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Selective Nerve Root block – Evaluation of Functional outcome of transforaminal steroid injection in Lumbar Intervertebral Disc Herniation.

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Abstract

Aims and objective: Study of efficacy and functional outcome of steroid injection in lumbar intervertebral disc by transformational route at the base of kambin triangle.

Material and Method: A descriptive study was held at KBBH hospital, from October 2023 to May 2024. Total 40 patients were included in the study after satisfying inclusion and exclusion criteria.

Results: Following the procedure, most patients in the study were classified in the moderate to severe pain category. Initially, the mean numeric pain rating using the NRS during straight leg raising on the affected side dropped to 4, primarily due to the local anaesthetic's immediate effect.

As the study progressed, subsequent follow-ups demonstrated a steady decline in the proportion of patients experiencing pain relief. Initially, 80% reported relief after 6 weeks, but this decreased to 57.5% by 3 months and further declined to 35% by 6 months.

Conclusion: Selective Nerve Root Block (SNRB) is increasingly acknowledged and accepted in the medical community as an effective approach for diagnosing and treating lumbar radiculopathy. Studies consistently show evidence supporting its efficacy.

While SNRB provides temporary pain relief, particularly beneficial for patients with mild to moderate pathology, its effects are short-lived. However, it does not change the prognosis for patients with severe pathology who require surgical intervention. This underscores its role as a valuable diagnostic and therapeutic tool in managing certain cases of lumbar radiculopathy.

Keywords: Nerve Root Block, Lumbar Radiculopathy, Surgical Intervention.

Introduction

Lumbar radiculopathy refers to pain originating in the lower back that radiates down the leg or along a specific lumbar nerve pathway. This condition is increasingly limiting physical activities and is growing at an alarming rate. Various factors contribute to the risk of developing

spine pain, including physical, socioeconomic, medical health, psychological, occupational, and environmental factors.

Selective Nerve Root Block (SNRB) is utilized as a component of the treatment for radicular pain caused by a specific affected nerve root in both the cervical and lumbar regions [1-3].

It is used invariably for those with or without significant surgical spinal lesions[4].

Low back pain can originate from various sources including spinal ligaments, spinal nerve roots, the vertebral periosteum, facet joints, paravertebral muscles, and the annulus fibrosus.

The inflammatory reaction to the exposed nucleus pulposus is also believed to play a role in causing nerve root pain [5].

The primary underlying process is age-related degeneration affecting vertebral discs and facet joints. In cases of Prolapsed Intervertebral Disc (PIVD), acute disc herniation mechanically compresses the nerve within the intervertebral foramina, triggering both swelling and direct neuronal activity due to an inflammatory response.

This technique aims to mitigate nerve root inflammation by administering a steroid injection into the disc. This procedure targets the leakage of steroid from an annular tear, alongside inflammatory mediators near the dorsal root ganglion, thereby reducing pain intensity. However, it's important to note that the root cause of nerve irritation persists, leading to the possibility of recurrence.

Out of various intraspinal steroid injection techniques like transforaminal, interlaminar, and caudal epidural steroid injections, selective nerve root block (SNRB) stands out as a precision-focused procedure that demonstrates significant efficacy in patients with lumbar disc herniation (LDH) [6,7].

During SNRB, the corticosteroid is administered in close proximity to the dorsal root ganglion and the inflamed nerve root.

Evidence from randomized clinical trials suggests that nerve block procedures like SNRB are cost- effective for most cases when compared to other surgical interventions[8].

We conducted a prospective, observational cohort study involving patients with acute lumbar disc herniation (LDH) who underwent selective nerve root block (SNRB). We monitored these patients for duration of 6 months to assess the efficacy of the procedure.

Materials and Methods

We included patients experiencing lumbar radiculopathy for over 3 months, exhibiting a positive unilateral Straight Leg Raising test (SLRT) within the range of 30-60 degrees.

All patients underwent MRI as part of our standard protocol to identify mechanical lesions. Only those with intervertebral disc lesions impacting a specific lumbar nerve root were enrolled in the study.

Patients primarily experiencing back pain rather than radiating pain were excluded, along with those presenting with bilateral symptoms, multiple nerve root involvement, or neurological weakness.

We use Pfirmann grading system for MRI for grading our patients [9-10].

Our study group consisted of 40 patients, 22 male and 18 female.

Age of our patients was between 30– 68 years.

23 patients had right sided radiculopathy and 17 patients had left sided radiculopathy.

All patients were given the Oswestry Disability Index (ODI) 11 and Roland Morris Disability questionnaire (RMDQ) for back pain and their score was recorded before and after the procedure[12] .

All patients included in the study had previously undergone conservative management with rest and physiotherapy, which did not alleviate their symptoms.

Prior to administering the block, patients were positioned prone on a radiolucent table.

A PA view of the lumbar spine was taken, and a central line was marked passing through the spinous process.

Subsequently, the desired level was marked in the PA view as our second reference line.

A lateral view of the lumbar spine was then obtained to mark the same level, and this line was extended anteriorly until it intersected with the second line. Our entry point for the needle was 1.5 cm above this intersection point.

Local anaesthetic used during the procedure included 2% Lignocaine and 0.5% Bupivacaine.

The needle dimensions were 18G x 25 cm with a diameter of 1.2 mm as shown in figure 1.

Following scrubbing and draping, local anaesthetic was administered, and the needle was inserted into the desired level from the base of the Kambin triangle as shown in figure 2 and figure 3.

Confirm the needle position on both PA and lateral views, following the steps used in the Inside-out technique for trans-foraminal endoscopic spine surgery.

Inject 0.5 ml of Iohexol, an iodine-based radiopaque dye, to verify the needle's placement.

Next, we administered a mixture of 40 mg of Methylprednisolone-based suspension along with a local anaesthetic over the affected nerve root. It's anticipated to experience post-procedure paraesthesia due to the local anaesthetic's effects.

We utilized the Numeric Rating Scale (NRS) to assess pain levels during Straight Leg Raising Test (SLRT), analysing the immediate impact of this procedure.

Most patients were discharged on the procedure day and advised to rest for the initial two days.

Figure 1: Endoscopic Spine Needle

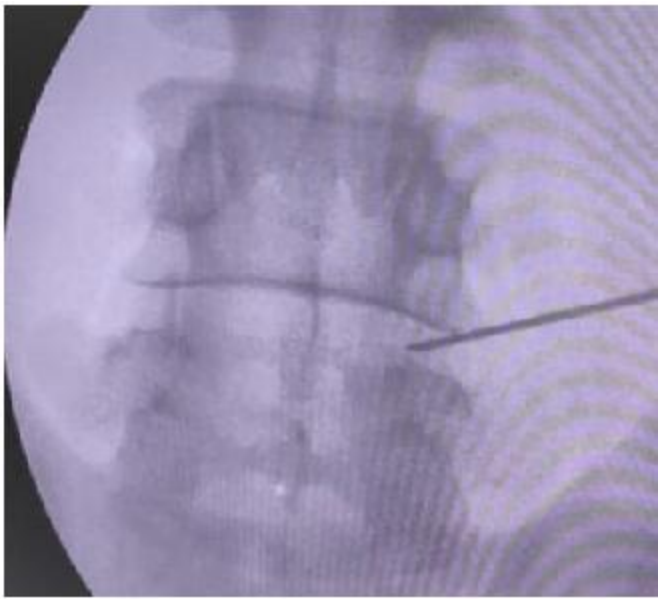

Figure 2: PA view

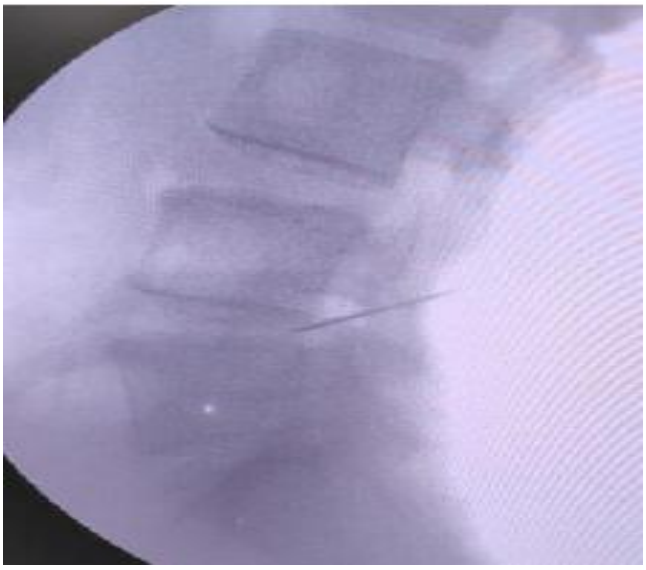

Figure 3: Lateral view

Results

The MRI assessments based on the Pfirrmann grade system indicated that among the patients studied, 6 were

classified as grade 3, 8 as grade 4, 17 as grade 5, 5 as grade 6, and 4 as grade 7.

Table 1:

Modified Pfirmann grade	No. of patients
Grade 3	6
Grade 4	8
Grade 5	17
Grade 6	5
Grade 7	4

Before undergoing the procedure, the average numeric rating of pain using the NRS during straight leg raising on the affected side was 8. The mean pre-procedural RMDQ score was 0.39, and the ODI score was 40.95, suggesting that most patients in the study fell into the moderate to severe category.

Both RMDQ and ODI scores were recorded at 6 weeks, 3 months, and 6 months. At the 6-week follow-up, the mean RMDQ score was 0.26 and the mean ODI score was 25.75. At 3 months, these scores were 0.3 and 29.3, respectively, and at 6 months, they were 0.338 and 33.95, respectively.

	Before	After		
		6 Weeks	3 months	6 months
ODI	40.95	25.75	29.3	33.95
RMDQ	0.39	0.26	0.3	0.338

Table 2

Immediately after the procedure, the mean numeric rating of pain using the NRS during straight leg raising on the affected side decreased to 4, attributed to the local anaesthetic effect. Some patients reported similar complaints after 6 weeks, particularly those with severe category scores. They were informed about their poor outcomes, and all opted for surgical decompression.

Subsequent follow-ups showed a consistent decrease in the percentage of patients experiencing relief.

Eighty percent of patients reported relief after 6 weeks, which decreased to 57.5% by 3 months and further to 35% by 6 months.

Follow up	No. of patients with relief	Percentage
6 weeks	32/40	80
3 months	23/40	57.5
6 months	14/40	35

Table 3

Discussion

Lumbar radiculopathy is a prevalent condition frequently encountered in our orthopaedic clinic, showing an increased frequency among patients. The effectiveness of conservative management in these cases is often uncertain. Initial reluctance towards surgery is common among patients, and there are instances where surgical intervention may not be immediately necessary. These patients require interventions that can provide temporary relief from pain. Selective Nerve Root Block (SNRB) plays a crucial role in managing such cases. However, since the underlying cause of nerve root irritation persists, the prognosis can vary significantly.

Many studies have utilized methylprednisolone-based preparations for this purpose, although preparations containing triamcinolone and betamethasone are also in use. Typically, a 40 mg dose of steroid is used for a single SNRB to achieve therapeutic effects.

We employed the numeric pain rating scale to assess pain levels before and after the procedure. This scale involves patients choosing a number between 0 to 10, with 0 indicating no pain and 10 indicating severe pain.

However, our primary focus was on evaluating functional outcomes, for which we utilized the Oswestry Disability Index (ODI) and Roland Morris Disability Questionnaire. This approach is particularly useful for patients who may not be able to attend follow-up appointments. By answering simple yes or no questions, often done through

telephonic conversations, patients can provide data. A higher number of "yes" responses indicate more severe issues. The progression of clinical improvement can be gauged by analysing serial questionnaire scores over time.

As observed by some authors, an initial response did not serve as a reliable predictor of the effect two weeks later 15. Some patient's initially experiencing severe pain gradually improved during the first follow- up, while others who initially had good relief experienced a gradual worsening of their condition.

Patients with severe disc prolapse who were reluctant to undergo surgery did not experience sustained pain reduction beyond the immediate post-procedural relief. This immediate relief can serve as a diagnostic indicator, confirming that the blocked nerve root is indeed the affected one requiring decompression. It correlates with the level of relief the patient might experience if that specific nerve root is surgically decompressed.

Patients with mild to moderate disc prolapse showed similar results, obtaining a period of reduced pain that allowed them to consider further management options if their pain recurred.

Conclusion

It seems like Selective Nerve Root Block (SNRB) is gaining more recognition and acceptance within the medical community as an effective tool for diagnosing and treating lumbar radiculopathy. The ability to customize the procedure based on each patient's unique requirements is particularly advantageous, allowing clinicians to optimize outcomes and minimize risks. It's interesting to note that there's consistency in study findings, indicating a growing body of evidence supporting the efficacy of SNRB[16]. This could potentially lead to further refinement of techniques and broader adoption in clinical practice, ultimately benefiting patients with lumbar radiculopathy. While SNRB, like any procedure, carries potential complications, major adverse events are exceedingly rare, with the benefits generally outweighing the risks. Although the pain-relieving effect of SNRB is typically short-lived for most patients, it offers a valuable period of reduced pain for those with mild to moderate pathology. This procedure can serve as an interim measure before considering surgery, especially for patients with inconclusive radiological findings. However, SNRB does not alter the prognosis for individuals with severe pathology warranting surgical intervention.

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