced asepsis, antibiotic prophylaxis, and early intervention protocols.

CONCLUSION

The enhanced recognition and risk-based stratification of postoperative discitis in patients with PIVD seen in this study reminds us of the importance of early recognition of postoperative discitis in these patients. Despite discitis developing only in 11.5% of the surgical cohort discitis was significantly associated with older age, lumbar or lumbosacral disc, and specific surgical technique such as modified laminectomy plus microdiscectomy.

The findings also validate that patients older than age 50 years, as well as those with comorbid conditions such as diabetes or obesity, are more susceptible to post surgical infections. This study advocates for the development of such targeted preventive strategies as patient education, tighter postoperative follow up, and optimized surgical protocols, by identifying such trends.

Ultimately, the incidence and impact of post-surgical discitis resulting from surgical interventions is minimized through a multidisciplinary approach of surgeons, infectious disease specialists, and physiotherapists, with safer spinal surgery outcomes for younger and elderly populations as a whole.

Ethical Approval

ERC/GHL/OS/2023/20-14

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