



CLINICAL EFFICACY OF A NOVEL DRUG COCKTAIL FOR SELECTIVE NERVE ROOT BLOCK IN LUMBAR RADICULOPATHY

Orthopaedics

Dr. Arnav P Rathod*

Resident, Department Of Orthopedics, Dr. PDMMC Hospital, Amravati *Corresponding Author

Dr. Chaitanya Chikhale

Associate Professor, Department Of Orthopedics, Dr. PDMMC Hospital, Amravati.

Dr. Rajendra Baitule

Professor, Department Of Orthopaedics, Dr PDMMC Hospital, Amravati,

Dr. Ganesh Pundkar

Head Of Dept & Professor, Department Of Orthopedics, Dr. PDMMC Hospital, Amravati

ABSTRACT

Background: Lumbosacral radicular pain due to disc herniation is one of the common disabling conditions in orthopaedic clinics. Most of these patients generally recover well even with non-operative treatment. The condition involves back pain, which may radiate to the lower limbs, and neurological symptoms, which involve a specific nerve root. Selective nerve root blocks is a common intervention, which are used to control the pain and neurological symptoms associated with chronic lumbar radiculopathy. **Aims And Objectives:** To evaluate the efficacy of single dose SNRB with 2ml of methylprednisolone acetate (80mg) and 3ml of Bupivacaine (0.5%), 5ML of Hypertonic Saline. Total 10ml of Cocktail in patients with single level unilateral disc prolapse with lumbar radiculopathy. **Materials And Methods:** This study was conducted in the Orthopaedics department of a tertiary care hospital. There were 60 radicular pain patients who were confirmed by MRI. All patients who met the inclusion criteria are subjected to SNRB with 10ml of Cocktail (2ml of methylprednisolone acetate (80mg) and 3ml of Bupivacaine (0.5%), 5ML of Hypertonic Saline) Outcome of the treatment was prospectively evaluated till 6 months of follow up using VAS and ODI score. Ethical Committee approval was taken. **Results:** In our study Mean VAS score was 7.987 ± 0.82 preoperatively. At 1 month it was reduced to 3.72 ± 0.67 , at 3 months 3.43 ± 0.88 and at 6 months 3.543 ± 0.98 . The results were statistically significant as p value is < 0.05 . Mean ODI score was 41.5 ± 8.82 preoperatively. At 1 month it was reduced to 25.82 ± 7.67 , at 3 months 17.87 ± 5.88 and at 6 months 12.89 ± 7.98 . only 3(5%) patients required surgical management, rest 57(95%) were relieved. **Conclusions:** Selective Nerve Root Block is a reliable option for acute pain management in patients with lumbar disc prolapse and radiculopathy. It results in significant improvement in pain and disability and helps in delaying the surgery in patients without neural deficits¹⁹.

KEYWORDS

Selective Nerve Root Block, Lumbosacral radicular pain, VAS and ODI score.

INTRODUCTION

One of the most prevalent issues in office orthopaedics that can negatively affect quality of life and restrict activities is radicular pain in the lower limbs.¹ A common source of this radicular pain in the legs is lumbar prolapsed intervertebral disc disease (PIVD). Frequently, the underlying cause of the symptoms and whether nerve root decompression would provide relief remains uncertain due to conflicting or unclear clinical and imaging findings.² The majority of radicular symptoms associated with PIVD are typically addressed initially through conservative methods such as physiotherapy, rest, and medication, provided there are no red flags.³ For individuals who do not respond to conservative treatment, selective nerve root block (SNRB) has been recommended as both a diagnostic tool and a therapeutic approach to avoid the necessity for surgery while identifying the affected nerve root. In addition to mechanical compression, inflammation plays a significant role in nerve root dysfunction related to PIVD.⁴

In addition to the component, other factors such as chemical inflammation also contribute to the pathophysiology of pain in PIVD.⁵ Back and radicular pain may result from local immunological reactions caused by the slid nucleus pulposus tissue into the epidural space. Cytokines and other pro-inflammatory compounds may be released, which will promote the development of epidural inflammation.^{5,6} Most individuals with a PIVD-induced radiculopathy recover on their own without medical intervention.⁷ The scientific basis for its conservative therapy is the resorption of the herniated disc by the cell autophagy phenomenon, which is credited with the spontaneous remission of the symptoms.⁸ Acute back pain with radiculopathy and chronic pain are two different clinical manifestations of PIVD.⁹ There are different modalities to treat lumbar radiculopathy conservatively, like acupuncture, pain medications with oral steroid and rest.¹⁰

By infiltrating the epidural space through the caudal or transforaminal route, anti-inflammatory drugs such as steroids might decrease the local inflammation that causes pain due to endo-neural oedema and an

increase in nerve root microvascular permeability.¹¹ The conservative treatment of radicular pain caused by a specific damaged nerve root in the cervical and lumbar regions includes the use of Selective Nerve Root Block (SNRB).^{12,13}

Our study aimed to evaluate the efficacy of single dose SNRB with total 10ml cocktail of -2ml of methylprednisolone acetate (80mg) and 3ml of Bupivacaine (0.5%), 5ML of Hypertonic Saline in unilateral disc prolapse with lumbar radiculopathy treated in Tertiary Level Of Institute in Central India.

MATERIALANDMETHODS

Study Settings: The study was conducted in Tertiary Level Of Institute in Central India.

Study Population: All patients (active police personnel) complaining of radicular pain demonstrating a positive Straight Leg Raise Test (SLRT) in 30-60 degrees and not responding to conservative management were selected for the root block procedure.

Sample Size: A total of 60 patients were included for study purpose.

Inclusion Criteria

- All patients having single level postero-lateral disc prolapse affecting a single nerve root were enrolled in this study.
- Patients who were willing to participate in study

Exclusion Criteria

- Patients with bilateral and multilevel radiculopathies who received SNRB were excluded from the study.
- Cases with predominant back pain without radiculopathy, progressive neurological deficits, cauda equina syndrome, and history of previous surgery and local infection were excluded from the study.

Procedure:

Photos Of C-Arm Position..



C-Arm has To Be Inclined Upto 25 Degrees Obliquely On The Affected Side With The Surgeon Standing On Ipsilateral I.e Planned Side Of Drug Delivery.



Needle Position At 6'o Clock Of Pedicle At Affected Side



2 Level Block Given. L-4/l-5/s-1



Dye Spread Photo Along The Nerve Root At l-4/l-5.

After obtaining informed consent and conducting routine tests, including a hemogram, random blood sugar, and bleeding profile (PT/INR), HIV, HBs-ag, Serum Creatine the patient was transferred to the procedure room. They were positioned in a prone position on a fluoroscopy-compatible table. We occasionally use a pillow to obliterate lumbar lordosis. The area was prepared with antiseptic precautions, including painting and draping.

Using fluoroscopic guidance, the targeted neural foramen was identified by adjusting the inclination until the "Scottish dog sign" was visible on the image intensifier screen which in most cases is 25° towards the symptomatic side. A 1% lignocaine solution was administered along the spinal needle's insertion path, aiming just below the "neck" of the Scottish dog sign. A 22G spinal needle was then advanced along the predetermined tract to reach the desired root canal within the safety triangle. Clinical confirmation of root irritation was achieved by eliciting a typical response from the patient. To verify the nerve root's course, 0.5 ml of iodine-based contrast dye was injected under fluoroscopic guidance.

Once proper positioning and spread of contrast seen, 10ml cocktail of -2ml of methylprednisolone acetate (80mg) and 3ml of Bupivacaine (0.5%), 5ML of Hypertonic Saline was slowly administered. Following the procedure, a local dressing was applied, and the patient was monitored in the recovery room for 30 minutes. Before discharge, an assessment was conducted to evaluate immediate symptom relief and limb neurology.

Visual Analogue Scale (VAS) and Oswestry Disability Index (ODI) were recorded pre-procedure, and at, 1 month, 3 months and 6 months follow up and statistical analysis was done using SPSS version 24.

All the patients were advised to take supervised physiotherapy at our institute.

RESULTS

Table 1 Age Wise Distribution Of Patients(n=60)

AGE GROUP	NO.OF PATIENTS	PERCENTAGE
20-30	04	6.66
31-40	29	48.33
41-50	24	40.0
50-60	02	3.33
>60	01	1.66

The mean age of the 35.3 years and ranging from 20 to 60 years. Majority were in age group 31-40 years.

Table 2 Sex Wise Distribution Of Patients(N=60)

SEX	NO.OF PATIENTS	PERCENTAGE
Males	42	70.0
Females	18	30.0

Majority were males with Male: Female ratio of 2.33:1

Table 3 VAS Score Of Patients

	VAS SCORE(MEAN $\pm$ SD)	P value
PRE PROCEDURE	7.987 $\pm$ 0.82	0.0056
1 MONTH	3.72 $\pm$ 0.67	
3 MONTH	3.43 $\pm$ 0.88	
6 MONTH	3.543 $\pm$ 0.98	

Mean VAS score was 7.987 $\pm$ 0.82 preoperatively. At 1 month it was reduced to 3.72 $\pm$ 0.67, at 3 months 3.43 $\pm$ 0.88 and at 6 months 3.543 $\pm$ 0.98. The results were statistically significant as p value is <0.05

Table 4 Oswestry Disability Index (ODI)

	ODI SCORE I % (MEAN $\pm$ SD)	P VALUE
PRE PROCEDURE	41.5 $\pm$ 8.82	0.0023
1 MONTH	25.82 $\pm$ 7.67	
3 MONTH	17.87 $\pm$ 5.88	
6 MONTH	12.89 $\pm$ 7.98	

Mean ODI score was 41.5 $\pm$ 8.82 preoperatively. At 1 month it was reduced to 25.82 $\pm$ 7.67, at 3 months 17.87 $\pm$ 5.88 and at 6 months 12.89 $\pm$ 7.98. The results were statistically significant as p value is <0.05

Table 5 Distribution Of Patients On Basis Of Operative Requirement

	NO.OF PATIENTS	PERCENTAGE
RELIEVED	57	95
REQUIRED SURGERY	03	05

In our study only 3 (5%) patients required surgical management, rest 57(95%) were relieved.

DISCUSSION

Selective nerve root blocks, or SNRBs, were first introduced by Macnab in 1971 and are now often used. SNRBs have a permanent to transient symptom-relieving impact in PIVD and spinal canal stenosis, and they can be employed for both diagnostic and therapeutic purposes.¹⁴

The disc is positioned ventral to the nerve root, indicating that the pain source lies ventral to the root as well. When an injection is administered into the epidural space, the medication distributes primarily to the dorsal aspect. Therefore, in a selective nerve root block (SNRB), our goal is to deliver the medication ventral to the nerve root. In contrast, using a caudal or interlaminar epidural approach, the medication is injected dorsally and does not target the pathology directly. In SNRB procedures, an 80 mg dose of Methylprednisolone Acetate is utilized to mitigate inflammation surrounding the affected nerve root, which in turn alleviates the pain and swelling associated with lumbar radiculopathy. The 2% Lignocaine in SNRB serves to confirm that the correct nerve root is being targeted and provides quick symptom relief. The brand Anawin represents a 0.5% Bupivacaine, a long-acting local anesthetic. We hypothesize that the use of 3% hypertonic saline will lead to a reduction in disc size, resulting in improved clinical outcomes and extended pain relief. Furthermore, we believe that utilizing a 10 ml solution will help flush out the toxins responsible for chemical irritation and inflammation of the nerve roots. To our knowledge, this study is unique in advocating for the use of the innovative cocktail described here. When implemented in SNRB, it offers extended pain relief, complementing the analgesic effects initiated by lignocaine. Additionally, 0.5 ml of an iodine-based contrast agent is employed to visualize the distribution of the injected solution under fluoroscopic guidance, ensuring precise needle placement and appropriate medication dispersal around the target nerve root.

In our study Mean VAS score was 7.987 $\pm$ 0.82 preoperatively. At 1 month it was reduced to 3.72 $\pm$ 0.67, at 3 months 3.43 $\pm$ 0.88 and at 6 months 3.543 $\pm$ 0.98. The results were statistically significant as p value is <0.05. Mean ODI score was 41.5 $\pm$ 8.82 preoperatively. At 1 month it was reduced to 25.82 $\pm$ 7.67, at 3 months 17.87 $\pm$ 5.88 and at 6 months 12.89 $\pm$ 7.98.¹⁸

Our result however, further supports recommendations from a systemic review by Benoy Benny and Pari Azari that SNRB has long term pain relief in most of the patients.¹⁵ There is a strong evidence for transforaminal injections in the treatment of lumbosacral radicular pain for both short term and long-term relief, and is less expensive and

less invasive treatment modality to treat lumbar radiculopathy.^{16,17} Gaurav et al reported positive clinical efficacy of SNRB in similar age but in general Nepalese people. He found that VAS and disability index scores significantly become better till around six months and then they plateau. There is no difference in outcome at 6 months and one year.¹⁸

CONCLUSION

Selective Nerve Root Block is a reliable option for acute pain management in patients with lumbar disc prolapse and radiculopathy. It results in significant improvement in pain and disability and delaying the Surgery in such patients. By using Our Proposed 10ml Cocktail solution flushing out the toxins that cause chemical irritation and inflammation of the nerve roots will give better clinical outcomes.

Conflict Of Interest: Nil

REFERENCES

- Frymoyer JW, editor. The Adult Spine: Principles and Practice. New York, NY: Raven Press; 1991.
- Beynon R, Elwenspoek MM, Sheppard A, Higgins JN, Kolias AG, Laing RJ, et al. The utility of diagnostic selective nerve root blocks in the management of patients with lumbar radiculopathy: A systematic review. *BMJ Open* 2019;9:e025790.
- Yang JC, Chiu ST, Oh JY, Kaliya-Perumal AK. Selective nerve root block in treatment of lumbar radiculopathy: A narrative review. *Surgeries* 2022;3:259-70.
- Mulleman D, Mammou S, Griffoul I, Watier H, Goupille P. Pathophysiology of disk-related sciatica. I. Evidence supporting a chemical component. *Joint Bone Spine* 2006;73:151-8.
- Wheeler AH, Murrey DB. Chronic lumbar spine and radicular pain: Pathophysiology and treatment. *Current pain and headache reports*. 2002;6(2):97-105.
- McCARRON RF, Wimpee MW, Hudkins PG, Laros GS. The inflammatory effect of nucleus pulposus. A possible element in the pathogenesis of low-back pain. *Spine*. 1987;12(8):760-4.
- Benoist M. The natural history of lumbar disc herniation and radiculopathy. *Joint Bone Spine*. 2002;69(2):155-60.
- Diao Z-J, Jiang H, Liu J-T. Significance of cell autophagy in resorption of lumbar disc herniation. *Zhongguo gu shang= China journal of orthopaedics and traumatology*. 2018;31(4):386-90.
- Cowan N, Bush K, Katz D, Gishen P. The natural history of sciatica: a prospective radiological study. *Clinical radiology*. 1992;46(1):7-12.
- Saal JA, Saal JS. Nonoperative treatment of herniated lumbar intervertebral disc with radiculopathy. An outcome study. *Spine*. 1989;14(4):431-7.
- Stafford M, Peng P, Hill D. Sciatica: a review of history, epidemiology, pathogenesis, and the role of epidural steroid injection in management. *British journal of anaesthesia*. 2007;99(4):461-73.
- Narozny M, Zanetti M, Boos N. Therapeutic efficacy of selective nerve root blocks in the treatment of lumbar radicular leg pain. *Swiss medical weekly*. 2001;131(0506).
- Chung J-Y, Yim J-H, Seo H-Y, Kim S-K, Cho K-J. The efficacy and persistence of selective nerve root block under fluoroscopic guidance for cervical radiculopathy. *Asian spine journal*. 2012;6(4):227.
- Macnab I. Negative disc exploration: an analysis of the causes of nerve-root involvement in sixty-eight patients. *JBJS*. 1971;53(5):891-903.
- Benny B, Azari P. The efficacy of lumbosacral transforaminal epidural steroid injections: a comprehensive literature review. *Journal of back and musculoskeletal rehabilitation*. 2011;24(2):67-76.
- Vashishtha S, Singh SK, Verma A, Anand A. A study on effectiveness of selective nerve root blocks in lumbar radiculopathies. *International Journal of Orthopaedics*. 2019;5(3):191-9.
- Khan KS, SAH S, Rafiq T, Dolan M, Devitt A, editors. The Role Of Selective Nerve Root Block In Patients With Lumbar Radiculopathy. *Orthopaedic Proceedings*; 2004: The British Editorial Society of Bone & Joint Surgery.
- Dhakal GR, Hamal PK, Dhungana S, Kawaguchi Y. Clinical Efficacy of Selective Nerve Root Block in Lumbar Radiculopathy due to Disc Prolapse. *Journal of Nepal Health Research Council*. 2019;17(2):242-6.
- Mutubuki EN, van Helvoirt H, van Dongen JM, van't Klooster M, Jornada Ben A, Vleggeert-Lankamp CLA, et al. Effectiveness and cost-effectiveness of mechanical diagnosis and treatment combined with transforaminal epidural steroid injections for patients on a waiting list for surgery for a chronic lumbar herniated disc: a randomized controlled trial and economic evaluation. *Spine J*. 2025;25(5):1309-21.