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CASE REPORT

Lumbar Disc Reherniation Following Minimally Invasive Spine Endoscopic Pain Procedure (MISEPP): A Case Report With Review of Literature

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Abstract

Background

Lumbar disc reherniation is a recognized complication following minimally invasive spine endoscopic pain procedures (MISEPP). Early disc reherniation after these procedures is uncommon but can result in significant neurological symptoms, requiring prompt diagnosis and intervention.

Case Presentation

A 46-year-old male had a BMI of approximately 24.5 kg/m^2, was a non-smoker, developed early L5–S1 disc reherniation 25 days after undergoing MISEPP, following an 18-day symptom-free interval he presented with burning radicular pain in the right lower limb for 7 days associated with urinary hesitancy. But there was no saddle numbness. Neurological examination revealed sensory loss in the right S1 dermatome, weakness of the extensor hallucis longus, and a positive straight leg raise test at 50°. MRI demonstrated a large extruded L5–S1 disc compressing the bilateral S1 nerve roots. Revision Minimally Invasive spine endoscopic pain procedure (MISEPP) was performed, resulting in complete resolution of symptoms.

Discussion

Early lumbar disc reherniation following MISEPP is a rare but important complication. Contributing factors may include incomplete disc removal, annular defects, altered biomechanics, or premature postprocedure loading. Early recognition based on clinical findings and imaging is essential to prevent neurological deterioration. Revision MISEPP can be an effective treatment in appropriately selected patients.

Conclusion

This case highlights early lumbar disc reherniation as a potential complication following MISEPP. Careful patient selection, meticulous procedural technique, adherence to postprocedural precautions, and timely recognition of reherniation symptoms are crucial for optimizing

outcomes. Revision MISEPP offers a safe and effective management option in cases of early reherniation.

Introduction

Minimally invasive spine endoscopic pain procedure has gained widespread acceptance due to reduced muscle trauma, minimal blood loss, shorter hospital stay, and faster recovery compared to conventional open surgery. The term minimally invasive spine endoscopic pain procedure (MISEPP) is used in pain-medicine to describe endoscopic spinal interventions, including endoscopic interlaminar and transforaminal discectomy, posterior and lateral recess decompression procedures. Despite these advantages, lumbar disc reherniation remains as a potential complication in the postprocedural period. Reherniation is defined as herniation at the same level after a symptom-free interval and after resuming the routine physical activities. Understanding the causes, prevention strategies, and optimal management is essential for improving outcomes.

Case Presentation

A 46-year-old male had a BMI of approximately 24.5 kg/m^2, was a non-smoker, presented with complaints of low back pain radiating to right lower limb for 2 months following lifting of heavy weights associated with paresthesia and numbness while walking, not relieved with conservative management, walking distance significantly reduced. On examination sensory deficit present over right L5 dermatome, right extensor hallucis longus power reduced to 3/5, straight leg raising test positive on right side at 50°. MRI showed PIVD at L5-S1 with right lateral recess stenosis with type 1 Modic changes in the L5 and S1 vertebrae, considering the clinical findings and MRI correlation, the patient was planned for and underwent MISEPP at L5-S1 level.

Following the procedure, the patient demonstrated complete resolution of radicular pain with improvement in sensory and motor deficits, discharged on the first postprocedural day. However, 25 days later, he presented with new onset burning pain in the right lower limb radiating to the inner region of the right thigh for 7 days following a symptom-free interval of 18 days. There was no associated numbness or paresthesia. The patient also reported urinary hesitancy but there was no saddle numbness. The patient reported adherence to postprocedural restrictions, including avoiding heavy lifting and excessive spinal flexion, with no history of premature strenuous activity, trauma, or fall preceding the recurrence.

On clinical examination, sensory deficit was present over the right S1 dermatome. Motor examination revealed weakness of the extensor hallucis longus on the right side. Straight leg raising test on the right side was positive at 50°. MRI of the lumbosacral spine revealed a large extruded disc at L5–S1 compressing bilateral S1 nerve roots with lumbar canal stenosis and type 1 Modic changes in the adjacent vertebrae (Fig. 1, Fig. 2).



Fig. 1: Sagittal section of MRI showing reherniation at L5-S1 level with type 1 Modic changes.

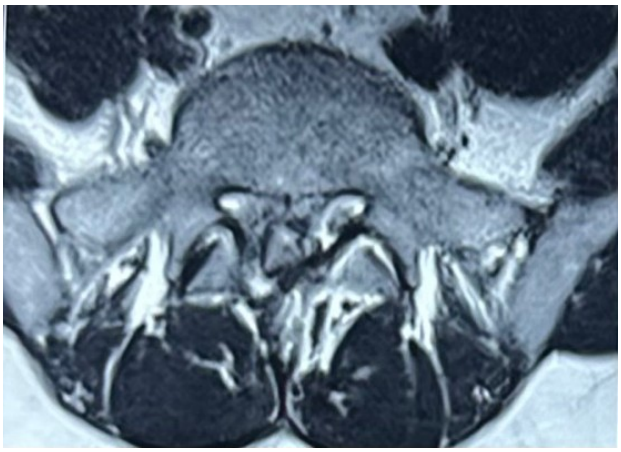


Fig. 2: Axial MRI section demonstrating L5-S1 disc reherniation with lumbar canal stenosis and nerve root compression, with prior laminotomy defect posteriorly.

The preceding symptom-free interval, new radicular symptoms, and a larger extruded fragment than on the initial MRI were consistent with disc reherniation. Postprocedural MRI was not obtained after the index procedure, as it is not routinely performed following an uncomplicated MISEPP with symptom resolution. Considering the clinical and radiological findings, the patient underwent revision MISEPP at L5–S1. Intraprocedurally a large, extruded disc fragment compressing the nerve roots was identified and removed. Adequate decompression was achieved.

Postprocedurally, the patient experienced complete relief of radicular pain with resolution of urinary hesitancy and improvement in neurological deficits. Patient was reviewed at 10 days, 4 weeks and again at 3-month intervals. At all the visits, he reported no new complaints, and there were no new neurological deficits. The previously noted neurological deficits showed progressive improvement.

Discussion

Endoscopic techniques are increasingly used for lumbar disc herniations due to minimal tissue disruption; however, reherniation can still occur. Risk factors reported in literature include obesity, smoking, heavy physical activity, central disc herniation, large annular defects, and severe disc degeneration. Proper technique and postprocedural precautions play an important role in minimizing risk of reherniation.

Residual disc fragments left behind during primary procedure represent one of the most recognized causes of early recurrence. Kim et al.[1] in their prospective study evaluating 300 patients who underwent PELD, defined endoscopic procedure failure as persistent symptoms without a pain-free interval and verification of remnant fragments by radiological studies. They emphasized the importance of distinguishing true reherniation from incomplete primary discectomy. Similarly, studies on full-endoscopic lumbar discectomy (FELD) for migrated herniations have noted that anatomical constraints and technical difficulties can lead to incomplete removal of disc material, particularly in highly migrated fragments[2]. Heo et al.[3] demonstrated that in zone C upward-migrated discs, complete fragment removal was challenging even with endoscopic assistance, with remnant particles detectable on postoperative MRI in some cases. In the present case, neurological examination revealed sensory deficit over the right S1 dermatome and weakness of the right extensor hallucis longus (3/5). Although EHL weakness is classically associated with L5 radiculopathy, the large L5–S1 extrusion with severe lateral recess and canal compromise could result in compression of multiple neural structures. Therefore, the neurological findings were not interpreted as representing isolated S1 root involvement. This highlights the potential for overlapping neurological manifestations in patients with large lumbar disc extrusions.

The size of the annular defect following discectomy is a well-established predictor of reherniation. Miller et al.[4] in a systematic review and meta-analysis of 7 comparative studies involving 1,653 lumbar discectomy patients, found that the risk of symptom recurrence (OR = 2.5) and reoperation (OR = 2.3) was significantly higher in patients with large annular defects (>6 mm) compared to small defects. Carragee et al.[5] reported a recurrent herniation rate of 27% in patients with an annular defect of at least 6 mm, compared with only 1% in those with smaller defects. Furthermore, Shimia et al.[6] concluded that the annular rent failing to seal completely allows a weakened defect to remain exposed to ongoing mechanical intradiscal pressure changes, thereby increasing the risk of further nucleus pulposus extrusion.

Pre-existing disc degeneration accelerates the biomechanical vulnerability of the intervertebral disc following surgery. Hao et al.[7] reported a higher incidence of recurrent disc herniation following PELD among patients with Modic changes present on preoperative MRI. Elevated body mass index (BMI) directly increases mechanical loading on the intervertebral disc and has been linked to recurrence in multiple studies. Siccoli et al.[8] in a prospective registry-based cohort study of 3,012 patients who underwent tubular microdiscectomy, found that overweight (BMI > 25) and obesity were directly associated with a higher risk of recurrent lumbar disc herniation, and recommended weight loss and smoking cessation alongside discectomy. Wang et al.[9] in a study of 942 consecutive PELD patients, identified higher BMI as an independent significant risk factor for recurrent herniation on multivariate logistic regression analysis.

Early ambulation and return to heavy physical activity before adequate disc healing has been shown to increase the risk of recurrence. Kim et al.[1] specifically noted that early ambulation without orthotic support applies repeated body weight loading to the remaining nucleus pulposus, increasing disc pressure and thereby raising the risk of reherniation. Wang et al.[9] demonstrated in their multivariate analysis that early ambulation and occupational heavy lifting

were independent risk factors for recurrent herniation after PELD. Their study recommended that patients avoid heavy work and ambulate at appropriate times postoperatively. A review of return-to-sport literature by Sámano López IU, et al.[10] identified premature return to high-level physical activity as a major risk factor for disc herniation recurrence, with common complications including reherniation and persistent pain.

At our institute, our postprocedural protocol to minimize the risk of reherniation includes advising patients to wear a lumbosacral (LS) belt at all times except while lying down or eating, for a duration of 4 to 6 weeks following the procedure. They are instructed to avoid heavy weight lifting and forward bending, and to use commode to reduce lumbar flexion stress. Controlled early mobilization is encouraged in the form of short walks of 10 to 15 minutes every 2 hours, which promotes circulation and prevents deconditioning without excessive spinal loading. Other exercises and formal physiotherapy are avoided during this initial recovery period to prevent premature mechanical stress on the healing annulus.

The morphological characteristics of disc herniation significantly influence recurrence risk. Yin et al.[11] found that the prevalence of recurrent herniation was significantly higher at upper lumbar disc levels (5.4%) and for laterally located discs (4.7%), highlighting the role of disc location and morphology in determining recurrence risk. These findings were corroborated by a study of Risk Factors and Surgical Treatment for Recurrent Lumbar Disc Prolapse in which sub-ligamentous or trans-ligamentous disc herniation and caudal migration of the herniated disc were associated with increased chances of recurrence[12].

The MISEPP requires a significant learning process, and pain physicians in the early stages of their experience have been associated with higher rates of incomplete decompression and complications. Morgenstern et al.[13] studying 144 patients undergoing transforaminal endoscopic discectomy, concluded that at least half of surgical failures could be attributed to the surgeon's learning curve in recognizing and treating the pathoanatomy. They determined that 72 cases were necessary to achieve a 90% success rate. Yao et al.[14] found that surgeons who had performed fewer than 200 PELD cases had a higher recurrence rate in univariate analysis, identifying the learning curve as a potential contributing factor. Son et al.[15] studying transforaminal endoscopic discectomy learning curves, demonstrated that risks of incomplete decompression and nerve root injury-related complications were significantly higher during the novice stage.

A balance between adequate decompression and preservation of remaining disc integrity helps limit annular weakening. Miller et al.[4] recommended that surgeons minimize the size of the annulotomy created during discectomy to reduce the risk of large annular defects, which are associated with a 2.5-fold increased risk of symptom recurrence. The International Society for the Advancement of Spine Surgery (ISASS) published guidelines in 2019, updated in 2025, supporting the use of bone-anchored annular closure devices in patients with large annular defects (≥6 mm) identified following discectomy, demonstrating reduced reherniation rates in this high-risk subgroup[16].

Modification of lifestyle risk factors is an essential component of recurrence prevention. Andersen et al.[17] in a retrospective cohort study of 1,378 consecutive discectomy patients, demonstrated through binary logistic regression that smoking was an independent risk factor for symptomatic recurrent LDH leading to reoperation (OR = 2.12; 95% CI = 1.39–3.15). These findings were corroborated by the systematic review by Huang et al.[18] involving 17 studies, which identified smoking as one of the most consistent predictors of recurrent lumbar disc herniation.

In this case, several commonly reported risk factors for recurrent herniation were absent: the patient was a non-smoker with a BMI of 24.5 kg/m^2, and there was no premature strenuous activity, trauma, or non-adherence to postoperative restrictions. Annular defect size was not documented at the index procedure, so it cannot be considered a demonstrated risk factor. Similarly, since no immediate postoperative MRI was obtained, residual disc material cannot be radiologically excluded with certainty. Nevertheless, the complete initial clinical response, followed by a symptom-free interval and new radicular and neurological symptoms with a large extruded fragment at the same L5–S1 level, strongly supported the diagnosis of disc reherniation.

Management of Recurrent Disc Herniation

Management depends on symptom severity and neurological status. Conservative treatment may be considered in patients with mild symptoms without neurological deficit.

Revision MISEPP is an effective minimally invasive option for symptomatic recurrence with clear radiological compression. Ravikumar et al.[19] in a systematic review and meta-analysis of 20 studies involving over 1,000 patients, confirmed that PELD is a safe and effective technique in the treatment of recurrent LDH, with lower complication rates than open lumbar microdiscectomy.

However, caution must be exercised when performing repeat endoscopic procedures, as repeat MISEPP is significantly more challenging than a primary procedure. Adhesions and epidural fibrosis resulting from the initial procedure can obscure tissue planes and increase the risk of inadvertent dural or nerve root injury. The risk of intraoperative bleeding is also higher due to the vascular changes associated with perineural scarring. Additionally, an important technical challenge unique to revision MISEPP is the lack of adequate bony support for the endoscopic sleeve at the procedural level, owing to the laminotomy performed during the primary procedure and the removal of the ligamentum flavum, which are not reconstituted prior to revision procedure. This absence of the normal posterior arch structures means the working cannula lacks the rigid anatomical purchase it relies upon during a primary procedure, potentially compromising instrument stability and increasing the risk of inadvertent tissue injury.

While undertaking revision MISEPP, clinicians should anticipate these challenges and plan accordingly, with readiness to convert to open microdiscectomy if safe endoscopic access cannot be established. Published literature on revision PELD, including the systematic review by Ravikumar et al.[19], corroborates the higher technical complexity of repeat endoscopic procedures and supports careful patient selection and meticulous preoperative planning in this context (Fig. 3, Fig. 4).



Fig. 3: Intraprocedural image during revision MISEPP demonstrating the large reherniated disc fragment and previous laminotomy defect.



Fig. 4: Disc fragments removed during revision MISEPP.

Open microdiscectomy may be required in cases where endoscopic access is difficult or where recurrence is associated with spinal instability.

Limitations

Immediate postprocedural MRI was not performed after the index MISEPP, as the patient showed complete clinical improvement. Consequently, the extent of disc removal and any residual annular defect could not be objectively documented. While the initial symptom-free interval followed by recurrent radicular symptoms and a larger extruded fragment strongly supported reherniation, residual disc material cannot be radiologically excluded with certainty. Post-void residual volume was not measured despite the reported urinary hesitancy. The patient was followed clinically at 10 days, 4 weeks, and 3 months post-revision, showing progressive improvement; longer-term follow-up beyond it was unavailable.

Conclusion

Lumbar disc reherniation remains a challenging complication following MISEPP. Early recognition and appropriate intervention are essential to prevent neurological deterioration. Revision MISEPP can provide satisfactory outcomes when performed in appropriately selected patients. Preventive strategies including meticulous technique, postoperative rehabilitation, and lifestyle modification play a key role in reducing recurrence rates.

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Declarations

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying clinical images.

Conflict of Interest

The authors declare that there are no conflicts of interest.

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Author Contributions

All authors contributed to the conception, preparation, review, and final approval of the manuscript.