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Research Article

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Study of Efficacy of Selective Nerve Root Block in Patients of Lumbar Radiculopathy with Disc Prolapse

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ABSTRACT

Background: Lumbar radiculopathy is the term used to describe radiculopathy that affects the lower back. The lifetime prevalence of chronic lumbar radiculopathy is 3-5%. Though most instances go away independently, up to 30% still have noticeable symptoms a year later. If non-invasive therapies cannot relieve symptoms, a physician can suggest surgery. The aim is to evaluate selective nerve root block (SNRB) efficacy in lumbar radiculopathy with disc prolapse patients.

Methods: Fifty patients with lumbar radiculopathy with the herniated disc were included. The procedure was conducted by an orthopaedic surgeon using fluoroscopy and Iopamidol non-ionic contrast agent. The mixture of the drug was injected and pain reduction was recorded by Visual Analogue Scale (VAS) Score and Oswestry Disability Index (ODI) Score.

Results: Total 50 patients with mean age of 38.8±10.15 years were included in the study. The pre-injection Visual Analogue Pain Score was significantly reduced at follow-up 1 week, 1 month, 3 months 6 months and 1 year. Similarly, pre-injection Oswestry Disability Index score of was also significantly reduced at different follow 1 week, 1 month, 3 months, 6 months and 1 year.

Conclusion: In cases of lumbar radiculopathy, selective nerve root block markedly lowers the Visual Analogue Pain Score for up to a year; however, the pain reduction ends after around six months. ODI parameters had no significant reduction after 6 months and 1 year of follow-up.

Key-words: Chronic Back Pain, Disc prolapse, Lumbar Radiculopathy, ODI Score, SNRB, VAS Score

INTRODUCTION

Lumbar radiculopathy is the most prevailing and leading cause of disability [1] and a herniated disc is the main victim of radiculopathy, causing low back pain. Lumbar radiculopathy is defined as lower backache radiating to the lower limb along the course of nerve entrapment. It is commonly experienced as radiating pains in the lower limb of all age groups [2,3].

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Which in turn impacts individuals and functional status of all age groups, such as depression [4], dementia [5], falls [6], and disability [5]. Recent cross-sectional studies from the USA have shown that people with low socioeconomic status are more prone to low backache than those with high socioeconomic status, which different socioeconomic status indicators can explain.[7] Most patients can be treated only with medical management and physiotherapy, but few require surgical management.[1-3] Procedure constitutes a diagnostic and therapeutic block that could help determine the pathological level or origin of pain and its management.[4] Recent studies have shown evidence of increased chemical irritation or sensitivity to the affected nerve root and suggested that inflammatory

causes can be reversible.[5,6] SNRB gives us an alternative approach and has demonstrated better than epidural root blocks in managing lumbar radiculopathy, foraminal stenosis, disc pathology or any degenerative changes.[8-11] SNRB is a useful procedure providing dual diagnostic and therapeutic modalities. It also provides us with better alternatives or substitutes to surgery and increases compliance with patients or physical therapies.[8]

A prospective observational study was conducted to assess the efficacy of SNRB in patients suffering from lumbar radiculopathy due to disc prolapse, who didn't respond to 6 weeks of conservative management along with rehabilitation in virtue of ODI and VAS score in the Indian population.

MATERIALS AND METHODS

A prospective observational study was performed in a tertiary care hospital after approval by the Institutional Ethical Committee from January 2020 to August 2021.

Inclusion Criteria- Aged 20 to 60 years with lumbar radiculopathy with the herniated disc were selected from the tertiary care hospital's outpatient department (spine clinic). They were included in the study after fulfilment of inclusion criteria and informed consent was obtained. These patients were diagnosed both clinically and radiologically, having positive straight leg raising (SLR) test and a lateralized disc herniation at the lumbar region shown in magnetic resonance imaging (MRI).

Exclusion Criteria- Patients with the failed back syndrome, cauda equina syndrome, neoplastic or vascular causes, pregnancy or lactating mothers, extruded or sequestrated disc or systemic diseases such as diabetes or any other source of infections were excluded from the study.

50 Patients who fulfilled the inclusion criteria were 30 males and 20 females. Pre-injection evaluation was done using the visual analogue scale (VAS) and Oswestry disability index (ODI), which was filled out by the patients and monitored in a chart.

A pre-procedure evaluation was done by necessary investigations (CBC, ESR, CRP, Urine Routine and microscopy, Chest X-ray in Anterior-Posterior view, Random blood Sugar) and vitals (Pulse rate, Blood Pressure, Respiratory rate, Temperature.) were recorded to rule out any source of infection or any co-morbidities.

Statistical Analysis- The data were recorded using a Microsoft Excel Sheet and analysed using the software SPSS version 2.0 and different tables/charts.

After a thorough evaluation and intravenous infusion line assessment using 18G venflon, procedure was conducted by an orthopaedic surgeon in the operation theatre using fluoroscopy and Iopamidol non-ionic contrast agent under aseptic condition (Fig. 1).

Fig. 1: Procedure of giving SNRB under C-Arm guidance

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The patient was asked to lie in a prone position. After proper drawing and painting, the pathology site was identified using fluoroscopy in AP (anterior-posterior) and lateral view (Fig. 2 & 3). After confirmation of the pathological site, the skin and subcutaneous tissue were infiltrated with local anaesthesia (2% lignocaine). Total 22-gauge needle was inserted transforaminal until the patient confirmed the pain along the affected site, Iopamidol radio-opaque dye (non–ionic contrast agent) was injected and the spread of the dye under fluoroscopy guidance was looked for (Fig. 4, 5, 6) Needle position was confirmed under fluoroscopy guidance in oblique view and the needle position was kept in the centre of the eye of the scotty dog.

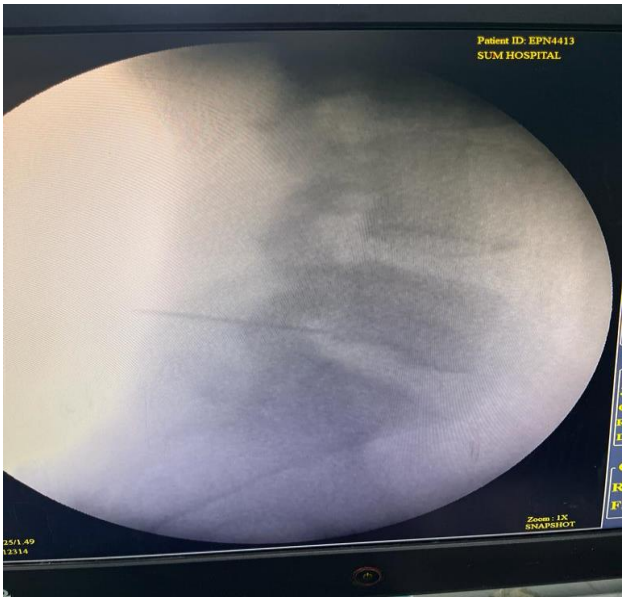

Fig. 2: C-Arm image showing LS spine lateral view with needle in position at nerve root)

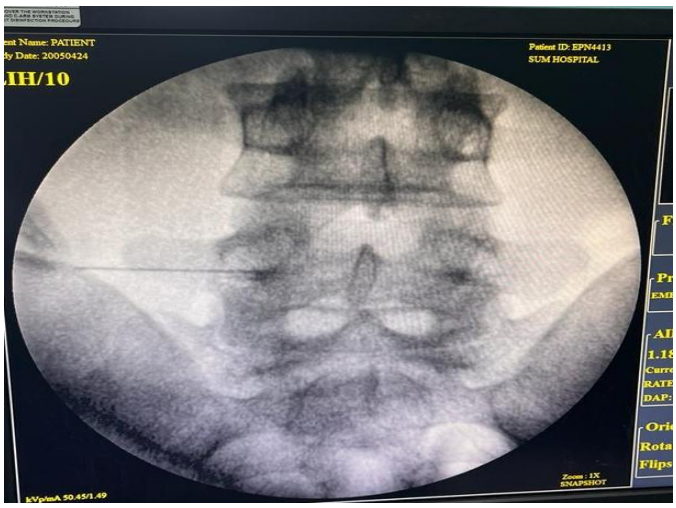

Fig. 3: C-Arm image showing LS Spine in AP view with needle in position at nerve root

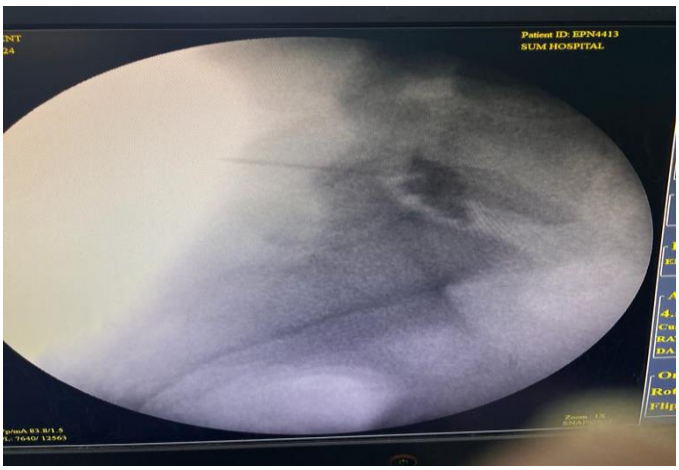

Fig. 4: C-Arm image showing LS Spine lateral view with dye at nerve root

Fig. 5: C-Arm image showing LS spine AP view with dye at the level of nerve root)

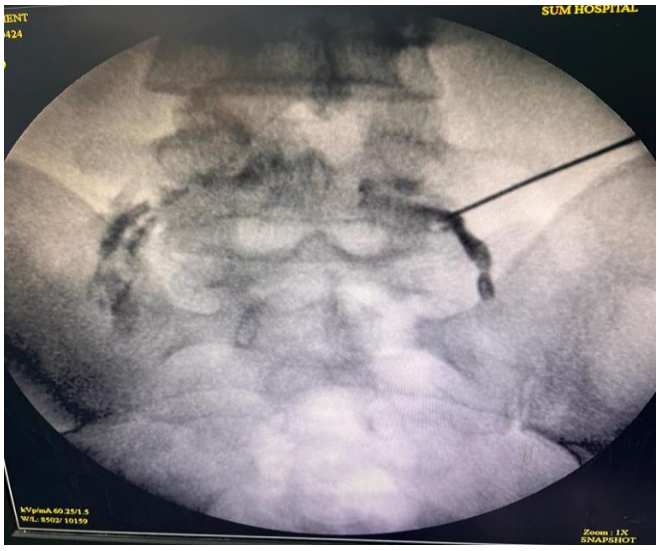

Fig. 6: C-Arm of LS Spine AP view showing dye at bilateral nerve root)

Once the position of the needle was confirmed, the mixture of the drug (dexamethasone 8mg (2ml) + 2% lignocaine preservative-free (1ml) + normal saline 2ml)

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was injected and the patient was asked about the reduction in pain as compared to pre-injection. A positive selective nerve root block was defined by Derby and Kine [12] as a reduction in the degree of pain within 20 minutes of injection lasting for more than 30 minutes, which is considered positive. After the procedure, the patient was shifted to the post-operative room for 2 hours and observed for any complications. Evaluation was done clinically and neurologically by the VAS score for pain and ODI score for disability. Any decrement in the VAS and ODI was considered positive. Post-injection VAS score and ODI score were recorded and monitored in the chart. After confirming the status of the patient and vitals within normal parameters, patients were asked for discharge and advised for sincere follow up to 1 year for VAS and ODI charting.

RESULTS

In our study, lumbo-sacral radiculopathy patients recorded mean age 38.8±10.15 years. Out of 50 patients, 30 patients were male and 20 were female. The most common root involved were L4-L5 and L5-S1 (Table 1).

Table 1: Demographic cycle

Age	38.8±10.15
Gender	Male (30), Female (20)
L4-L5	23
L5-S1	27
Follow up period	1 year

The pre-injection VAS Score of 7.46±1.02 was significantly reduced at follow-up 1 week (3.5±0.53, p<0.05), one month (3.44± 0.49, p<0.05), three months (3.34±0.71, p<0.05), 6 months (2.78±0.50, p<0.05) and 1 year (3.42±0.56, p<0.05) (Table 1 & Fig. 7).

Table 2: Visual analogue pain score at different follow-up periods

Time	Mean±S. D	p-value
Pre-injection	7.46 ±1.02	-
1 week	3.5±0.53	p<0.05
1 month	3.44±0.49	p<0.05
3 months	3.34±0.71	p<0.05
6 months	2.78±0.50	p<0.05
1 year	3.42±0.56	p<0.05

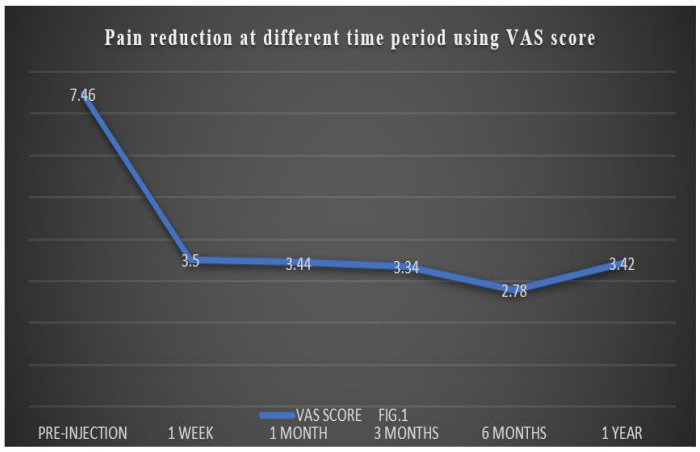

Fig.7: Pain Reduction at Different time Using VAS Score

Similarly, the pre-injection ODI score of 44.88±3.61 was also seen as a significant reduction at different follow-up periods of 1 week (26.6±2.84, p<0.05), 1 month (25.6±2.77, p<0.05), 3 months (24.62±2.66, p<0.05), 6 months (23.66±2.51, p<0.05) and 1 year (25.5±2.56, p<0.05) (Table 3; Fig. 8).

Table 3: Oswestry disability index score at different follow-up period

Time	Mean±S. D	p-value
Pre-injection	44.88±3.61	-
1 week	26.6±2.84	p<0.05
1 month	25.6±2.77	p<0.05
3 months	24.62±2.66	p<0.05
6 months	23.66±2.51	p<0.05
1 year	25.5±2.56	p<0.05

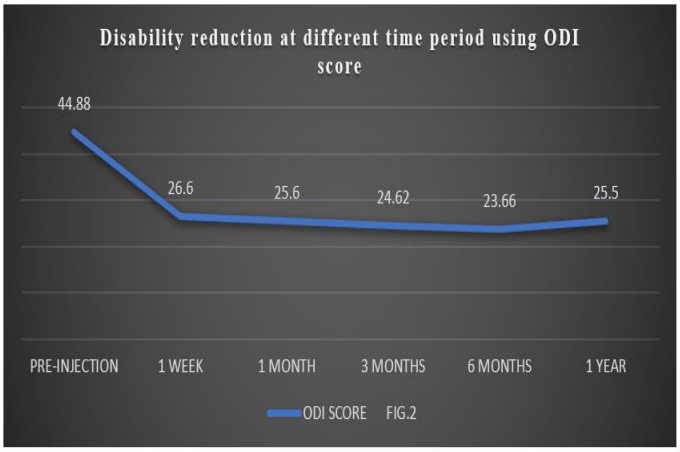

Fig. 8: Disability Reduction at Different Periods Using ODI Score

There was no complication noticed during the procedure time.

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DISCUSSION

Our orthopaedics outpatient department routinely sees lumbar radiculopathy due to disc prolapse/herniation. We encounter an increase in the number of patients with lumbar radiculopathy who didn't respond to conservative management along with rehabilitation and neither wanted to undergo surgery. This type of patient requires something in between that can relieve their pain for a short duration or delay the surgical procedure. Here, selective nerve root block plays an important role in managing these patients regarding diagnostic and therapeutic management. As the actual pathology of nerve root irritation is unknown, the prognosis of these patients can vary.

Chronic nerve root irritation in these patients causes radiculopathy and the ability to facilitate or alleviate the pain forms the basis of selective nerve root block.[13,14] Nowadays, MRI scan is the best diagnostic modality in spine surgery compared to others in that field. However, the limitation is neither to give a clear picture of all the causes of radiculopathy nor to correlate the symptoms with its findings.[15] So, selective nerve root block is becoming an easier and cheaper way to identify the root pain cause and simultaneously administer a mixture of drugs as therapeutic injections to look for pain relief, which is the aim of the selective nerve root block.

Patients having severe disc herniation or prolapse, who didn't want to undergo any surgical procedure or didn't have any satisfactory reduction in pain except for immediate post-procedure improvement. Through this, we can consider selective nerve root block as a diagnostic procedure and confirm the site needs to decompress. Similarly, patients having mild to moderate disc herniation or prolapse show significant pain reduction but allow them to reconsider the next line of management if the pain comes back.

Many authors have used methylprednisolone-based preparations in the past for this study; triamcinolone and betamethasone were also in demand.[16,17] We chose a dexamethasone-based non-particulate solution for our study as it was easily available in our institution. We have taken 8mg of steroid for SNRB for satisfactory therapeutic effect. Utmost care was taken to handle the needle gently to prevent any nerve injury, as most authors said this was to prevent needle-based complications of root block.[18,19]

It was seen that there was a significant reduction in the visual analogue score as compared to pre-procedure values in 1st month as compared with the other studies where the score was analysed at 6 weeks, 3 months and 1 year. [20,21] Comparatively, these studies have shown a significant reduction with a statistical significance of approximately 40-50% in the first 1 month. In contrast, Kappinen has analysed a 50% reduction in VAS score in the first 3 months (VAS pre-injection 71±18, 3 months: 34.3).[20] Because of subjective modalities like the VAS Score, slight differences can occur due to various factors like pain perceptions and different races and populations.[22] After 6 months of study, VAS score achieves a plateau phase with no significant reduction in the Kappinen study, comparable with ours.[20]Tafazzel also confirmed that these findings have no benefits in assessing the visual analogue score in 12 12-month study.[21] However, the reduction seen in our study was better even between 6 months and 1 year by using dexamethasone, which has a shorter duration of action compared to their study as they have used long-acting methyl-prednisolone.

Compared to VAS score in our studies, ODI scores have a comparable pattern but a lesser magnitude of reduction. Kappinen has shown that the reduction in ODI score of his study was approximately 40-50 % in the first 3 months, which was not significant (ODI: pre-injection: 42.9±16) and not even at 6 months and 1 year respectively (18.9), and (15.9).[20] In the Tafazal study, the ODI score was [ODI: pre-injection: 43.4 (32-54) Vs 6 weeks: 34.6±2.1; p=0.93], even less than kappinen.[21]A systematic review of the studies shows no significant reduction in ODI score compared to VAS Score with SNRB.[23] Our studies showed that ODI parameters have no significant reduction after 6 months and 1 year of follow-up.

The patients who undergo this procedure can complain of painful procedures and will face difficulty in cooperating, most commonly during the early phase of the study.[24] However, we have excluded the cases that failed to comply with the reduction in pain level during the early phase of the procedure. It was noticed in the previous study that the furcal nerve and sinus-vertebral nerve may get stimulated because of wrong needle placement.[25,26] So, in our study, we used a non-ionic contrast medium for better accuracy and to confirm the needle placement, we used fluoroscopy.

Previously, some authors have suggested that the primary role of inflammation is to increase the neural sensitivity of affected or irritated nerves.[27,28] Since phospholipase A2 is the chief product of inflammation responsible for lumbar radiculopathy and also the rate-limiting steps in the pathway of arachidonic acid, many studies support similarity in pain score with the use of dexamethasone, triamcinolone, and methylprednisolone in epidural injection.[26,29] As triamcinolone aggregates into large particles, causing occlusion of the major vessels and leading to ischaemic or infarction, we used dexamethasone sodium phosphate, which is non-particulate.[30]

Complications arising from SNRB are rare except for radicular spasm or cord infarction. The most frequently reported side effects are insomnia, fever, face flushing, etc. Other complications like increased blood glucose level, blood pressure, fluid retention and hypothalamic-pituitary axis suppression have also been reported. We didn't notice any adverse effects in our study, which may be due to the use of dexamethasone.

This study proves that selective nerve root block (SNRB) is effective in Indian populations visiting a tertiary care hospital. Still, the outcome and accuracy will be more validated in a large sample size.

CONCLUSIONS

It was seen that in patients with lumbar radiculopathy, there was a significant reduction in pain acutely from weeks to months in patients who had undergone selective nerve root block, whereas in Oswestry Disability index reduction in the disability score was noticed 50% in the 1weeks with a decrease in severity but not significantly.

The study recommends selective nerve root block in patients with lumbar radiculopathy who didn't respond to conservative management with physiotherapy for at least 6 weeks or didn't want to undergo surgery due to financial issues. An added benefit of selective nerve root block is that it can be utilised for both therapeutic and diagnostic purposes.

CONTRIBUTION OF AUTHORS

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Supervision- Sandeep Lenka, Chirag Gupta, Manoj Kumar Ram
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Data collection- Gopal Kumar Agarwal, Sandeep Lenka
Data analysis and Interpretation- Gopal Kumar Agarwal, Chirag Gupta
Literature search- Gopal Kumar Agarwal Manoj Kumar Ram
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Critical review- Kasinath Swain, Chirag Gupta, Diptiranjani Bisoyi
Article editing- Sandeep Lenka, Kasinath Swain, Manoj Kumar Ram
Final approval- Sandeep Lenka, Diptiranjani Bisoyi

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