

CASE REPORT

Percutaneous epidural balloon decompression and neuroplasty by ZiNeu catheter in lumbar spinal stenosis patient in Bangladesh: A case report

Rajat Shuvra Das¹ Sanjoy Kumar Saha¹ Panna Lal Saha²Jin-Woo Shin³AKM Akhtaruzzaman¹

¹Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University (currently, Bangladesh Medical University), Dhaka, Bangladesh

²Department of Anaesthesiology, Critical Care and Pain Medicine, National Institute of Burn and Plastic Surgery, Dhaka, Bangladesh

³Department of Anaesthesiology and Pain Medicine, Asan Medical Center, Seoul, South Korea

Correspondence

Rajat Shuvra Das
rajatsdas1351@gmail.com

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Handling editor

Md Nahiduzzamane Shazzad
0000-0002-8535-4259

Reviewers

Taslim Uddin
0000-0002-2884-9212
Seong-Soo Choi
0000-0002-2333-0235
Kazi Mahzabin Arin
0009-0004-0064-3847

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Ethical approval was not sought because this is a case report. However, written informed consent was obtained from the patient for publication of this case report and any accompanying images.

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Introduction

Epidural adhesions, often resulting from surgery, spinal stenosis, or disc herniation, restrict spinal nerve movement and increase neural sensitivity causing pain. Percutaneous epidural adhesiolysis (PEA), particularly beneficial for patients resistant to conservative treatments, breaks these adhesions and delivers drugs directly to the affected area [1]. Utilising RacZ or ZiNeu catheters, PEA enhances drug distribution effectiveness hindered by adhesions [2]. PEA proves more effective than traditional epidural steroid injections in lumbar spinal stenosis [3]. Percutaneous epidural balloon neuroplasty (PEBN), combining balloon decompression and neuroplasty, has shown significant pain reduction and functional improvement with minimal complications [4]. We report a case of percutaneous balloon decompression and neuroplasty with a ZiNeu catheter for lumbar spinal canal stenosis, confirming its safety and effectiveness. So far literature search, no cases of combined balloon decompression and epidural neuroplasty with the ZiNeu catheter have been reported in our country.

Case description and management

A 22-year-old female presented with a three-year history of lower back pain and right leg tingling that worsened after walking for 5 minutes and improved with rest or forward flexion. Physical examination revealed bilateral sacroiliac joint tenderness, positive

straight leg raise, at right side, Patrick's, sacral thrust, and Kemp tests. Laboratory findings showed elevated erythrocyte sedimentation rate (40 mm/hour) and C-reactive protein 8, pelvic radiography (modified Ferguson view) indicated bilateral grade 2 sacroiliitis.

MRI showed L4-L5 right paracentral disc protrusion and L5-S1 diffuse disc bulge, compressing L4-L5 traversing nerve roots, resulting in right-sided foraminal stenosis at L4-L5 and bilateral neural foraminal stenosis at L5-S1. The diagnosis was lumbar spinal canal stenosis at L4-L5 and L5-S1 caused by right paracentral disc protrusion and spondyloarthropathy. The patient received oral ibuprofen, acetaminophen, pantoprazole, and duloxetine, along with oral tofacitinib and physical exercise based on specialists' recommendations.

After one month, with minimal improvement, the patient underwent percutaneous epidural balloon decompression and neuroplasty. The procedure performed under C-arm guidance with American Society of Anesthesiologists Monitoring System, involved an 18-gauge IV line in the right arm and a 10-gauge caudal epidural needle from the ZiNeu (02) 1.55 mm catheter set up to S3 in caudal epidural space. The skin was infiltrated with 1% lidocaine before needle insertion. A mixture of 10 ml iohexol contrast dye and 1% lidocaine (1:1) identified filling defects at L5-S1 anterior epidural space and bilateral foramen and L4-L5 anterior epidural space (Figure 1). A ZiNeu balloon catheter was guided to both the anterior and posterior epidural space at the sites of

Key messages

This case demonstrates the efficacy of percutaneous epidural balloon neuroplasty with a zineu catheter for lumbar spinal stenosis in patients unresponsive to conservative treatment. This procedure facilitates adhesiolysis, reduces venous congestion, and enables localised drug delivery, resulting in pain relief and functional improvement. It may also serve as an alternative to surgical intervention or conventional epidural steroid injections.

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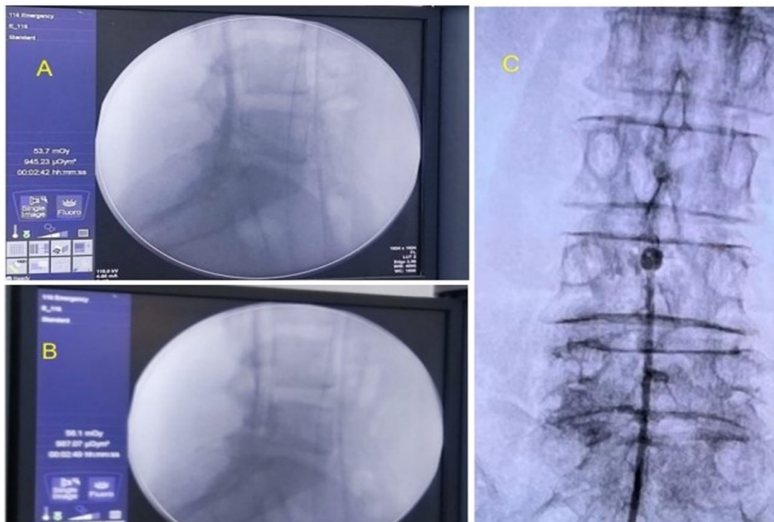


Figure 1 a) Epidurogram before percutaneous balloon decompression; b) Epidurogram after percutaneous balloon decompression; c) ZiNeu catheter at posterior epidural space with inflated balloon.

the filling defect mentioned above and, balloon was inflated with 0.1 ml iohexol dye for adhesiolysis and repeated for up to a maximum of 5 seconds at each site. Dexamethasone (3 mg) was injected into L4-L5 and L5-S1. Severe adhesions in the L5-S1 anterior epidural space necessitated 1500 units of hyaluronidase.

Although an epidurogram showed dye spread to the anterior epidural space and right L5-S1 neural foramen, balloon decompression could not be done at the L4-L5 anterior epidural space. An epidural catheter was placed in the right L4-L5 lateral canal, and 5 ml of plain 1% lidocaine was administered postoperatively. Thirty minutes later, 4 ml of 5.0% NaCl was injected after confirming the absence of motor block. The patient was discharged after one hour of satisfaction. Follow-ups over one month showed reduced pain, tingling, numbness, and improved mobility, with scores of 2/11 on the numerical rating scale, 8/35 on Paindetec, and 4 on PHQ9. The patient was able to walk for 30-40 minutes without neurogenic claudication. Physical examination revealed negative straight leg raise, and Kemp tests on the right side.

Discussion

Lower back and lower extremity pain unresponsive to conservative treatments is often linked to post-surgery syndrome, spinal stenosis, or disc herniation [5]. For patients unsuitable for or unresponsive to surgery and epidural injections, percutaneous adhesiolysis may be an effective alternative [6]. PEA alleviates pain and improves function by disrupting epidural adhesions and restoring nerve mobility.

Studies show PEA's efficacy in managing lumbar spinal stenosis, chronic disc herniation, and post-lumbar surgery syndrome [7]. The ZiNeu catheter's balloon technology aids adhesiolysis and decompression, enhancing epidural drug delivery and expanding stenotic areas. This intervention increases nerve root mobility and reduces neurogenic claudication symptoms [8].

Epidurography is crucial for identifying filling defects from adhesions and assessing procedural efficacy. A study reported transforaminal balloon treatment increased epidural space in the intervertebral foramen by 28% and lumbar foraminal canal volume by 98% [9]. Research shows significant pain relief and functional improvement with balloon decompression. In our case, improvement confirmed the safety and effectiveness of this minimally invasive procedure.

The combined balloon decompression and adhesiolysis approach using the ZiNeu catheter offers a promising alternative for managing chronic lumbar spinal stenosis, providing long-term relief and functional recovery while minimising risks.

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Author contributions

Manuscript drafting and revising it critically: RSD, SKS, AKMA. *Approval of the final version of the manuscript:* RSD, SKS, PLS, JWS, AKMS. *Guarantor accuracy and integrity of the work:* RSD, SKS, PLS, JWS, AKMA.

Conflict of interest

We do not have any conflict of interest.

Data availability statement

We confirm that the data supporting the findings of the study will be shared upon reasonable request.

Supplementary file

None

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