

## Case Series

# Dorsal root ganglion block for pain management in chronic lower back pain: a retrospective case series

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## ABSTRACT

**Introduction:** Chronic lower back pain is considered as one of the most frequent sources of orthopedic morbidity worldwide, affecting approximately 12% of general population. It remains challenging for all pain therapists, since most of the chronic pain is still unrelieved after pharmacotherapy, physical therapy, occupational therapy, and minimally invasive techniques or surgery. In this study, we conducted a case series to report the success of pain management by using the dorsal root ganglion (DRG) block technique to chronic back pain patients. The purpose of this case series is to demonstrate the efficacy of DRG blocking both for diagnostic purpose and pain management of chronic lower back pain.

**Methods:** This study was a retrospective case series of patients who received DRG block for chronic lower back pain. The subjects were those who did not respond adequately to initial pharmacological treatment and those who refused to do surgical intervention. The procedures were performed by an orthopedic surgeon under C-ARM in the operating theater. Each patient's pain scores from the pre- and the post-DRG blocking were assessed using the VAS (Visual Analog Scale) and RMQ (Roland Morris Disability Questionnaire) evaluation systems.

**Study Design:** Retrospective Case Series

**Results:** A total of six patients were included in this study, in which all experienced significant pain relief. Every patient was happy with the procedure and were able to continue their daily activities. In addition, some had hoped that if the pain recurred, the procedure could be repeated to relieve their symptoms.

**Conclusion:** DRG block is a safe and effective way to treat patients in which surgery is contraindicated or upon the patient's request. Even though we reported that DRG block effectively improves the quality of life, our study has significant limitations. Hence, more studies are needed to proof the efficacy and safety for DRG blocking to treat chronic lower back pain.

**Keywords:** chronic lower back pain, dorsal root ganglion block, pain management, case series  
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## INTRODUCTION

Chronic lower back pain is considered as one of the most frequent sources of orthopedic morbidity worldwide, affecting approximately 12% of general population according to a systematic review<sup>1,2</sup>. It remains challenging for all pain therapists, since most of the chronic pain is still unrelieved after pharmacotherapy, physical therapy, occupational therapy, and minimally invasive techniques or surgery<sup>1,3,4,5</sup>.

Many studies and guidelines suggest the use of diagnostic blocks, including dorsal root ganglion (DRG) blocks and medial branch blocks (MBBs), as tools for diagnostic pain intervention<sup>5,6,7</sup>. Other studies noted the efficacy rate of DRG block as quite significant: a study conducted by Vad *et al.* in 2002 showed improvement of Roland-Morris score by 5 or more, reduction of pain by 50% or greater, together with a high satisfaction score. In a study by Karpainen in 2001, statistically significant results were obtained where patients' leg pain decreased by 61%.<sup>13,14</sup> In this occasion, we conducted a case series to report the success of pain management using dorsal root ganglion (DRG) block technique in chronic back pain patients. We assessed pain scores using both VAS (Visual Analog Scale) scoring and Rolland-Morris Disability Questionnaire (RMQ). We chose the former since it is quite easy to be used to measure pain, and based on a study by Longo *et al.* in 2010, the latter is simple to conduct and is easily understood by patients, in addition to having a credible construct validity, internal consistency, responsiveness, and reliability. The purpose of this case series is to demonstrate the efficacy of DRG block both for diagnostic purpose and pain management of chronic lower back pain.

## METHODS

This study was a retrospective case series of patients who received DRG blocks for chronic lower back pain. To minimize biases, we implemented 1) specific inclusion and exclusion criteria, 2) high follow up rate to patients, 3) specific time interval for collecting patient's data, 4) clear measurement of clinical outcomes to prove relieving symptoms. All patients had already undergone physiotherapy but had no significant pain improvement. The inclusion criteria were: 1) diagnosed with HNP, 2) experiencing chronic lower back pain lasting >12 weeks, 3) suffering from radiculopathy with positive clinical examination, 4) the condition was confirmed

by magnetic resonance imaging (MRI). Whereas the exclusion criteria were: 1) had no previous chronic lower back pain, 2) never experienced any previous surgery, 3) suffering from uncontrolled psychiatric disorders, 4) had no other medical illness or conditions (i.e. infection, pregnancy, and use of anticoagulants). The procedures were performed by one orthopedic surgeon under C-ARM in the operating theater. Each patient's pain scores from pre- and post-DRG block were assessed using the VAS (Visual Analog Scale) and RMQ (Rolland Morris Disability Questionnaire) evaluation systems.

### Procedural steps for dorsal root ganglion block

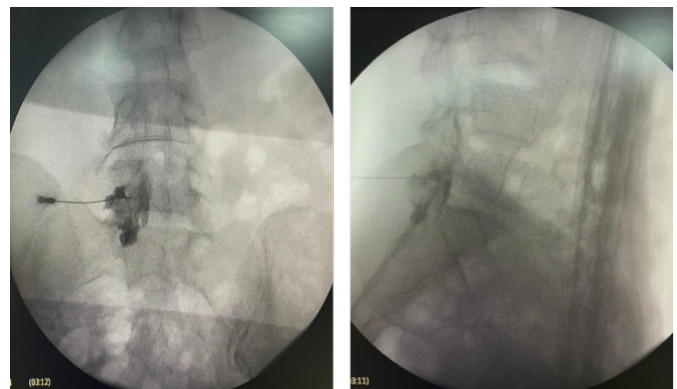


Figure 1. DRG Block under C-ARM guiding

Before the procedure, each patient had to consult to an orthopaedic surgeon for symptoms assessment, physical examination, and other medical examinations (including MRI). We also had to confirm that the patient was not under coagulopathy therapy in order to minimize bleeding complications after the procedure. To target the dorsal root ganglion, antero-posterior (AP) subpedicular approach was used as a guiding point to deliver the drug, which lies in the epidural space just caudal to the inferior margin of the pedicle, located superolaterally and anterior to the targeted nerve root. After sterilizing the area, Lidocain 1% was injected as a local anesthetic to the skin, then a spinal needle G22 was injected into the targeted site guided by image intensifier. Afterwards, the contrast dye Iopamiro 370 (0.5cc) was used to confirm the injection site, and then 1 mL Marcaine 0.5% and 10mg Flamicort was injected near the dorsal root ganglion. Immediate effect after the injections was assessed from the patient in the operating theater. Patient monitoring was performed for 12-24 hours, after which the patient could be discharged (one-day care). The patients were given mecobalamin (tid), and 500mg Paracetamol (tid) after the procedure and suggested to continue their

physical therapy regimens. Finally, 3 months after the procedure, we assessed the pain score using VAS and RMQ.

### Case Presentation

We present six patients with chronic lower back pain that was successfully treated with dorsal root ganglion (DRG) block. Each patient's presentation was described in full detail, including demographic data, symptoms, diagnosis, pre- and post-DRG block pain scores.

**Table 1.** Patient Demographics, Pain symptoms, and Diagnosis

ID	Initials	A g e / Sex	Presenting features	Diagnosis
1	PFA	27/F	Lower back pain, sometimes radiating through buttocks	Hernia Nucleus Pulposus L4-5
2	ND	22/F	Lower back pain, pain radiating through left leg, tingling sometimes experienced	Hernia Nucleus Pulposus L4-5
3	PM	49/F	Lower back pain, radiating through right leg, tingling sometimes experienced	Hernia Nucleus Pulposus L4-5
4	VER	33/F	Lower back pain, radiating through right leg, tingling sensation present	Hernia Nucleus Pulposus L4-5
5	MBA	30/M	Lower back pain, radiating through left leg, tingling sensation present	Hernia Nucleus Pulposus L5-S1
6	RP	40/M	Lower back pain, sometimes radiating through both legs, absent tingling sensation	Hernia Nucleus Pulposus L4-5

#### Patient 1: PFA

PFA was a 27-year-old female presenting with chronic lower back pain. She had been experiencing pain within the last 1 year, which was aggravated by activity. She worked as a teacher and she felt that the pain was

bothering her daily activities. In addition, the pain sometimes radiating through her buttocks. No tingling or numbness was present. Pain usually came in the morning and after moderate activities, such as walking while carrying bags or books.

Her pain score on VAS was 5 out of 10, and RDQ score was 14 from 24. She used painkillers and was once treated by another doctor for tender point injection, but no significant improvement was shown for the treatment. We planned to perform DRG block for diagnostic and pain intervention, to which she agreed. She had no previous history of medications for chronic disease or anti-platelets.

On physical examination, her legs and skin had normal color, with no deformities. Tenderness was found on levels L5-S1. Sensory and motor functions were normal. Special test was performed; we found that straight leg raise test was positive in 75° for both legs, while Patrick, contra-Patrick, and Femoral stretch tests were negative. MRI revealed a bulging disc on levels L5-S1.

DRG block was chosen for diagnostic and pain management. After the procedure, the patient was monitored for 24 hours and discharged subsequently. Three months after the procedure, we assessed the pain score: gratefully, she scored on 2 for VAS score compared to 5 before procedure and scored 12 from 24 on RDQ (showing 12 points of improvement). We estimated 85-90% clinical improvement for the symptoms.



**Figure 2.** MRI of patient 1

#### Patient 2: ND

ND is a 22-year-old female with chronic lower back pain. She had no history of trauma. The pain started one and a half years ago, with no history of surgery. The pain radiated through the left leg and also came with radiating tingling sensation that sometimes appeared in

the morning and at night. Bladder function was normal. Her pain score on VAS was 5 out of 10, and her RDQ score was 16 out of 24.

Physical examination showed normal legs and skin color. Tenderness along the L4-L5 levels was observed with positive paravertebral muscle spasm, together with a slight pain on the L5-S1 levels. Straight leg raise test was positive for the left leg on 60°, however the Bowstring, Patrick and contra-Patrick, and Femoral stretch tests were negative.

MRI revealed a herniated disc predominantly on the left side of L4-5. Since surgical intervention was not the first option and the patient also refused microsurgery, the DRG block for diagnostic and pain management was chosen. The procedure was performed, and the patient was monitored for 24 hours before being discharged.

Three months after the procedure, a follow-up suggested a significant recovery: she scored 2 out of 10 in VAS and 3 out of 24 for RDQ, which equals to 81% pain improvement. She was happy with the result.



**Figure 3.** MRI of patient 2.



### **Patient 3: PM**

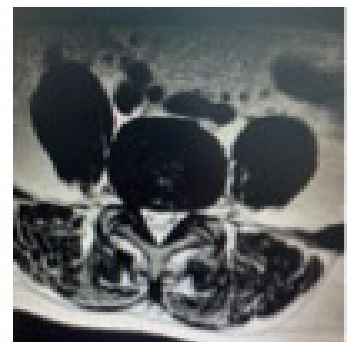
PM was a 49-year-old female with no history of systemic disease. She complained of lower back pain that started 8 months ago without prior injury. The pain had interfered with her activities of daily life. In addition, she complained that her pain radiated through her right leg. She also felt a tingling sensation on her right leg intermittently. She had been taking medication and received a tender point injection, but no significant improvement was shown. She was not on any other medication at that moment.

We assessed the VAS (6 out of 10) and RDQ (17 out of 24) scores. On clinical examination, we noticed tenderness in the lower back region, the L4-5 area,

along with paravertebral muscle spasms. No signs of infection or deformities were found. Straight leg raise test was positive on the right side at 55°, the Bowstring, Patrick and contra-Patrick, and the Femoral stretch tests were negative. Sensory and motor functions were within normal limit.

MRI revealed a slight disc bulging on the right side, on levels L4-5. We decided to carry out DRG block on levels L4-5 on the right side for diagnostic and pain management.

DRG block was made on the levels L4-5 on the right side. Since the patient was in one-day care, she was discharged after 24-hour observation period. Three months after the procedure, she came for a follow-up visit and expressed that she was relieved from the pain. She reported a VAS score of 1 out of 10 and the RDQ pain score of 4 out of 24 (reduced by 13 points), which equals to 76% clinical improvement. The patient was satisfied and hoped to be able to repeat the procedure should her symptoms recur in the future.



**Figure 4.** MRI of patient 3.

### **Patient 4: VER**

VER was a 33-year-old female, working as a bank accountant. She complained of chronic lower back pain that started 9 months ago without prior injury. Her BMI fell within the grade I obese classification, where her height was 156 cm and her body weight was 80 kg. The pain was aggravated by activity, and when attempting to stand up from sitting, she felt pain that radiated to her right leg. She complained of a tingling sensation as if she had been sitting for a long time, which manifested itself after doing activities such as lifting documents and came on almost every night. She was not on any medication at the moment of visit. She had undergone some physical therapy however no significant improvement was achieved. She felt that the pain was interfering with her

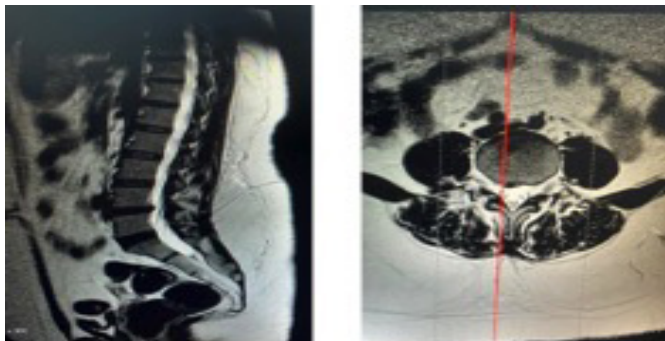


work.

We assessed her pain scores: VAS (6 out of 10) and RDQ (16 out of 24). On physical examination, no signs of deformity, paleness, and infection were found. Tenderness was found on the levels L4-5. Straight leg raise test was positive on the right side on 70°, whereas the Bowstring, Patrick and contra-Patrick, and Femoral stretch tests turned out to be negative. We confirmed the diagnosis by an MRI study.

On lumbar MRI, we observed a herniated disc at the level L4-5. No other abnormalities were found. The patient refused to undergo microsurgery and preferred a DRG block for diagnostic and pain management. The procedure was performed, and after 24 hours of monitoring, no side effect was present on the patient, after which she was discharged.

Three months after the procedure, she came for a follow-up and reported that she was satisfied with the result. By that time, her VAS score was 1 out of 10 and RDQ was 4 out of 24 (reduced by???) which was equivalent to 75% improvement. She also noticed that weight loss helped relieve pain and still routinely exercise and control her diet.



**Figure 4.** MRI of patient 4.

#### **Patient 5: MBA**

MBA was a 30-year-old male; he was an active person who was working as a janitor. He complained of lower back pain that first appeared 3 years ago without prior injury, and he felt that the pain had been interfering with his daily activities since he had to stand upright for a long time during work. The pain was aggravated by activity and would usually manifest in the morning. It would appear whenever he was attempting to lift heavy objects. Radiating pain and tingling sensation were also reported through his left leg. He had been taking 200 mg

celecoxib twice daily and 50 mg eperisone three times daily as painkillers, but the pain did not subside. He had already attended physiotherapy sessions frequently but they were futile as well.

He reported VAS (5 out of 10) and RDQ (16 out of 24) scores. Physical examination revealed no signs of inflammation, infection, and deformity. Straight leg raise test was positive on the left side on 60°, Bowstring test was positive on the left side, while Patrick and contra-Patrick and Femoral stretch tests were negative. MRI was performed to confirm the diagnosis.

MRI revealed a bulging disc on L5-S1. He refused surgical intervention, but chose DRG instead for diagnostic and pain management. After the procedure, we monitored the patient for 24 hours and found no side effects.

Three months after the procedure, he made a follow-up visit. The pain had mostly subsided, where he scored 1 out of 10 and 4 out of 24 (reduced by 12 points) on VAS and DRQ, respectively, which equals to 75% improvement. He was delighted with the procedure because he could now return to work.



**Figure 5.** MRI of patient 5.

#### **Patient 6: RP**

RP was a 40-year-old male who worked as a laborer. He complained of chronic lower back pain that first manifested 1 year ago, which was severely affecting his daily activities and working routines. The pain radiated from his lower back to both legs. No tingling sensation was present. It was aggravated by walking and he felt better in supine position. Every morning he constantly experienced spasms and pain in his lower back. He had consumed medication and undergone physical therapy, but they were not adequate to relieve the pain. He had no history of trauma and underlying disease.

His pain scores were 6-7 out of 10 and 18 out of 24 based

on VAS and RDQ, respectively. Physical examination revealed no deformities or signs of infection, and his skin color was normal. Straight leg raise test was positive for both legs on 70°, Bowstring, Patrick and contra-Patrick, and Femoral stretch tests were negative. MRI was performed to confirm the diagnosis.

MRI revealed lumbar disc herniation on L4-5. We offered DRG block for diagnostic and pain management. After the procedure, the patient was monitored for 24 hours, and he was discharged without any adverse effect.

Three months after the procedure, he reported a VAS score of 2 out of 10 and RDQ of 3 out of 24 (reduced by 15 points), which indicated 71% improvement.



**Figure 6.** MRI of patient 6.

**Table 2.** Pre- vs. Post- DRG Block Pain Scores

ID	Initial	VAS Score pre-DRG block	VAS Score 3 months post-DRG block	RDQ score pre-DRG block	RDQ score 3 months post-DRG block	Improvement of symptoms based on RDQ score
1	PFA	5/10	2/10	14/24	2/24	90%
2	ND	5/10	2/10	16/24	3/24	81%
3	PM	6/10	1/10	17/24	4/24	76%
4	VER	6/10	1/10	16/24	4/24	75%
5	MBA	5/10	1/10	16/24	4/24	75%
6	RP	6-7/10	2/10	18/24	3/24	83%

## DISCUSSION

Low back pain is a very common health problem among the population and is a major cause of disability that affects work performance and well-being<sup>8</sup>. DRG block is primarily used both for diagnostic and pain reduction purposes. The drug is injected near the site of the impinged nerve, allowing it to relieve pain more directly and reduce inflammation<sup>9,10</sup>. By injecting a cocktail that contains steroid and local anesthetics, it stabilizes cell

membranes, inhibits the synthesis of prostaglandin, suppresses immune responses, increases neural blood flow, and reduces reactions of inflammatory mediators such as IL-1, TNF, and phospholipase A2. In addition, it also blocks nociceptive C fiber conduction<sup>12,13</sup>.

DRG block is a safe and effective minimally invasive method in patients with radicular pain due to herniated lumbar disc or spinal stenosis<sup>14</sup>. A case-control by Schaufele *et al.* concluded that DRG block resulted in better short-term pain improvement and fewer long-term surgical interventions<sup>15</sup>. In a study conducted by Jeong *et al.*, it was shown significant difference between the therapeutic effect and the symptoms that was observed in short-term follow-up. However, epidural steroid injection results in a shorter duration of pain relief. Better outcomes usually occur on those with shorter symptom duration, which means patients with chronic pain or who seek help much later after symptoms had started have a tendency of pain recurrence. They also found 60.4% success rate for patients that were successfully followed up for 6 months<sup>11</sup>.

Kennedy *et al.* used the transforaminal epidural steroid injection (TFESI) technique on patients who were then followed up to 5 years. They noticed that although most patients had improved significantly in the first 6 months, symptoms tended to resurface in the subsequent 5 years<sup>16</sup>.

In our study, we reported efficacy of DRG block using steroid injection and local anesthesia on patients with chronic back pain, we found it effectively improved the quality of life and work performance in each individual based on pain scoring. However, this study has its own limitations: although we considered it a success, longer follow-ups are needed to prove the actual efficacy of the treatment. To minimize bias, we added inclusion and exclusion criteria, adhered to a high follow up rate for all patients, set a specific time interval for collecting the

patient's data, and implemented a clear clinical outcome measure to proof relieved symptomatic relief. Further studies are needed to determine the efficacy of DRG block for either short-term or long-term pain intervention in chronic lower back pain.

## CONCLUSION

In our study, we reported 6 cases which responded well to DRG block to relieve chronic back pain. DRG block is also a safe and effective way to treat patients where surgery is contraindicated due to underlying disease and not their first choice of treatment. Even though we reported that DRG block is effectively improved life quality, we still have a lot of limitations in our study. Hence, more studies are needed to proof the efficacy and safety of DRG block to treat chronic lower back pain.

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