

A Minimally Invasive L5-S1 Discectomy by Unilateral Biportal Endoscopy in A Patient of L5-S1 Intervertebral Disc Prolapse with S1 Nerve Root Compression: A Case Report

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Abstract

Introduction: A minimally invasive surgical procedure called unilateral biportal endoscopic discectomy is used to treat disorders of the cervical and lumbar spine, such as spondylotic radiculopathy and disc herniations. unilateral biportal endoscopic discectomy allows for efficient decompression with little tissue damage by using two tiny portals for endoscopic access. With applications spanning from the cervical to the lumbar regions, endoscopic spine surgery (ESS) has emerged as a dependable and successful alternative to open spine surgeries. The method performs multidirectional surgeries through two primary portals: the viewing and working portals.

Case report: A 38-year-old female patient presented with intense left buttock pain for four months, causing tingling and numbness in her left lower limb. Her quality of life has been significantly compromised, with an Oswestry Disability Index score of 70%. Physical examination revealed a right-sided limp, muscle power at 5/5, and diminished sensory perception in the S1 dermatomal area. Pre-operative radiographic imaging showed no instability, but magnetic resonance imaging revealed a left-sided L5-S1 extruded disc compressing the S1 nerve root.

Conclusion: Unilateral biportal endoscopic discectomy is a minimally invasive surgical technique that offers a smaller incision, less muscle trauma, and lower chances

of infection and bleeding. It can be used in stenosis, far lateral disc herniation, and far lateral disc herniation. It offers excellent magnification and is cost-effective, using the same instruments as microdiscectomy. UBE is safe, with lower complication rates and few chances of dural tears, making it an excellent minimally invasive treatment option.

Keywords: Endoscopic, Discectomy, unilateral biportal endoscopic discectomy, UBE.

Introduction

Unilateral biportal endoscopic discectomy (UBE) is a minimally invasive surgical technique used for treating lumbar and cervical spine conditions, such as disc herniations and spondylotic radiculopathy. This approach is gaining attention due to its potential advantages over traditional open surgeries, including reduced trauma, quicker recovery, and less postoperative pain. UBE involves the use of two small portals for endoscopic access, allowing for effective decompression with minimal tissue disruption. By providing a minimally invasive technique that allows for direct visualisation of spinal pathologies, endoscopic spine surgery (ESS) has completely changed spinal procedures. With applications ranging from the lumbar to the cervical regions, ESS has become a dependable and effective substitute for open spine surgeries. Open posterior lumbar interbody fusion [1], transforaminal lumbar interbody fusion [2], and posterior decompression [3] are the conventional methods of treating lumbar disc herniation. Depending on the location of the spinal lesion and the surgeon's skill level, targeted decompression procedures can now be performed using a variety of surgical techniques thanks to the development of comprehensive endoscopic systems. Notwithstanding its benefits, this technique has

disadvantages such as difficulty attaining accurate stereoscopic positioning, restricted instrument manoeuvrability, and decreased surgical efficiency. Furthermore, the specialised tools and equipment needed for these procedures limit their wider use and potential advancement in ESS.

The viewing portal and the working portal are the two main portals used in this surgical technique. For precise visualisation during the procedure, the endoscope must have a clear surgical field of vision, which is provided by the viewing portal. Surgeons carry out complex surgical procedures inside and around the spinal canal using the working portal and specialised instruments like the burr, chisel, Kerrison rongeur, and plasma radiofrequency wand [5]. This method overcomes the drawbacks of conventional coaxial endoscopic procedures, such as their limited field of view and manoeuvrability, by utilising two-port technology to perform multidirectional surgeries. In order to streamline procedures that are typically carried out with patients in the prone position, biportal endoscopic techniques have been developed. By possibly lowering the risks connected with prone positioning, investigating the lateral position for biportal endoscopy may provide further benefits. The successful use of unilateral biportal endoscopy (UBE) in the lateral position to treat a patient with severe radicular symptoms brought on by a disc protrusion at the L5–S1 level is highlighted in this case report.

Case Report

A 38-year-old female patient presented with principal complaints of intense left buttock pain radiating to the left lower extremity for a duration of four months, accompanied by a tingling and numbness sensation in the left lower limb, which has substantially

compromised her quality of life, as evidenced by an Oswestry Disability Index score of 70%. Her symptoms have exacerbated with forward bending and the execution of daily activities such as ambulation, with a marked intensification observed over the preceding fifteen days. There was no documented history indicative of bowel or bladder dysfunction, nor were there any other medical comorbidities or a history of tobacco consumption.

Physical examination indicated a right-sided ambulation deficit characterized by a limp, with muscle strength assessed at 5/5 in both the Extensor Hallucis Longus and Flexor Hallucis Longus, accompanied by preserved deep tendon reflexes. The straight leg raise test on the left side yielded a positive result at an angle of 40 degrees, in conjunction with a positive Bragard's test. Diminished sensory perception was observed in the S1 dermatomal area of the left lower extremity. Pre-operative radiographic imaging demonstrated the absence of instability, whereas magnetic resonance imaging disclosed a left-sided L5-S1 extruded disc within the lateral recess, resulting in compression of the S1 nerve root.(Figure 1)

To relieve the symptoms the patient was planned to treat surgically with unilateral biportal endoscopic discectomy at the level of L5-S1.

Surgical procedure

L5-S1 discectomy by unilateral biportal endoscopy

Patient was given general anesthesia and put in prone position with bolster under chest and pelvis with eye padding and soft cotton paddind protecting all bony prominences. Once the patient is positioned and necessary trial imaging is done, the patient was draped and prepared for the procedure. Level of the disc was marked using C-arm guidance. A two centimeter left

paramedian line drawn and viewing portal made cranially and working portal caudally. Soft tissue clearance was done so that superior lamina and interlaminar space is exposed properly. Burring of lower part of lamina to detach the attachment of ligamentum flavum done. Disc material below the shoulder of S 1 nerve root was extracted. Fragmentectomy done to extract disc material. (Figure 1)



Figure 1: Saggital section of MRI

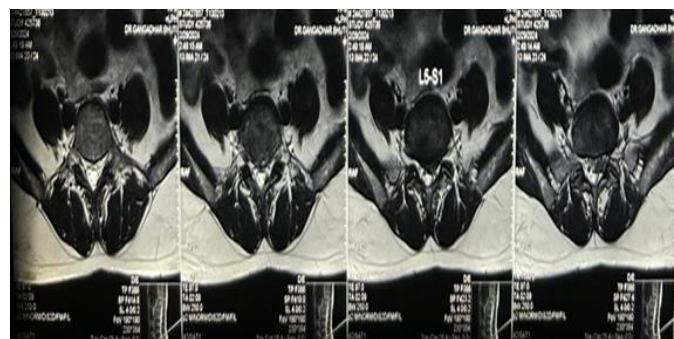


Figure 2: Axial sections of MRI

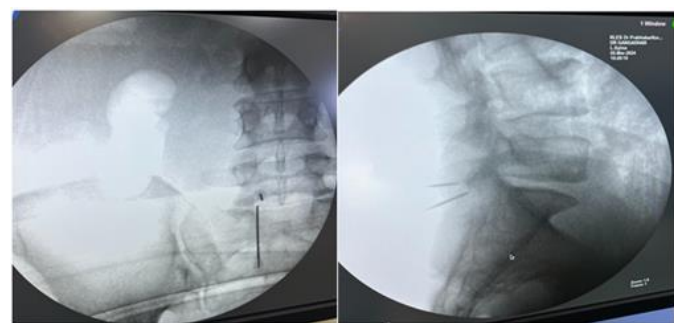


Figure 3: Triangulation in AP and lateral view on C-arm

Discussion

UBE has been shown to significantly reduce intraoperative blood loss and shorten hospital stays compared to traditional open surgeries. For instance, in lumbar discectomy, UBE resulted in an average blood

loss of 53.1 ml compared to 121.5 ml in microdiscectomy, and a hospital stay of 2 days versus 4 days, respectively [6] Similarly, in cervical spondylotic radiculopathy, UBE demonstrated less blood loss and shorter operation times compared to anterior cervical discectomy and fusion (ACDF)[7] Patients undergoing UBE often experience better early postoperative outcomes, such as reduced pain and disability scores. In young obese patients with lumbar degenerative diseases, UBE showed significant improvements in VAS and ODI scores one month post-surgery compared to open discectomy[8]. Studies indicate that UBE provides similar long-term clinical outcomes to other surgical techniques. For example, the Oswestry Disability Index scores were comparable between UBE and microdiscectomy at all stages of follow-up [6] Additionally, the excellent and good rates of clinical outcomes were similar between UBE and open surgery in young obese patients[8]. While UBE offers several advantages, it is important to consider its limitations and the context of its application. For instance, the technique requires specialized equipment and training, which may not be available in all surgical centers. Additionally, while UBE shows promise in reducing early postoperative pain and recovery time, the long-term benefits compared to traditional methods like ACDF or open discectomy require further investigation to establish its efficacy across diverse patient populations and conditions[9] [10]. In our patient treated with UBE showed excellent improvement in terms of clinical symptoms and performance in daily activities of living thus stating the importance of this minimally invasive surgical technique as compared to other traditional modalities of surgical management.

Conclusion

In UBE a smaller incision results in less muscle trauma, fewer chances of infection and bleeding, and less post-operative pain; the patient can be mobilised on the same day of surgery. It is possible to perform over-the-top decompression in stenosis. Para UBE can be used for far lateral disc herniation. The anatomy is very familiar, similar to microdiscectomy, so it is preferable to transforaminal endoscopy, where understanding anatomy difficult. A scope provides excellent magnification, allowing for detailed visualisation of all neural structures. The main advantage is that it is extremely cost-effective. In centres without separate spine units, the same 30-degree scope used for knee and shoulder arthroscopy is used in UBE, as are the same instruments used for microdiscectomy, eliminating the need for special expensive instruments and lowering overall costs. This surgical technique is suitable for transforaminal lumbar interbody fusion. It is extremely safe, with low complication rates and a low risk of dural tears, because normal saline irrigation creates a plane between the ligamentum flavum and dura. Thus, UBE is an excellent minimally surgical treatment option that employs a minimally invasive technique.

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Abbreviations

1. UBE- Unilateral biportal endoscopic discectomy.
2. ESS-Endoscopic spine surgery.
3. ACDF- Anterior cervical discectomy and fusion