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Incidence and severity of complications in postoperative spondylodiscitis after lumbar disc herniation surgery

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ABSTRACT

Background: Postoperative spondylodiscitis is a rare but serious complication after lumbar disc herniation surgery, with incidence varying between 0.2–4%. It is mainly related to intraoperative contamination and host-related risk factors. This study aimed to evaluate demographic variables, lifestyle-related factors, and clinical outcomes in patients diagnosed with postoperative spondylodiscitis.

Methods: We conducted a retrospective observational study on 85 patients treated between 2018 and 2024 in a tertiary care centre. Clinical and paraclinical data were collected, including demographic characteristics, residence, lifestyle-related risk factors, discectomy level, complications, treatment type, motor deficit, and hospitalisation duration. Statistical analyses were performed using χ^2 and Student's t-tests, with significance set at $p < 0.05$.

Results: Complications were observed in 24 patients (28.2%), predominantly at the lumbar level. Age, sex, and residence showed no significant associations with complication status ($p > 0.05$). In contrast, lifestyle-related factors such as smoking, alcohol consumption, and poor hygiene were significantly correlated with complications (χ^2 test, $p < 0.05$). Patients with complications had longer hospital stays (23.25 vs. 12.66 days, $p < 0.05$). Abscesses were the most frequent complication, followed by epiduritis. The presence of complications was significantly associated with motor deficits ($p < 0.05$).

Conclusion: While demographic factors did not influence outcomes, lifestyle-related risk factors and surgical treatment were associated with increased complications and prolonged hospitalisation. Early identification of high-risk patients and aggressive management of abscess formation remain essential to reduce morbidity. Keywords: postoperative spondylodiscitis, lumbar disc herniation, spinal infection, complications, lifestyle risk factors, hospitalisation, motor deficit.

Abbreviations: N = number of patients; p = p-value; r = Pearson correlation factor; SD = standard deviation; t-test = Student's t-test; χ^2 = Chi-square test.

Keywords
postoperative spondylodiscitis, lumbar disc herniation, spinal infection, lifestyle-related risk factors

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Introduction

Postoperative spondylodiscitis is a rare but serious complication following lumbar disc herniation surgery, with an incidence reported between 0.2% and 4%, depending on surgical technique and patient-related risk factors [1]. The condition is characterized by infection of the intervertebral disc and adjacent vertebral bodies, often leading to prolonged hospitalization, need for reoperation, and in severe cases, long-term disability [2,3]. Early diagnosis remains difficult due to the non-specific clinical presentation, which includes back pain, fever, and elevated inflammatory markers that may overlap with expected postoperative changes [2,4,5]. Several studies have indicated that the presence of comorbidities such as diabetes, smoking, and immunosuppression increases susceptibility to postoperative infections, while intraoperative factors including prolonged surgical time and intraoperative bleeding may also contribute [4-6]. Furthermore, lifestyle-related factors such as poor hygiene, alcohol consumption, and tobacco use have been implicated in exacerbating the risk of postoperative complications, although evidence remains heterogeneous [7,8]. The clinical course of postoperative spondylodiscitis varies significantly; some patients respond well to conservative treatment with antibiotics, while others require revision surgery due to abscess formation, epidural involvement, or persistent neurological deficits [9,10]. Given its impact on patient morbidity and healthcare burden, it is essential to better understand the risk factors, complication patterns, and outcomes of this condition in order to develop improved strategies for early recognition, prevention, and management.

Materials and methods

Study design and population

We conducted a retrospective observational study including 85 patients diagnosed with postoperative spondylodiscitis following lumbar disc herniation surgery. Patients were identified from the institutional database and included if they met clinical, radiological, and/or microbiological criteria for postoperative spondylodiscitis.

The cohort consisted of 24 patients with complications and 61 patients without complications. Patients were further subgrouped according to age, sex, place of residence (urban vs rural), lifestyle-related risk factors (smoking, alcohol consumption, poor hygiene), treatment modality (conservative vs surgical), and discectomy level (thoracolumbar, lumbar, lumbosacral).

Variables and data collection

The following variables were collected: age, sex, place of residence, presence of lifestyle-related risk factors, type of treatment received, duration of hospitalization, presence and type of complications, and presence of neurological motor deficit.

Complications were categorized as: abscess, epiduritis, fluid collection, myositis, or empyema.

Statistical analysis

Statistical analysis was performed using descriptive and inferential methods. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were reported as frequencies and percentages.

Normality of continuous variables was assessed using the Shapiro–Wilk test.

Outliers were checked with standardized Z-scores (no extreme values identified, $-3 < Z < 3$).

Homogeneity of variances was verified using Levene's test.

The relationship between age and hospitalization duration was tested with the Pearson correlation coefficient ($r = 0.007$, $p \geq 0.05$, no significant correlation).

Comparisons of mean age between patients with and without complications were performed with the Student's t-test.

Associations between categorical variables (presence of complications vs sex, residence, lifestyle risk factors, treatment type, and motor deficit) were tested with the Chi-square (χ^2) test of independence.

All analyses were two-tailed, with statistical significance set at $p < 0.05$.

Results

When analyzing the relationship between age and the presence of complications, patients with complications had a slightly lower mean age (61.29 years, SD±11.611) compared to those without complications (63.75 years, SD±13.608). Although complications were more frequently observed in patients aged between 55 and 79 years, the overall difference in age between the two groups was not statistically significant. The distribution of age did not

differ substantially between subgroups, and no extreme values were identified (Table 1).

Table 1. Patient age distribution according to the presence of complications

Grouping Criteria	Cohort Subgroups	No. of patients	Median Age
Presence of complications	Yes	24	61.29 (SD±11.611)
	No	61	63.75 (SD±13.608)
Total		**85**	**63.06 (SD±13.055)**

Regarding the relationship between age and length of hospitalization, the two variables are not correlated (r = 0.007, p-value ≥ 0.05); therefore, hospitalization duration does not increase with patient age.

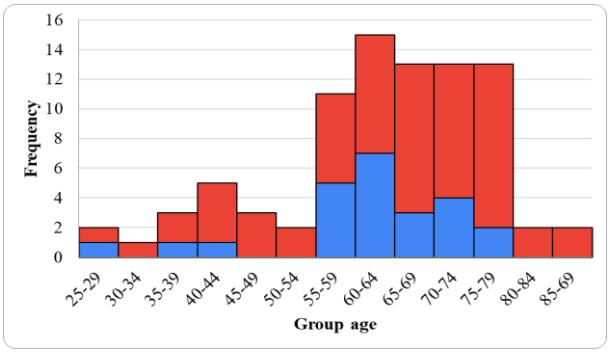

Figure 1. Age group distribution by complication status.

Red bars represent patients without complications, while blue bars represent those with complications. The number of patients with complications is lower than that of patients without complications in the older age groups. Most patients with complications are concentrated between ages 55 and 79. Statistical analysis confirmed that age distributions did not differ significantly between groups (Levene's test p ≥ 0.05; Student's t-test p ≥ 0.05), although normality was not met in either subgroup (Shapiro–Wilk p < 0.05) (Figure 1).

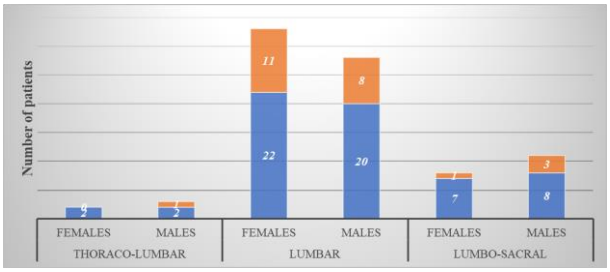

Figure 2. Distribution of patients with and without complications by spinal level and sex.

Blue bars represent patients without complications, while orange bars represent patients with complications. Out of the 85 patients included in the study, 24 developed complications. The association between complication occurrence and sex was analyzed only for the lumbar region, as the minimum number of observations per category was not met in the other regions. No statistically significant association was found between sex and the presence of complications in lumbar spondylodiscitis (χ^2 test, $p > 0.05$) (Figure 2).

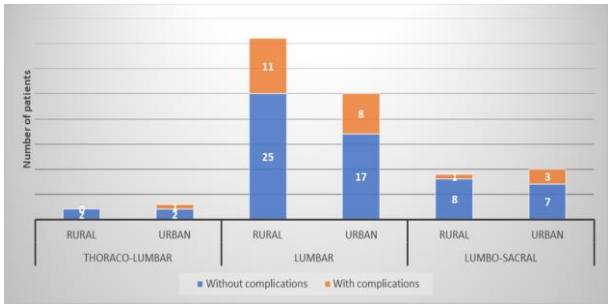

Figure 3. Distribution of patients with and without complications by spinal level and residence.

No statistically significant association was found between residence (urban/rural) and complications in lumbar spondylodiscitis (χ^2 test, $p > 0.05$) (Figure 3).

Table 2 presents the presence or absence of complications in patients with lifestyle-related risk factors. Among the total participants included in the study, only 18 individuals exhibited lifestyle-related risk factors, some of whom had two or even three risk factors. The presence of at least one risk factor was significantly associated with the occurrence of complications (χ^2 test, $p < 0.05$).

Level of discecomy	Lifestyle factors	Without complications	With complications
Thoraco-lumbar	*Smoking*	1	1
	Alcohol	0	1
	Poor hygiene	1	0
Lumbar	*Smoking*	**3**	**4**

	Alcohol	2	1
	Poor hygiene	1	**4**
Lumbo-sacral	*Smoking*	**4**	0
	Alcohol	1	2
	Poor hygiene	1	0

Table 2. Presence of complications in patients with lifestyle-related risk factors by level of discectomy

83 of 85 patients received conservative treatment, consisting of antibiotic therapy, either a single antibiotic or combination regimens involving two or three antibiotics from different classes. Surgical treatment was significantly associated with the presence of complications (χ^2 test, $p < 0.05$). Table 3 illustrates the average length of hospital stay for the total patient cohort and for subgroups (patients with complications versus those without complications, and by level of discectomy). The mean hospital stay was significantly longer for patients with complications compared to those without complications (Student's t-test, $p < 0.05$).

Level of discectomy	Complications	Number of patients	Median hospital stay
Thoraco-lumbar	Yes	1	10
	No	4	1.5 (SD±0.577)
Lumbar	Yes	19	23.74 (SD±17.944)
	No	42	10.57 (SD±13.182)
Lumbo-sacral	Yes	4	24.25 (SD±20.855)
	No	15	21.47 (SD±36.975)
Subtotal	**Yes**	**24**	**23.25 (SD±17.797)**
Subtotal	**No**	**61**	**12.66 (SD±21.645)**
Total		**85**	**15.65 ((SD±21.080)**

Table 3. Average length of hospital stay by complication status and level of discectomy.

In the studied cohort, complications were most frequently observed at the lumbar level, with abscesses being the most common type. Thoraco-lumbar and lumbo-sacral levels showed fewer complications overall. Abscess formation predominantly affected the lumbar region, while other complications such as epiduritis, fluid accumulation, myositis, and empyema were less frequent across all levels (Table 4).

Level of discecomy	Complication type	Number of patients
Thoraco-lumbar	No complications	4
	Abcess	0
	Epiduritis	0
	Fluid build-up	1
	Miozitis	0
	Empiema	0
Lumbar	No complications	**42**
	Abcess	11
	Epiduritis	4
	Fluid build-up	2
	Miozitis	1
	Empiema	1
Lumbo-sacral	No complications	15
	Abcess	3
	Epiduritis	1
	Fluid build-up	0
	Miozitis	0
	Empiema	0
Total	**No complications**	**61**
Total	**Complications**	**24**

Table 4. Frequency of complications and diagnostic approaches in the study cohort

Figure 4 shows the frequency of patients according to the presence of complications and motor deficit. The presence of complications was significantly associated with the occurrence of motor deficit (χ^2 test, $p < 0.05$).

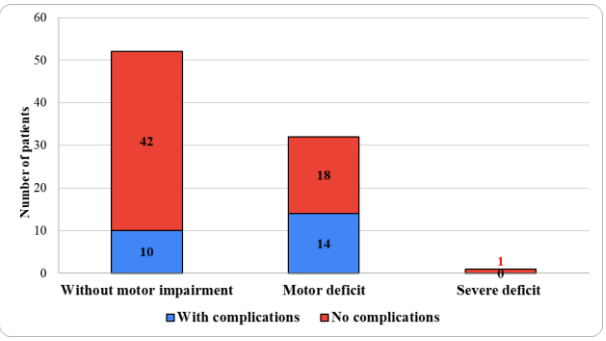

Figure 4. Frequency of patients by complication status and presence of motor deficit

Discussions

In our study, the incidence of postoperative spondylodiscitis was associated with lifestyle-related risk factors such as smoking, alcohol consumption, and poor hygiene, while demographic factors including age, sex, and place of residence did not show significant associations with the presence of complications. These findings are consistent with previous reports suggesting that lifestyle-related and comorbidity factors play an important role in susceptibility to postoperative spinal infections (11,12).

Similar to our results, other studies have shown that age alone is not a predictor of postoperative complications, although most cases cluster in the middle to older age groups (13). In our cohort, patients aged between 55 and 79 years were most affected, which aligns with findings indicating that comorbidities and immunological decline in these age groups may predispose to infections rather than age itself being an independent risk factor (14).

We also observed that sex was not significantly associated with the occurrence of complications in lumbar cases. This is in agreement with several reports in the literature showing no consistent gender-related predisposition to postoperative disc infections (15).

Importantly, we found that patients with complications had a significantly longer hospital stay compared to those without complications, which reflects the increased burden of postoperative spondylodiscitis. This observation is supported by prior studies highlighting prolonged hospitalization and healthcare costs as major consequences of these infections (16,17).

The most frequent complication in our study was abscess formation, followed by epiduritis, consistent with previous findings where abscesses are described as a common driver for the need of surgical intervention (18). Our results reinforce the need for early recognition and aggressive management of abscesses in order to reduce morbidity and prevent neurological deficits.

Conclusions

This retrospective study on 85 patients with postoperative spondylodiscitis following lumbar disc herniation surgery highlights several key findings. Complications were present in 24 patients (28.2%), most frequently in the lumbar region, with abscess formation as the predominant type.

Age did not significantly influence the occurrence of complications (Student's t-test, $p \geq 0.05$), nor was there a correlation between age and hospitalization duration ($r = 0.007$, $p \geq 0.05$). Most complications were concentrated in the 55–79 years age group, but age itself was not a predictor. Similarly, sex and place of residence showed no significant associations with the occurrence of complications (χ^2 test, $p > 0.05$).

In contrast, lifestyle-related factors such as smoking, alcohol consumption, and poor hygiene were significantly associated with complications (χ^2 test, $p < 0.05$). Surgical treatment was also strongly correlated with the presence of complications (χ^2 test, $p < 0.05$), underlining the higher risk in this subgroup.

Hospitalization was significantly prolonged in patients with complications compared to those without (23.25 vs. 12.66 days, Student's t-test, $p < 0.05$), demonstrating the additional healthcare burden. Moreover, the presence of complications was significantly associated with motor deficits (χ^2 test, $p < 0.05$), reflecting the clinical severity of these cases.

Overall, our results emphasize that while demographic variables such as age, sex, and residence did not influence outcomes, lifestyle-related factors, type of treatment, and the development of abscesses play a central role in the evolution and prognosis of postoperative spondylodiscitis. Early recognition of complications and targeted interventions are essential to limit prolonged hospitalizations and neurological deterioration.

References

1. Hadjipavlou AG, Gaitanis IN, Katonis PG, et al. Spondylodiscitis: Diagnosis and management. Orthop Clin North Am. 2009;40(1):7-15.
2. Nasto LA, Colangelo D, Mazzotta V, et al. Postoperative spondylodiscitis after lumbar discectomy: A review. Eur Rev Med Pharmacol Sci. 2012;16(2):202-208.
3. Babic M, Simpfendorfer CS. Infections of the Spine: Discitis, Vertebral Osteomyelitis, Epidural Abscess. Infect Dis Clin North Am. 2017;31(2):279-297.
4. Duarte RM, Vaccaro AR. Spinal infections: State of the art and management algorithm. Eur Spine J. 2013;22(12):2787-2799.

5. Pola E, Logroscino CA, Gentiempo M, et al. Surgical treatment of spondylodiscitis: An up-to-date review. Eur Rev Med Pharmacol Sci. 2012;16(Suppl 2):35-46.
6. Fantoni M, Trecarichi EM, Rossi B, et al. Epidemiological and clinical features of pyogenic spondylodiscitis. Eur Rev Med Pharmacol Sci. 2012;16(Suppl 2):2-7.
7. Sendi P, Bregenzer T, Zimmerli W. Spinal osteomyelitis in clinical practice. QJM. 2008;101(1):1-12.
8. Kehrer M, Pedersen C, Jensen TG, Hallas J, Lassen AT. Increased short- and long-term mortality among patients with infectious spondylodiscitis compared with a reference population. Spine J. 2015;15(6):1233-1240.
9. Butler JS, Shelly MJ, Timlin M, Powderly WG, O'Byrne JM. Nontuberculous pyogenic spinal infection in adults: A 12-year experience from a tertiary referral center. Spine (Phila Pa 1976). 2006;31(23):2695-2700.
10. Cottle L, Riordan T. Infectious spondylodiscitis. J Infect. 2008;56(6):401-412.
11. Massimiliano V, D'Aliberti G, Talamonti G. Postoperative spondylodiscitis: risk factors and management. J Neurosurg Spine. 2017;26(1):90–7.
12. Duarte RM, Vaccaro AR. Spinal infections: state of the art and management algorithm. Eur Spine J. 2013;22(12):2787–99.
13. Sobottke R, Seifert H, Fatkenheuer G, Schmidt M, Gossmann A, Eysel P. Current diagnosis and treatment of spondylodiscitis. Dtsch Arztebl Int. 2008;105(10):181–7.
14. Fantoni M, Trecarichi EM, Rossi B, Mazzotta V, Calabria M, Nasto LA, et al. Epidemiological and clinical features of pyogenic spondylodiscitis. Eur Rev Med Pharmacol Sci. 2012;16 Suppl 2:2–7.
15. Rutges JP, Kempen DH, van Dijk M, Oner FC. Outcome of conservative and surgical treatment of pyogenic spondylodiscitis: a systematic literature review. Eur Spine J. 2016;25(4):983–99.
16. Herren C, Jung N, Pishnamaz M, Breuninger M, Siewe J, Sobottke R. Spondylodiscitis: diagnosis and treatment options. Dtsch Arztebl Int. 2017;114(51–52):875–82.
17. Reihsaus E, Waldbaur H, Seeling W. Spinal epidural abscess: a meta-analysis of 915 patients. Neurosurg Rev. 2000;23(4):175–204.
18. Tschugg A, Meusburger B, Löscher WN, Hartmann S, Wildauer M, Thomé C. Prognostic factors for treatment success in patients with spondylodiscitis. Eur Spine J. 2015;24(11):2482–91.