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CASE REPORT PAIN MANAGEMENT

# Radiofrequency ablation of superior hypogastric ganglion and dorsal root ganglion reduces neuropathic pain in L5-S1 disc anterior protrusion: a case report

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## ABSTRACT

Approximately 36%-55% of patients with chronic low back pain (LBP) have neuropathic pain syndrome. Prescription of adjuvant analgesics or antidepressants is effective in reducing pain but requires special attention.

A female patient, 57 y, presented with complaints of LBP for 5-7 days. Pain was spread bilateral in the hips-groin, as well as to the fingers and soles (NRS 6-8, PainDETECT 35). She had history of falls 10 y ago, but still worked for 5 hours daily. She had allodynia, dysesthesia, hyperalgesia, and L4-5 and L5-S1 hypesthesia. Magnetic resonance imaging (MRI) showed postero-central and lateral bulged L4-5 and L5-S1 discs. Radiofrequency ablation (RFA) 70o of superior hypogastric ganglion for 90 sec, and pulsed radiofrequency (PRF) 42o of dorsal root ganglion (DRG) L4-5, L5-S1 bilaterally for 2 min reduced nociceptive pain (NRS 2-3) and neuropathic pain (PainDETECT 12). Post-surgical medication included levofloxacin, gabapentin, paracetamol, amitriptyline and Vitamin B12.

The sympathetic ganglia supply the anterior segments of the lumbar vertebrae and the anterior longitudinal ligament, often overlooked as a cause of pain. The management of LBP patient depends upon the etiology, whether associated to structural abnormalities or nerve dysfunction.

**Keywords:** anterior disc herniation, dorsal root ganglion, lumbar disc herniation, neuropathic pain, superior hypogastric ganglion, radiofrequency

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## 1. INTRODUCTION

Lumbar disc herniation (LDH) is most often posterolateral or posterocentral, which is evidenced by radicular pain or radiculopathy. Daghighi et al. concluded that the direction of disc herniation in herniated nucleus pulposus (HNP) patients was classified as posterocentral (17.3%), paracentral (74.2%), subarticular (4.3%), intraforaminal (2.5%), and extraforaminal (1.8%). And the radiculopathy syndrome is found in intraforaminal (96%), subarticular (88.6%), paracentral (76.8%), posterocentral (66.5%), and extraforaminal (27.8%) directions.[1] Pain syndrome in HNP sufferers is caused by an inflammatory process (increased levels of IL-1, IL-6, IL-8, TNF-α, and MMPs), as well as the biomechanical stress that occurs. The LDH sufferers do not always show clinical signs and symptoms. Although based on magnetic resonance imaging (MRI) there are: bulging (52%), protrusion (20%–63%), extrusion (0%–24%), or sequestering (19%).[2] Neuropathic pain syndrome in patients with chronic LBP is caused by several mechanisms, namely: nerve branch lesions that supply the disc (sprouting) through its annulus cracks, mechanical compression of the spinal roots, or inflammatory mediators from the disc causing inflammation and damage to the spinal roots.[3]

The size of the herniated mass is not a guideline, whether

 

an LDH patient requires surgery. Approximately 85.1% of patients with disc herniation accompanied by lateral stenosis showed clinical improvement even without surgery. About 90% of herniated disc lesions can regress spontaneously, caused by: tension retraction of the posterior longitudinal ligament, resorption of the herniated mass due to phagocytosis by macrophages, better lymph drainage, due to an immunological process, and dehydration of the disc mass. Based on the previous research, itwas concluded that only about 8.7% required surgery.[4] Spontaneous resorption of herniated masses in patients with LDH was found both at sequestration (96%), extrusion (70%), protrusion (41%), and bulging (13%) stages.[5]

Conservative management carried out thoroughly, showed clinical improvement in pain and daily activities in 89.23% - 95.38% of disc herniation patients, who were evaluated for 10 y of therapy.[6] Operative decompression showed improvements in disability up to 66.42%, and a decrease in pain intensity by 61.15% in the following three weeks.[7] Minimally invasive management of discectomy shows an effective clinical improvement of 75%-80%, about 45% complain of radicular pain, and about 25% require repeat surgery in the same lesion area 3 years later.[8] In patients with chronic HNP, in addition to increased intradiscal levels of inflammatory mediators, there is also an increase in blood serum levels for up to 3 months postoperatively. So that complaints of pain can still be felt even though decompression measures have been taken at the top of the lesion.[9]

Studies concerning anterior disc herniation is still very rare, due to distraction from the etiology of pain. In patients with chronic anterior disc herniation: pain-sensitive fibrous tissue on the anterior surface of the disc, as well as neovascularization can be found,[10] in addition to sympathetic neuritis. Sympathetic nerve activity increases when pain intensity increases.[11] Because it irritates the sympathetic trunk in the anterior disc, management of pain transmission blocks or anti-inflammation is the treatment of choice.

## 2. CASE REPORT

A 57-year-old female, reported to the outpatient installation of RSUP Dr. Kariadi Semarang with complaints of LBP and a constant feeling of heat for 5-7 days, spread across the hips-groin, as well as the fingers and soles of the feet. The intensity of nociceptive pain showed an NRS score 6-8 and a neuropathic PainDETECT of 35. Previously, she had falls while sitting three times about ten years back but was able to work as a batik maker in a low sitting position (> 5 hours a day). On examination she was found to have allodynia (+), dysesthesia (+), hyperalgesia (+), and hypesthesia in the L4-5, L5-S1 bilateral (left side heavier) areas. Magnetic resonance imaging (MRI) showed posterocentral and lateral bulging of L4-5, and L5-S1 discs, with anterior protrusion of the L5-S1 disc (Figure 1). Management was done with radiofrequency ablation (RFA) with a temperature of 70° targeting the left and right hypogastric superior ganglion, each lasting 90 sec. Followed by pulsed radiofrequency (PRF) with a temperature of 42°, with the target being the left and right dorsal root ganglion (DRG) L4-5 and L5-S1, each lasting 120 sec (Figure 2).

Post-action medication prescribed included levofloxacin 500 mg/24 h, gabapentin 50 mg TDS, paracetamol 500 mg TDS, amitriptyline 12.5 mg BID, Vit B12 50 mcg BID. Evaluation seven days after the procedure showed improvement in nociceptive pain intensity (NRS score 2-3) and neuropathic pain (PainDETECT score 12). Informed consent of the subject to publish this case report was obtained. It was approved by Ethical Clearance Committee: No. 1015/EC/KEPK-RSDK/2022.

## 3. DISCUSSION

The sympathetic nerves also innervate the vasculature of the lower extremities, anterior body and disc, and anterior longitudinal ligament. Therefore, disc lesions to the anterior cause inflammation of the sympathetic nerves, which is complained of as discomfort in the visceral organs (abdomen).[10] Often the etiology of pain like this is overlooked, so the pain becomes intractable.

The PainDETECT score is a good parameter for evaluating neuropathic pain syndrome, having a sensitivity of up to 85% and a specificity of 80%.[12] The PainDETECT score is used to assess the intensity of neuropathic pain: a score ≥19 perceived pain is neuropathic, and a score of13–18 indicates the presence of neuropathic pain.[3] The effectiveness of management of patients with chronic lumbar HNP includes conservative means or physiotherapy (Level B), anti-inflammatory analgesics (Level A), adjuvant analgesics (Level A), opioids or antidepressants (Level B), muscle relaxants, spinal or epidural root blocks (Level B, A), minimally invasive, to open surgery (Level B, A).[13] Physiotherapy for patients with chronic LDH which is carried out routinely for 6 weeks, shows a reduction in pain intensity of up to 45%.[14] Physiotherapy together with analgesics shows an effectiveness of around 27% -29%, it is possible that the intensity of pain will decrease with analgesics so that physical therapy is not needed.[15]

Surgery is effective in reducing pain intensity by at least 50% in the following 12 weeks.[16] Approximately

 

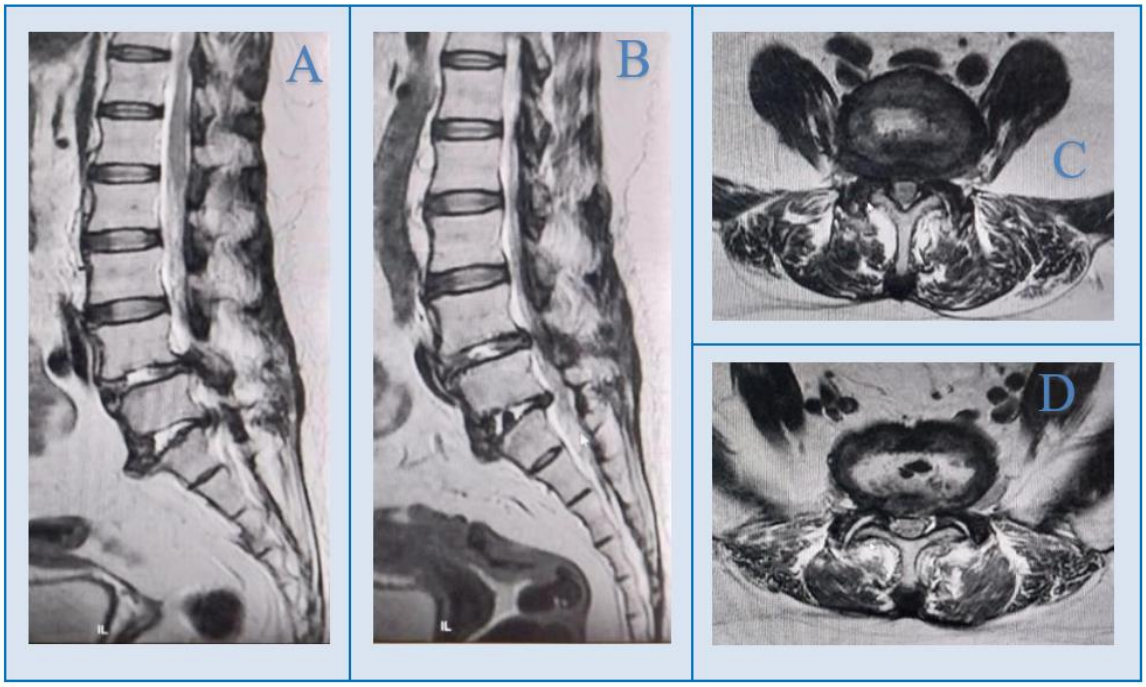


**Figure 1:** MRI scan: **A** and **B**: sagittal section showing protrusion of the L4-5 and L5-S1 discs accompanied by degeneration and narrowing of the disc, and anterior herniation at the level of L5-S1; **C** and **D**: axial incision with posterocentral herniation to the L5-S1 disc, there is lateral stenosis at the L3-4 and L5-S1 foramen right-left.

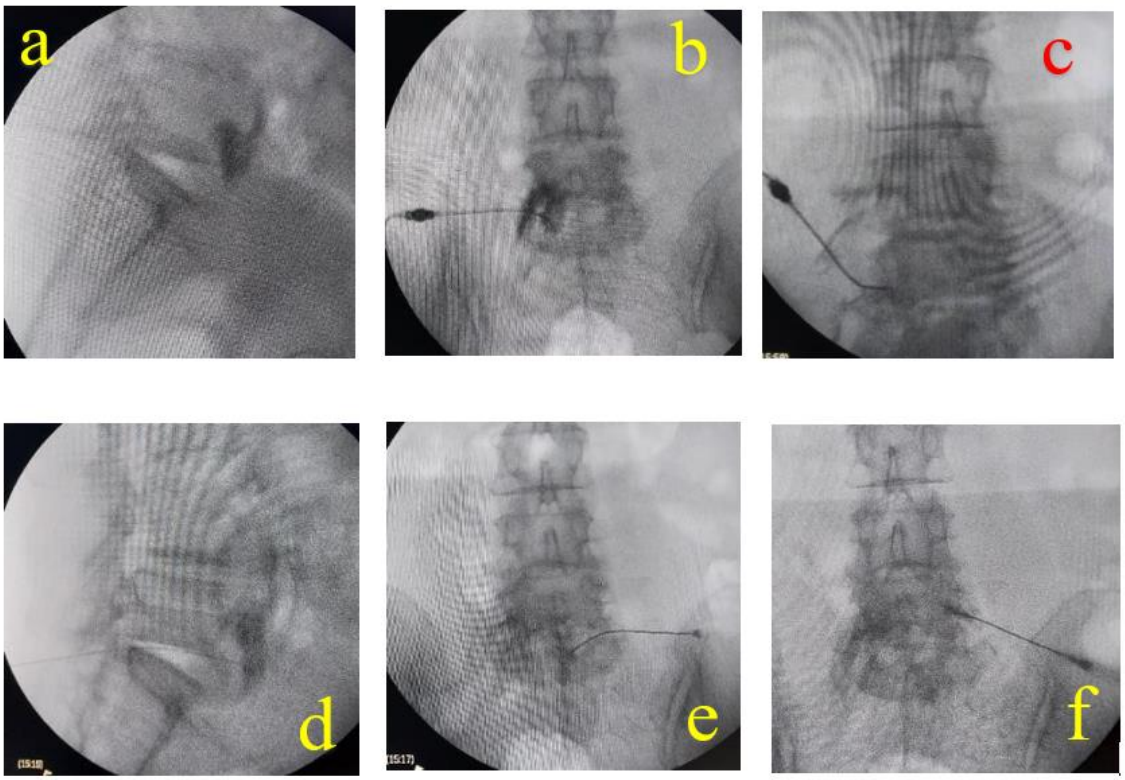


**Figure 2:** Block technical procedures: **RFA ( a & b):** left superior hypogastric ganglion; **(d & e):** right side; **PRF** on DRG L5-S1 **(c):** left and **(f):** right.

 

80% of patients with lumbar HNP who undergo surgery require repeat surgery within two years afterwards.[12,13,17] There was an improvement in the NRS score of 62.5% - 66.7% (6-8 to 2-3) and the PainDETECT score of 65.7% (35 to 12) in this study. These results resembled the PRF study followed by the previous triamcinolone injection (50%-62.5%).[19] And superior hypogastric ganglion RFA management in this study also showed immediate postoperative pain.[20] The analgesic dose in this study decreased more compared to the previous study.

Sympathetic nerve block aims to reduce pain transmission due to inflammation in the sympathetic nerves, where sympathetic neuritis can affect the circulation of the lower extremities. Obstructed limb circulation causes stasis, leg edema, as well as pain and redness.[19] In patients with LDH, discogenic pain often occurs due to this sympathetic neuritis.[10] Anatomically, the annulus, and vertebral endplates are the parts that have the most innervation.[20] DRG are the anatomical structures that receive afferent fibers from the dorsal rami, the sinuvertebral fibers on the surface of the annulus, and the anterior rami that have connections with the sympathetic ganglion on the anterolateral side of the vertebral body. Spinal root lesions will affect the DRG because impulses from the distal part are forwarded centrally through this DRG. And when chronic inflammation occurs, the glial cells in the DRG cell bodies will become hypersensitive.[21] Compression of the spinal roots will trigger increased levels of substance P, vasoactive intestinal peptide (VIP), calcitonin gene-related peptide (CGRP), or neuropeptide Y. This neurotransmitter plays a role in the mechanism of allodynia and hyperalgesia.[22] so triamcinolone injection after PRF shows good results. The PRF procedure causes changes in membrane potential, ion channel function, and pain threshold, and reduces dorsal horn nerve ectopic eruptions. Thus, reducing the intensity of nociceptive and neuropathic pain, where a downward analgesic mechanism occurs in the DRG due to the release of noradrenaline and serotonin. Previous studies have shown that this procedure will reduce tumor necrosis factor (TNF-α) levels, which are pro-inflammatory mediators.[23]

# 4. CONCLUSION

Chronic low back pain accompanied by signs and symptoms of neuropathic pain in patients with lumbar disc herniation can be caused by several triggers for the pain. The pain transmission might be in association with the regional innervation and it should be looked after as a part of the target treatments. The short post-operative monitoring time is one of the limitations of this study. Although there are still fewstudies regarding anterior herniation, it should be a concern when complaints of pain persist.

## 5. Conflict of interest

The author declares no conflict in the conduct of this procedure or sharing of this report.

## 6. Author's Statement

The abstract of this research was presented at the Indonesian National Congress of Neurologists, 2-6 August 2023 in Semarang, Indonesia. However, it has never been published in scientific journals.

## 7. Authors contribution

Trianggoro Budisulistyo has been the sole author of this case report.

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