

## EFFECTIVENESS OF ROOT BLOCK AND RADIOFREQUENCY IN PROLAPSE INTERVERTEBRAL DISC AND LUMBAR CANAL STENOSIS

**MITUL D. MISTRY<sup>a1</sup>, DIPAK A. SHAH<sup>b</sup>, VISHAL R. CHAUDHARI<sup>c</sup> AND LOKESH H. THAKKAR<sup>d</sup>**

<sup>a</sup>Department of Orthopedics, B. J. Medical College Ahmedabad, Gujarat, India

<sup>b</sup>Department of Orthopedics, M. P. SHAH Medical College Jamnagar, Gujarat, India

<sup>d</sup>Department of Orthopedics, Aum Orthopedic Hospital, Ahmedabad, Gujarat, India

### ABSTRACT

**This paper evaluate efficacy of root block and radio frequency ablation therapy in management of lumbar canal stenosis and lumbar disc prolapse. This is a therapeutic study-level II, prospective comparative study. Results were graded primarily using Oswestry disability index pre and post procedure and visual analogue scale. Using this scoring system outcome did not differ much in either of the technique in patients with root block but outcome significantly differs in patients treated with radiofrequency ablation therapy. Although overall outcome of the patients with disc prolapse at final follow up remains mostly unchanged by both of these technique. Radiofrequency is more effective than root block in patients with canal stenosis particularly in static stenosis. While in dynamic stenosis patients require surgical intervention.**

**KEYWORDS :** Lumbar Canal Stenosis, Prolapse Intervertebral Disc

Chronic lumbosacral pain is a common and challenging clinical entity problem in pain management centre. Since its first description by Mixter Barr in 1934, lumbar disc herniation is one of the few abnormality in the lumbar spine, were a clear relationship between the morphological alteration and pain seems to exist while pure mechanical compression was considered previously as a source of sciatica there is increasing evidence that chemical irritation of the nerve root plays an essential role perhaps even most important role.

The natural history of sciatica is favorable and typically resolves with conservative care which includes activity modifications, physical therapy, progressive exercise, non-steroidal anti-inflammatory drugs, spinal injections, radiofrequency ablations therapy and surgical intervention. Nucleus pulposus tissue has inflammatory properties, which leads to an intraneural oedema, a very important factor in the pathogenesis of sciatic pain. The negative effect of nucleus pulposus on the nerve root can be significantly reduced by the application of methylprednisolone (Hui et al., 2005).

Radiofrequency ablation theory of dorsal root ganglion has been suggested as a potential therapeutic option for chronic radicular pain (Thomas et al., 2008). The premise for the use of pulsed radiofrequency lesioning (PRFL) is to produce a partial lesion in the DRG so as for preferentially disrupt nociception while avoiding significant sensory deficit. Because of the potential

neurological complication of the continuous radiofrequency lesioning (CRFL); pulsed radiofrequency lesioning (PRFL), an isothermal radiofrequency treatment is used for the chronic lumbosacral radicular pain.

The most commonly involved surgical indication are intractable leg or back pain and significant functional impairment that have been unresponsive to conservative measures. The absolute indication for lumbar herniated disc decompression is major motor weakness and cauda equina syndrome. Diagnostic image appearance of the disc herniation can pinpoint the pathology but the decision for surgery is primarily dependent on patient's clinical course rather than the size of the disc herniation.

### MATERIALS AND METHODS

All patients (n=100) who were included for study had complained of unilateral or bilateral leg pain and all had positive nerve root tension signs and or neurological deficit. Each patients had symptoms were consistent with the level of disc herniation. All patients had received one of the following terms of treatment like analgesics, NSAIDs, physical therapy, selective nerve root block or pulse radiofrequency. In this study selective nerve root block given every 20 days for 6 weeks or single dose pulse radiofrequency given for symptomatic radiculopathy with prolapsed intervertebral disc and they follow up for minimum six months with 85% follow up. Conservative management continued for six weeks. The recommendation

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<sup>1</sup>Corresponding author

of surgery was based on clinical symptoms and failure to improve on conservative therapy.

**Procedure of Selective Nerve Root Block (Murtagh, 2000)**

After taking informed consent, patient taken on operating table in prone position with proper exposure. Under IITV control spine is seen in oblique view, painting and drapping done. Under IITV guidance anaesthetize the skin with 2% lignocaine. 22/25 gauge spinal needle is inserted paramedially through skin and muscles in cranio-medial direction till bony encounter occurred.

This method allows advancing the needle in “safe triangle” without contact to the nerve root. (figure, 1 and 2)

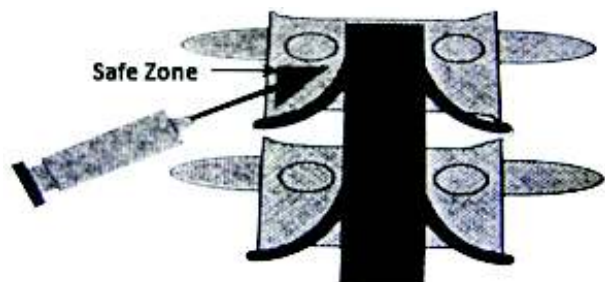
After verification of needle and correct needle position under IITV control, iohexol dye is injected and confirming into the periradially along the spinal root. Subsequently 2ml(80mg) triamcinolone acetate, 0.5 ml bupivacaine and 2 cc normal saline injected. With this technique described by Bogduk for giving injection in L1 to L5.

To perform selective nerve root block in S1 different technique is required as foramen direction is different

First IITV is made perpendicular to foramen. Needle is inserted in foramen position checked in two planes and dose given. Patient should be observed in ward for 30 minutes for side effects. Successful nerve root block was defines as reduction of leg pain of more than 60 % within the first four days.

**Procedure of Radiofrequency(Guerts et al.,2003)**

Written consent of the procedure must be taken first. After taking consent patient is given injection



**Figure 1 : Safe triangle - above the exiting nerve root and below the corresponding pedicle**

midazolam 1mg iv stat as a mild sedative. Prone position is given on table. Level is confirmed under the IITV control. Painting and drapping done. Local infiltration with injection lignocaine 2% 2cc with 24gauge hypodermic needle. Under IITV control 22gauge spinal needle with a curved 10 mm active tip with 1%lignocaine. Needle position must be confirmed in the intervertebral foramen anteroposterior and lateral view and the sensory and motor components are confirmed. Once the needle was appropriately positioned, the stylet is replaced by radiofrequency probe. After confirmation of sensory and motor components, thermocoagulation done.

Patient should be carefully watched for vitals in the ward for about 30 minutes and assess the pain relief. Patients results were assessed with pre-procedure and post procedure pain scores like Oswestry Disability Index (ODI) (Fairbank and Couper,1980) and Visual Analogue Score (VAS).

**RESULTS**

In this study, 100 patients were included. 82 patients were treated with selective nerve root block and 18 patients treated with pulse radiofrequency, were followed for average 6 months. Maximum number of patients were found in age group of 31 to 40 years (41%). Mean age of our study is 41.7 years with male to female ratio is almost 1:1.



**Figure 2: Safe Triangle (Radiograph)**

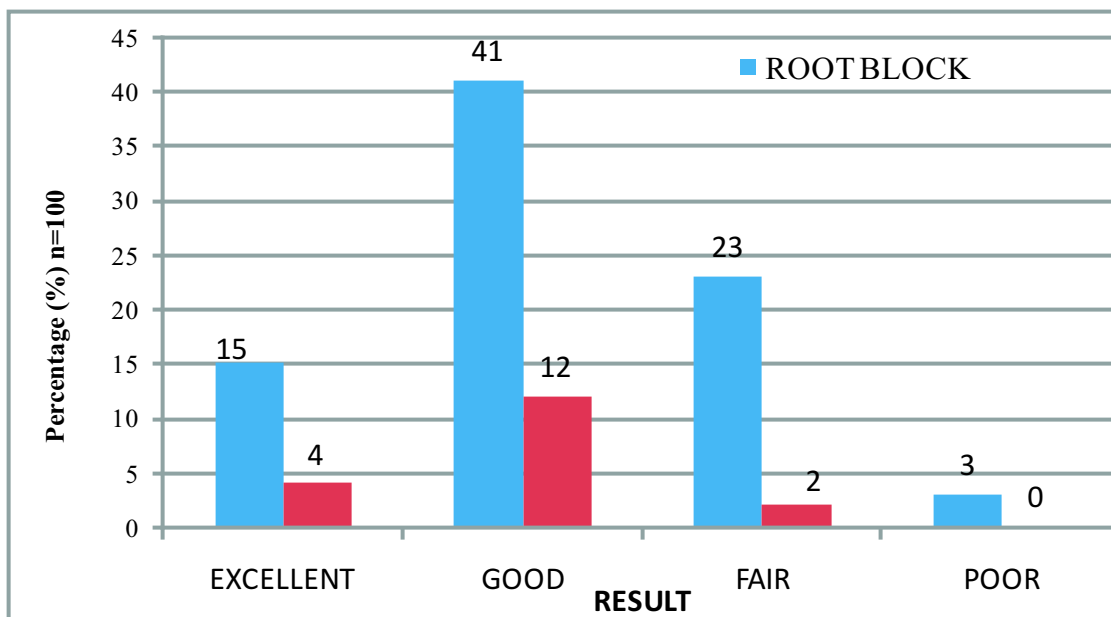


Figure 3 : Comparison of Result of Root Block and Radiofrequency

Maximum number of patients having disc herniation at level of L4-L5 (43%) and L5-S1 (47%). Majority of patients having disc prolapse is paracentral (72%). Among them 56% were contained disc and 16% were extruded disc. 28% patients having central type of disc prolapse , among them 21% contained and 7% extruded disc.

Patients treated with root block, total 18.3% patients presents with excellent result, 50% patients present with good result, 28% patients present with fair results and only 3 patients present with poor result according to ODI score.

Patients treated with radiofrequency, 22.22% patients present with excellent result, 66.67% patients present with good results and only 2 patients present with fair result according to ODI score.

Comparison of result of root block and radiofrequency according to ODI score.

According to ODI scoring, excellent to good score in root block is 68% and excellent to good score in radiofrequency is 89%. But overall there is no significant difference ( $p > 0.05$ ) Figure, 3.

### DISCUSSION

Low back pain is a prominent cause of morbidity in laborers and persons working in industries and carries with it severe economic consequences. Many forms of patient management are offered but outcome data frequently remain unimpressive. The main drawback of the non-operative treatment (medication and physiotherapy) is the slow recovery and patients are disabled for a prolonged time period. The effect of epidural steroid injections is still controversial in the literature. The drawback of epidural injections is the verification of the correct epidural application of the steroid unless the injection is performed with contrast medium under image intensifier control. On the contrary, a selective nerve root block and radiofrequency are always performed under image intensifier control and the correct application to the target nerve root is documented by the contrast medium. Although the steroids applied by the foraminal route can in theory diffuse and involve more than a single nerve root but did not observe any case reporting a temporary sensory deficit of the adjacent nerve roots(Tafazal et al.,2009). This demonstrates the relative selectiveness of the root block.

A herniated disc occurs most often in the lower lumber region of the spine especially at the L4-L5 and L5-

S1 levels (90% in this study). This is because the lower lumbar discs bear much more of the body weight and comparatively more bending force which leads to more degeneration and ruptures. According to type and site of disc prolapse, patients are separated into central and paracentrally located herniation groups. In paracentral disc, patients presents with more radicular pain than with the central disc prolapsed. This may be expected anatomically because the laterally located nerve roots are more likely to be irritated by a paracentral herniation than central herniation because lateral recess is narrow than central canal for allowing relative displacement of root to avoid direct compression. The apex of the paracentral disc herniation is much closer to the traversing and exiting nerve roots as compared with a central herniation.

Regarding the type of the disc prolapsed, natural history of disease suggests that majority of patients with acute disc herniation improve spontaneously by 3 months. The patients who continue to be symptomatic beyond 3 months are a distinct subset in whom the sciatic pain is related more to compression of the nerve root by herniated disc material rather than injury from inflammation. This could potentially explain why epidural steroid and selective nerve root block were associated with worse outcome when administered at 12-18 weeks post onset of symptoms. If selective nerve root block is given for acute disc herniation with root inflammation, it will be most effective particularly within 6 weeks of onset of symptom (Narozny et al., 2001). In this situation nerve root blocking with steroid and local anaesthetic resulted in better pain score because of anti-inflammatory action of steroid.

According to ODI score, results of radiofrequency is better than root block ( $p < 0.05$ ). But there is no statistical significance in VAS score ( $p > 0.05$ ). In our study, ODI score of walking, standing travelling and self care improve more after radiofrequency than root block because of long lasting effect of radiofrequency ablation of dorsal root ganglion.

In our study, patients with disc protrusion and foraminal stenosis were included. While a chemical irritation of the nerve root by disc material is well documented experimentally, mechanical compression of nerve root appears to be the major source of foraminal

stenosis in elderly patients often persisted for a time before suddenly becoming symptomatic. In spinal stenosis, there is a fix compression on cord structures rather than chemical irritation. In spinal stenosis, cord compression is found in more than one level. So, root block is more effective in early course of disc herniation where the main pathology is nerve inflammation. Dorsal root ganglion is more sensitive for pain perception by compressive pathology so, radiofrequency ablation of dorsal root ganglion is more effective in patients in later course of disc prolapse with foraminal stenosis. ( $p < 0.05$ ).

In lysis, patient with static stenosis treated with root block and radiofrequency presents with better result than patients with dynamic stenosis. In dynamic stenosis-lysthesi, main cause of pain is mechanical instability so, these patients should be treated with surgically rather than root block and radiofrequency. In our study 68.30% patients treated with root block present with excellent to good results while 89% patient treated with radiofrequency present with excellent to good results which is statistically insignificant ( $P > 0.05$ ). So, both modalities of treatment are equally effective in reducing radicular pain.

## CONCLUSION

The selective nerve root block combined with careful history, physical examination and quality radiographic studies, is an important tool in the diagnosis and treatment of patients with predominant lumbar radicular symptoms and it is a less invasive procedure. It gives acceptable results in form of pain relief if given in early course of disease. Along with selective nerve root block, pulsed radiofrequency ablation of dorsal root ganglion is also less invasive and effective therapy in patients with lumbar radiculopathy. As radiofrequency machine is not easily accessible and it is costlier than root block so, root block should be the first choice in treating patients with disc herniation. Patients compliance is better with radiofrequency than root block because one dose of radiofrequency will affect at least 6 months while in root block 3-4 injections have to be taken every 3 weeks according to the response.

In our study, both treatment modalities, root block

and radiofrequency are equally effective, as there is no significant difference in VAS score. Root block is more effective in patients with disc herniation rather than canal stenosis. Root block is more effective in early course of disease, within 6 weeks and less effective after 12 weeks of course of disease. While, radiofrequency is equally effective in patients with disc herniation as well as canal stenosis. In dynamic instability, root block and radiofrequency is temporarily effective so it requires surgical stabilization. The patient's clinical course remains the most important determinant for treatment decision in disc herniation.

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