

Therapeutic effects of selective nerve root block in cases of lumbar PIVD - A prospective study

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Abstract

Introduction: Chronic lumbar radiculopathy is defined as a clinical syndrome of back and leg pain accompanied by sensory, reflex, or motor deficits in a nerve root distribution lasting for more than 12 weeks. Lumbar radiculopathy mostly occurs due to a prolapsed disc. Both surgical and non-surgical treatments are available. This prospective analytic study was designed to assess the efficacy of selective nerve root block with corticosteroids in the management of pain associated with prolapsed lumbar intervertebral disc that didn't get relief from non-surgical pharmacological treatment.

Materials and Methods: 40 Known cases of lumbar PIVD not responding to pharmacological treatment were given c- arm guided root block for respective nerve root and the results were evaluated using the visual analogue scale (VAS), Oswestry Disability Scale (ODI) and straight leg raising (SLR) test over the period of 1,3,6, and 12 months.

Results: Total of 40 patients were included in the study out of which 29 (72.5%) were male and 11 (27.5%) were female. Average Age was 36.73±10.8 ranging 18–62 years. The average duration of pain was 13.08±4.1 months. The initial VAS was 7.65±0.5 which was reduced to 4.07±0.9 at final follow up after 1 year of treatment. The average SLR was increased to average 65.8 ± 5.3% t final follow up from average 41 ± 12.8% at initiation of treatment. The initial ODI score was 78.20±2.8 which was reduced to 41.70±5.5 at final follow up. All the parameters taken to assess the therapeutic effects of SNRB showed statistically significant change from initial values to final values.

Conclusion: Our study has shown that selective nerve root block is an easy and safe method with better short-term, mid-term, and long-term pain relief and improvement in functional disability in cases of lumbar intervertebral disc herniation. It can be given by a trained interventionist /orthopedic surgeon.

Keywords: Lumbar PIVD, Root block, ODI.

Introduction

Chronic lumbar radiculopathy is defined as a clinical syndrome of back and leg pain accompanied by sensory, reflex, or motor deficits in a nerve root distribution lasting for more than 12 weeks.¹⁻⁴ The lifetime prevalence of lumbar radiculopathy has been reported to be 5.3% in men and 3.7% in women.^{5,6} Lumbar radiculopathy due to a prolapsed disc resolves spontaneously in 23-48% of patients, but up to 30% will still have pronounced symptoms after one year, 20% will be out of work, and 5-15% will undergo surgery.⁷⁻¹⁰

Three principal techniques are available in order to deliver medication into the epidural space: caudal, trans-foraminal and inter-laminar routes. The trans-foraminal approach is advantageous because corticosteroid preparations can be closely injected to the probable source of the irritated nerve root, and this approach results in better ventral epidural spreading than the inter-laminar approach.^{11,12}

There have been no study of non-surgical treatment modality of pharmacological treatment like administration of corticosteroid through specific trans-foraminal nerve root blocks in the Indian population. This prospective analytic study was designed to assess the efficacy of selective nerve root block with corticosteroids in the management of pain associated with prolapsed lumbar intervertebral disc that didn't get relief from non-surgical pharmacological treatment.

Materials and Methods

This study was conducted in tertiary care hospital from Sep 2016 to Sep 2017 (12 months). Forty patients from 18 to 60 years of age with clinical and radiological (MRI) diagnosis of lumbar disc herniation with backache and radiculopathy, who failed to respond to conservative therapy for duration of 6 weeks and denied the proposed surgical intervention, were included in the study. All patients had a positive straight leg-raising test and no patient had any neurological deficit. The exclusion criteria included patients with prior back surgery, impending cauda equine syndrome or with cauda equine syndrome, back or leg pain due to other etiologies (e.g. spinal fracture, metastasis, neuropathy, vascular claudication or neurogenic claudication), pregnancy, breast feeding status or medical disorders like bleeding diathesis, uncontrolled diabetes, connective tissue disorders, excessive smoking and severe COPD.

The cases enrolled in the study were planned for treatment with selective nerve root block (through trans-foraminal approach) injections. Detailed information about the type of the procedure and the possible side effects and complications was given to each patient and written informed consent was obtained from all patients before inclusion in the study.

A specialist Orthopaedic surgeon performed all the root block procedures. A 5 ml syringe containing the drugs (2 ml of Depo-medrol and 3 ml of 2% xylocaine) was prepared. Patient was made to lie in the prone position with intravenous access and was monitored appropriately. Root

block procedure was performed for the selected nerve root after giving Local anaesthetic drug in the skin and a 20 G needle was use locate the nerve root and deliver the drug. After locating the nerve root with spinal needle, 2-3 ml of radio-opaque dye (Urografin) was used to confirm the correct position of the needle procedure using image intensifier (Fig. 1). After the procedure aseptic dressing was done and patient was monitored for next 2 hours and then sent home on the same day. The visual analogue scale (VAS) pain score at 1, 3, 6, and 12 month intervals for assessment of current back and lower extremity pain was



Fig. 1: C arm pictures of L-5 root visualized after identification and confirmation with radio-opaque dye both in AP as well as in lateral view

Results

Total of 40 patients were included in the study out of which 29 (72.5%) were male and 11 (27.5%) were female. Average Age was 36.73 ± 10.8 ranging 18–62 years. The average duration of pain was 13.08 ± 4.1 months. The most common level of prolapsed disc was L4-L5 (50%) followed by L5-S1 (25%) and L3-L4 (20%). Most of the patients were laborer (75%) by occupation (Table 1). The initial VAS was 7.65 ± 0.5 which was reduced to 4.07 ± 0.9 at final follow up after 1 year of treatment. The average SLR was increased to average $65.8 \pm 5.3\%$ t final follow up from average $41 \pm 12.8\%$ at initiation of treatment. The initial ODI score was 78.20 ± 2.8 which was reduced to 41.70 ± 5.5 at final follow up (Table 2). All the parameters taken to assess the therapeutic effects of SNRB showed statistically significant change from initial values to final values. 4 cases in selective nerve root block group (L4–5&L5–S1) failed to show a positive response with in 3weeks after the injection. There were no complications observed in our study. No patient was lost to follow-up.

Table 1: Showing employment status of patients before treatment

Housewife	5 (12.5%)
Office Worker	1 (2.5%)
Farmer	2 (5%)
Laborer	30 (75%)
Student	2 (5%)

Table 2: Showing VAS score and ODI at different time periods

	VAS	ODI
	Mean±SD	Mean±SD
Initial	7.65 ± 0.5	78.20 ± 2.8
After 1 month of injection	3.23 ± 0.5	36.90 ± 7.1
After 3 month of injection	3.40 ± 0.7	39.55 ± 5.1
After 6 month of injection	3.60 ± 0.8	40.20 ± 5.2
After 1 year of injection	4.07 ± 0.9	41.70 ± 5.5

Discussion

Epidural steroid injections for lumbar radiculopathy have been used since 1953.¹³ Along with mechanical compression of nerve roots, lumbar radiculopathy can be triggered by different pro-inflammatory chemical agents causing ectopic neuron firing.¹⁴⁻¹⁷ Steroids injected into the epidural space or around the affected nerve root are thought to inhibit these inflammatory mediators. Three principal routes have been used to deliver medication into the lumbar epidural space: (a) the caudal route, (b) the transforaminal route, and (c) inter-laminar route.¹⁸⁻²⁰ The transforaminal approach is most advantageous as medications are delivered close to the probable source of their rotated nerve root, requires least amount of medication, and his approach results in better ventral epidural spreading of drug than the inter laminar approach,^{21,22} but requires a skilled interventionist besides the use of fluoroscopy or a CT scan. There are many studies evaluating role of lumbar epidural

steroid injections (LESI) either by trans-foraminal route or by caudal route in the management of low back pain resulting from various causes.²³⁻²⁵ There are only few studies where trans-foraminal procedures for PIVD have been reviewed.^{8,13,26}

However, there is conflicting evidence for a potential benefit of epidural steroid injections.²⁷ Some studies have shown a moderate short term benefit,¹⁸⁻²⁵ whereas others have shown little difference between epidural steroid and placebo injections.²⁶⁻²⁸ Studies comparing epidural steroid injections with epidural saline or local anesthetic injections have shown less benefit from steroids^{26,29,30} than those comparing epidural steroid injections with sham or soft tissue injections.^{22,23,31,32} Manchikanti L²⁸ et al mentioned in his systematic review of therapeutic transforaminal epidural injection therapy for low back and lower extremity pain that for lumbar disc herniation, the evidence is good for transforaminal epidural with local anesthetic and steroids, whereas it was fair for local anesthetics alone.

In our study, we have observed that the initial pain score (VAS) was 7.65 ± 0.5 in SNRB group, which reduced to 4.07 ± 0.9 at one-year follow-up. The reduction in pain score was 57.5% at 1 month, 55.5% at 3 months, and 52.9% at 6 months (Table 2). Even though the pain had increased at 1-year follow-up (46.8%) from that compared to 6-month follow-up period (52.9%), the reduction in pain scores was statistically significant ($p=0.001$) at all follow-ups. Mehta N²⁹ et al did a randomized trial consisted of 120 patients treated with either TFESI or were managed conservatively with a history of persistent LBP with radiculopathy secondary to disc herniation or spinal canal stenosis and they observed that TFESI group showed statistically significant improvement in all parameters. At the end of 1 month, significant improvement was seen in 93% of patients in the ESI group and 23% of patients treated conservatively when all participants were included. In their study baseline VAS score was 8.20 ± 1.10 which reduced to 1.13 ± 0.35 at 1 month in TEFSI group. This study was limited to 1 month only. Vad VB⁸ et al in their study observed that after transforaminal epidural injection for lumbar radiculopathy After an average follow-up period of 1.4 years, the visual numeric pain had decreased from 8.8 ± 1.4 to 1.6 ± 0.8 and pain reduction was greater than 50% at least 1 year after treatment. Schaufele MK¹² et al compared the interlaminar with transforaminal epidural steroid injection in patients with symptomatic lumbar disc herniation and observed the Verbal Numerical Rating scale (VNRS) before the treatment, within one hour after the treatment and upon follow-up (average 17.1 days) were analyzed, along with the need of surgical interventions over a 1-year follow-up interval. In the transforaminal group, there was a statistically significant improvement in the VNRS scores from before the injection (VNRS mean 5.9) to immediately after the injection (VNRS mean 2.9, and upon follow-up (VNRS mean 3.2, mean 18.7 days). 2 patients (10%) required surgery during 1 year follow up. Manchikanti L³⁰ et al in their study found that transforaminal epidural steroid injection in chronic lumbar disc herniation reduced the

numeric pain rating scale 8.2 ± 0.9 to 4.1 ± 1.6 at 1 yr which was 50% from the baseline.

In our study we observed that the initial ODI in SNRB group was 78.20 ± 2.8 , which reduced to 41.70 ± 5.5 at 1-year period. This showed improvement of 52.8% at 1-month and 3-month periods, 48.6% at 6 months, and 46.7% at 1-year period. There was a decrease in ODI of more than 40% which is considered significant in terms of reduction of disability. Manchikanti L³⁰ et al observed that in transforaminal epidural steroid injection initial ODI was 28 ± 5.3 which was reduced to 14.5 ± 6.6 at 1 year which was about 50% from the baseline.

There were 4 cases labeled as non-responders in SNRB group. These cases had disc herniation at L5-S1 level. Giving a successful nerve root block for S1 is technically more demanding and requires to be done under CT scan imaging. We had not used CT scan imaging in our study for any procedure.

Conclusion

Our study has shown that selective nerve root block is an easy and safe method with better short-term, mid-term, and long-term pain relief and improvement in functional disability in cases of lumbar intervertebral disc herniation. It can be given by a trained interventionist /orthopedic surgeon. Although selective nerve root block injection is technically more demanding than other modalities of epidural injections and has to be given by a trained physician, it can very effectively be used as a treatment modality for lumbar PIVD considering the results in terms of pain relief and reduction of disability.

Conflict of Interest: None.

Financial Assistance: None.

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How to cite this article: Kumar S, Verma R, Chahal G, Kumar A, Walliulah S. Therapeutic effects of selective nerve root block in cases of lumbar PIVD - A prospective study. *Indian J Orthop Surg* 2019;5(1):42-45.