

Selective Spinal Nerve Root Block as an efficacious modality of treatment in lower backache with radiculopathy in cases of single level prolapsed intervertebral disc

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Abstract

Background: Back pain affects everybody at some point in their life and is one of the most common complaints evaluated by a spine surgeon. Lower limb radiculopathy is commonly associated with conditions like disc herniation, facet or ligamentous hypertrophy, and spondylolisthesis. The present study was conducted to assess the prognosis after a single dose of Selective Spinal Nerve Root Block in patients with lower backache with radiculopathy with a single level disc prolapse. **Methods:** Forty patients with complaints of lower backache with lower limb radiculopathy with a single level Prolapse Intervertebral disc [Magnetic Resonance Imaging (MRI) diagnosed] were assessed on the basis of Visual Analogue Scale score and Roland Morris Questionnaire score at different time intervals pre and post single level spinal nerve root block to assess the reduction in pain. **Results:** Pain recurrence was noted in four (10%) patients at 3-month post block and total five patients at six months post block. Five (12.5%) patients underwent a surgical procedure after six months of a block. A significant ($p < 0.0001$) reduction in the Roland Morris Questionnaire scores (Mean 19.53) and Visual Analogue Scale score for back pain (Mean 4.48) and leg pain (Mean 7.5) were observed during the follow-ups of Roland Morris Questionnaire scores at three months (Mean 2.55) and six months (Mean 3.55); with Visual Analogue Scale score at three months for back pain (Mean 1.60), leg pain (Mean 1.45) and six months for back pain (Mean 1.07) and leg pain (Mean 2.2) in 35 (87.5%) study subjects after block. **Conclusion:** The study recorded a pain-free period averaging six months with positive outcomes in almost all patients, indicating selective nerve root block efficacy among patients with lower back pain with radiculopathy with a single level prolapsed intervertebral disc, especially in younger patients and those with a short duration of symptoms.

Keywords: Lumbar radiculopathy, lower back pain, single-level prolapse intervertebral disc, Selective Spinal Nerve Root Block, Visual Analogue Scale score, Roland Morris Questionnaire score

Introduction

The most common underlying cause of radiculopathy is irritation of a particular nerve, which can occur at any point along the nerve itself and is most often a result of a compressive force. It may be related to disc bulging or herniation, facet or ligamentous hypertrophy, spondylolisthesis, or even neoplastic and infectious causes⁽¹⁾. The diagnosis is confirmed with the help of clinical and radiological assessments.

Mechanical lesions affecting the spine include various stages of disc prolapse, ligamentum flavum hypertrophy, facet hypertrophy, and degenerative osteophytes causing foraminal stenosis, all leading to nerve root irritation. Inflammatory response to exposed nucleus pulposus of the intervertebral disc also contributes to nerve root pain⁽²⁾.

Age is a primary risk factor, as it occurs secondary to the degenerative process within the spinal column. Symptoms typically begin in midlife, with men often affected in the 40s

while women are affected in the 50s and 60s^(2,3). In the general population, there is a male preponderance⁽⁴⁾. Conservative management in such patients is highly unpredictable. Most patients do not like to undergo a surgical procedure in the first place and there are conditions where surgery is not indicated. Such patients require pain relief at least for a short period.

Henceforth, Selective Spinal Nerve Root Block may play an important therapeutic role in such patients. As the pathology causing the nerve root irritation remains, prognosis may vary. The principle is to reduce inflammation of the nerve root by injecting a steroid around it, thereby reducing the pain intensity. However the actual pathology causing the nerve root irritation remains, which increase the chances of recurrence. Selective Spinal Nerve Root Block is practiced in the management of radicular pain due to a particularly affected nerve root in both, cervical and lumbar region⁽⁵⁾. Patient history along with physical examination, and quality radiography is an important tool in diagnostic evaluation and

treatment of patients with predominant radicular symptoms⁽⁵⁾. The primary objective of the present study was to compare the functional recovery of patients by Roland Morris Questionnaire score and Visual Analogue Scale score before and after root block and to determine the duration of the window period of reduced pain achieved. The secondary objectives were to compare the pain relief between younger and elderly patients and those with shorter and longer duration of symptoms pre block.

Material and Methods

The present study was carried out in the Department of Orthopaedics, Bharati Vidyapeeth Medical College and Hospital, Pune, from October 2019 to December 2021. The study included 40 patients above the age of 18 years with a single level prolapsed intervertebral disc (MRI diagnosed) with lower backache and lower limb radiculopathy who did not have pain relief after a trial of conservative management (10 mg prednisone in a tapering dose for 10 days). A detailed history of the patient was taken after obtaining informed consent. The patients having back pain with radiculopathy due to multiple level disc lesion, recurrent disc on MRI, traumatic and pathological vertebral fractures, infective pathologies of the spine, and secondaries or metastasis in the spine were excluded from the study. The study was approved by the Institutional Ethics Committee.

Patients were assessed based on the Visual Analogue Scale score for pain for back and leg on a scale of one to ten and the Roland Morris Questionnaire score⁽⁴⁾. Roland Morris Questionnaire measures how back pain affects various functional activities of daily living, in which greater levels of disability are reflected by higher numbers on a 24-point scale. The patient is asked to tick a statement when it applies to him that specific day, this makes it possible to follow changes in time. The end score is the sum of the ticked boxes. The score ranges from 0 (no disability) to 24.

The procedure was done in the operation theatre setting under fluoroscopic guidance on day care basis and the patient was discharged on the very same day.

After confirming the nerve root level, a combination of 40 mg (1ml) of triamcinolone acetonide-based suspension with a local anaesthetic 1ml (2% lignocaine) was injected around the affected nerve root. Both provocative responses (replicating symptoms during needle placement) and analgesic responses (significant reduction of symptoms) to Selective Spinal Nerve Root Block were diagnostically useful in confirming or ruling out a given nerve root as the source of clinical symptoms. Visual Analogue Scale score

and Roland Morris Questionnaire scores were recorded Pre block, Day 1, 1 week, one month, three months, and six months after a single level spinal nerve root block to assess the reduction in pain.

Statistical Analysis

The results obtained were entered into an excel sheet, the categorical variables were presented as frequency and percentages, and the continuous variables were presented as mean \pm standard deviation. The difference in the means was compared by student's t-test. Statistical analysis was carried out using software statistical package for social sciences version 25. The p-value of <0.05 was considered significant.

Results

The present study was conducted to assess the prognosis after a single dose of Selective Spinal Nerve Root Block at a single level in patients with lower backache with radiculopathy. The mean age was 41.57 ± 11.33 years, ranging between 25 to 75 years. About 40% of the patients belonged to the age group of 31-40 years. The body weight and duration of symptoms were 67.18 ± 6.68 kg and 9.58 ± 7.20 months, respectively (Table 1).

Table 1: Descriptive statistics of study group (n=40)

Criteria	Mean	Std. Deviation
Age (years)	41.57	11.33
Duration of symptoms (months)	9.58	7.20

Among 40 patients, 23 were females, and 17 were males, with female: male ratio of 1.35. The majority, 15 (37.5%) of patients were office workers, followed by housewives 14 (35%), and miscellaneous, as listed below. Among the office workers, 7 (46.67%) were females, and 8 (53.33%) were males (Table 2).

Table 2: The distribution of gender and occupation among the study group

	Characteristics	N	%
Gender	Male	17	42.5
	Female	23	57.5
Occupation	Office workers	15	37.5
	Housewives	14	35
	Driver	3	7.5
	Farmer	2	5
	Labourer	2	5
	Shopkeeper	1	2.5
	Student	1	2.5
	Tailor	1	2.5
	Teacher	1	2.5

In the study majority of the patients (21) had L5-S1 disc prolapse (52.5%), followed by L4-L5 disc prolapse in 14 patients (35%), and L3-L4 disc prolapse was noted among 5 (12.5%) patients out of a sample size of 40 patients (Table 3).

Table 3: Final diagnosis among the study group

Diagnosis	N	%
L3-L4 Prolapse intervertebral disc	5	12.5
L4-L5 Prolapse intervertebral disc	14	35
L5-S1 Prolapse intervertebral disc	21	52.5

To compare the functional recovery of patients (Dangling modifier), Roland Morris Questionnaire score was calculated before and after root block along with pre and post-block Visual Analogue Scale scores. The differences in pre-and post-Visual Analogue Scale scores and Roland Morris Questionnaire scores were compared using the student's t-test. A significant ($p < 0.0001$) reduction was recorded in the

Visual Analogue Scale score for the back and leg during the follow-ups of 3 and 6 months compared with the pre-block Visual Analogue Scale score. The Roland Morris Questionnaire scores at day 1, week 1, 1 month, three months, and six months were significantly ($p < 0.0001$) reduced when compared with the pre-block Roland Morris Questionnaire score (Table 4).

Table 4: Comparison of Visual Analogue Scale and Roland Morris Questionnaire score at different time intervals

	Mean	Std. Deviation	P-value
Pre-block Visual Analogue Scale score back	4.48	0.81	
Post block Visual Analogue Scale score back 3 months	1.60	0.60	<0.0001*
Post block Visual Analogue Scale score back 6 months	1.07	0.95	
Pre-block Visual Analogue Scale score leg	7.5	0.95	
Post block Visual Analogue Scale score leg 3 months	1.45	0.67	<0.0001 [#]
Post block Visual Analogue Scale score leg 6 months	2.2	1.82	
Pre-block Roland Morris Questionnaire score	19.53	2.09	
Post block Roland Morris Questionnaire score Day 1	4.88	2.08	
Post block Roland Morris Questionnaire score 1 week	2.88	1.35	<0.0001 ^s
Post block Roland Morris Questionnaire score 1 month	2.2	1.42	
Post block Roland Morris Questionnaire score 3 months	2.55	2.21	
Post block Roland Morris Questionnaire score 6 months	3.55	3.92	

* Pre-block Visual Analogue Scale score back Vs. post block Visual Analogue Scale score back at 3 & 6 months

[#] Pre-block Visual Analogue Scale score leg Vs. post block Visual Analogue Scale score leg at 3 & 6 months

^s Pre-block Roland Morris Questionnaire score Vs. post block Roland Morris Questionnaire scores at day 1, 1 week, 3 & 6 months

At three month follow up, the recurrence of the pain was present in 4 patients and a total of five patients at six months follow up. All these five patients underwent a surgical procedure after six months.

Discussion

Low back pain is one of the most frequently encountered conditions in orthopaedic practice. Up to 84% of adults have low back pain at some time in their lives. Low back pain can have major adverse impacts on quality of life and function. It is also one of the most common reasons for missed work or reduced productivity while at work⁽⁶⁾. Lumbar radiculopathy

is defined as pain from the lower back radiating until the leg or further beyond along the course of a particular lumbar nerve, caused by a pathological process such as inflammation or mechanical compression of that nerve root, inflammatory response to the exposed nucleus pulposus, stimulation of the dorsal root ganglion⁽⁷⁾. prolapse intervertebral disc is the most frequent (90%) cause of radiculopathy of the lower limb, especially under 50 years of age⁽⁸⁾.

Multiple treatment options for subacute and chronic low back pain are available. Broadly, these can be classified as pharmacological and nonpharmacological treatments. Non

pharmacological treatments (e.g. exercise therapy, cognitive behavioural therapy, spinal manipulation, acupuncture, and others), injection therapies, and surgical treatments. Injection therapy, the topic of this study, includes injections of a corticosteroid along a particular spinal nerve root⁽⁹⁾.

The present study assessed the prognosis after a single dose of Selective Spinal Nerve Root Block at a single level in patients with lower backache with radiculopathy with a single level disc prolapse. The mean age was 41.57 and 40% of the patients belonged to the age group of 31-40 years, higher being females (57.5%). Most of the participants were office workers, followed by housewives and drivers.

The diagnosis of L3-L4 prolapsed intervertebral disc was observed among five patients, L4-L5 prolapsed intervertebral disc in 14, and L5-S1 prolapsed intervertebral disc in 21 patients. Similar to the present study regarding the site of pathology, in a study by Kanaan T et al., it was found that among 76 patients with radiculopathy, 54 patients were diagnosed with Lumbar disc herniation; 2 were at the L2-L3 level, two at the L3-L4 level, 32 at the L4-L5 level, 13 at the L5-S1 level and 5 had multiple levels⁽¹¹⁾. Likewise, in a study by Dhakal GR et al., the most common nerve root involved was lumbar (L5), followed by sacral (S1) and lumbar (L4)⁽¹²⁾. Similar to the present study, Mistry M et al. noted a maximum number of patients having disc herniation at levels of L4-L5 (43%) and L5-S1 (47%)⁽¹³⁾. Arun-Kumar K et al. reported intervertebral disc prolapses among 32 patients at L4-L5, in whom L5 nerve root was targeted, and L5-S1 disc prolapse in 8 patients in whom S1 nerve was targeted⁽⁷⁾.

As per many studies reported above, the most common site of radiculopathy was found to be in the lumbar region, with the involvement of L4, L5, and S1. This can be attributed to lower lumbar discs bearing much more bodyweight and comparatively more bending force, which leads to more degeneration and ruptures⁽¹³⁾.

Judging back pain by comparing radiographs shows that clinical severity cannot be correlated to radiological parameters. The Roland Morris Questionnaire and the Visual Analogue Scale score have been used routinely to measure and monitor changes in functional outcomes in patients with back pain⁽¹⁴⁻¹⁶⁾.

In the present study, there was a significant reduction in the Visual Analogue Scale score for back and leg during the follow-ups at 3 and 6 months when compared with the pre-block Visual Analogue Scale score, though at six months, it was increased than three months for back as well as a leg, but significantly lower than pre-block score. The Roland Morris

Questionnaire scores at day 1, week 1, 1 month, three months, and six months were significantly reduced when compared with the pre-block Roland Morris Questionnaire score. Both Visual Analogue Scale and Roland Morris Questionnaire scores were significantly reduced in the young patients who had a better pain relief and less recurrence of pain than the elderly patients. Also, patients with shorter duration of symptoms had a better pain relief than those who had a longer duration of symptoms.

Similar outcomes in terms of Roland Morris Questionnaires and of Visual Analogue Scale score were reported by Dhakal GR et al.; the pre-injection Visual Analogue Scale Score was significantly reduced at one week, one month, six months, and one year⁽¹²⁾. The Roland Morris Questionnaire score was also significantly reduced when compared at six months and one-year duration. Mistry M et al. reported Visual Analogue Scale score reduction at each follow-up in contrast to the pre-block Visual Analogue Scale among the patients with lumbar radiculopathy⁽¹³⁾.

Arun-Kumar K et al. reported the mean of the pre-procedural Roland Morris Questionnaire score to be 23, with an improvement in the score at one week, but seven subjects with severe pain with an indication of surgery had Roland Morris Questionnaire score of 20 or more while remaining patients had recurrence after the first week with a score of 22 or more⁽⁷⁾. Salunkhe et al. reported that Visual Analogue Scale score was less among 82% of patients with excellent results, 8% had good results, 4% had fair results, and poor results were seen in 6% of patients among 50 sciatic radiculopathy patients⁽⁵⁾. Borkar SS et al. noted average Visual Analogue Scale score on Day 1 of block was 7, which sharply declined on day 1 to 4 weeks after the block and then plateaued from 4 weeks to 3 months and only minimal pain indicating an average score of 3 persisted till one year, with an overall improvement in 88.57% of patients⁽¹⁷⁾. Khan KS et al., showed improvement in symptoms and Visual Analogue Scale score among patients with lumbar radiculopathy in the first week⁽¹⁸⁾. The use of SNRB in patients with severe pain can reduce their pain and thus can even avoid the need for surgical intervention⁽¹¹⁾.

In the present study, during three months follow up, the recurrence of the pain was present among only four patients while absent in 36 patients. At six months post block follow-up, one patient developed recurrence of pain, excluding the four patients who had developed recurrence of pain at three months post block. So, in most patients, the maximum pain-free period observed by us averaged six months.

Kanaan T et al. reported a major rate of recurrence of pain and requirement of surgery followed by SNRB after three months follow up⁽¹¹⁾. Almost 50% improved with the second trial of conservative therapy or surgery out of those. Finally, 35 out of 69 patients underwent surgery. According to another study, had a good short term effect for at least one year; most of the improvement was seen at four weeks thereafter, and minimal improvement was reported⁽¹⁷⁾.

Conclusion

The effect of Selective Spinal Nerve Root Block, depending on the pathology, is typically short-acting in the majority of patients. Yet, it provides a considerable period of reduced pain in patients with single-level prolapse intervertebral disc. The pain-free period reported by the present study was six months, with a better functional recovery as assessed by Roland Morris Questionnaire and Visual Analogue Scale scores. Also, there is a better pain relief and less recurrence of pain in younger patients with short duration of symptoms as compared to elderly patients and those with longer duration of symptoms. Therefore, we conclude that this procedure can be effectively used as an intermediary measure in cases of lower back pain with lower limb radiculopathy with a single level prolapse intervertebral disc not relieved by conservative management. However, the prognosis in those with a severe disc prolapse and surgery is indicated remains unchanged.

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