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Comparative study between transforaminal epidural selective nerve root block versus interlaminar epidural in the treatment of lumbar radicular leg pain

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ABSTRACT

Background: Sciatic neuralgia is a result of nerve root oedema because of the inflammatory, immunological and mechanical factors. Steroid injections play an important role in the management of sciatic radiculopathy. Steroids act by reducing the oedema around the nerve roots and decreasing pain. Locally administered steroids have the advantage of reduced dosage and targeted delivery around the nerve roots. This forms the basis of epidural steroid injections. This can be given around the nerve root in the transforaminal space or in the interlaminar space. There is a paucity of literature comparing the two techniques of epidural steroid injections. We have done a randomized comparative trial, to compare the effectiveness of the two modalities of injection in the management of a single level unilateral foraminal disc herniation.
Methods: Patients were randomized in two groups Group A: Transforaminal epidural (SNRB) and Group B: interlaminar epidural. Same dose of steroid was used in each group.
Results: Immediate post injection, 2 week and 1 month transforaminal epidural (SNRB) was better compare to interlaminar epidural however at the end of 3 months the difference was not significant (p=0.08).
Conclusions: Both transforaminal and interlaminar epidural injection are effective form of treatment in mild to moderate grade of disc disease. Both the technique provide short lasting relief in the symptoms associated with disc pathology, however pain management is better in transforaminal group compared to interlaminar group. Thus these techniques can be considered for delaying surgery and providing intermitant relief.

Keywords: Transforaminal epidural, Interlaminar epidural

INTRODUCTION

Chronic lumbar radiculopathy is defined as a pain in the back and leg with accompanying sensory 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] Various treatment options have been used in the management of lumbar rdiculopathy. Epidural injections form an important line of management in mild to moderate disc pathology. Two form of injection techniques are used commonly, they are; a) Transforaminal injections (Selective Nerve Root Block (SNRB) b) Interlaminar injections (epidural block). Lumbar radiculopathy is a result of combined mechanical and inflammatory effects. Mechanical lesions include various stages of disc prolapse, ligamentum flavum hypertrophy, facet hypertrophy and degenerative osteophytes causing foraminal stenosis.[7] Inflammation of the affected nerve roots is a result of the exposed nucleus pulposus which contributes to the nerve root pain.[8] The principle of using these techniques is to reduce

inflammation of the nerve root by injecting a steroid and thus reducing the intensity of pain. The aims of the present study are to compare the effectiveness of steroid injections by the two techniques i.e. transforaminal epidural (SNRB) vs interlaminar epidural.

METHODS

This is a prospective study which was conducted in the department of Orthopedics ESIC medical college hospital Gulbarga from May 2016 to May 2018. Forty two patients presenting with low back ache and radiculopathy, with MRI showing single level unilateral disc herniation were included in the study (Figure 1). Written informed consent was taken from all those included in the study. Inclusion criteria were patients with a single level disc herniation who failed to respond to conservative management of 6 weeks. Conservative management included use of analgesics, muscle relaxants and guided physiotherapy. Exclusion criteria were patients with significant ligamentum flavum hypertrophy, bilateral foraminal stenosis, multilevel disc herniation, previous spinal surgery or patients who have received spinal steroid injections within 3 months. Patients who had contraindication to steroid injections like diabetes, renal disorders etc were not included. Patients with a fractured spine or having other congenital anamolies were also excluded. Pregnant and lactating females were also not included in the study.

Table 1: Selection criteria.

Inclusion criteria	Exclusion criteria
Age between – 18-50 years	Bilateral foraminal herniation
Unilateral leg pain	Multilevel disc herniation
MRI- single level unilateral disc herniation	Previous spinal surgery
Failed conservative management of 6 weeks	Patients receiving spinal steroid injections within 3 months
	Comorbid conditions: Renal disorders, diabetes
	Spinal fractures
	Congenital spinal anamolies
	Pregnant and lactating mothers

The patients included were randomized using a computer-generated random number table and the allocation was done in two groups: Group A: Transforaminal epidural (SNRB) and Group B: interlaminar epidural. The pain scoring was done using the VAS and Morris scoring system. Only 20 clinically relevant points of the scoring system were used. Considering significant decrease in the VAS scores and decrease in the Roland-Morris disability questionnaire (RMDQ) score as a measure of improvement.[9] Using a paired T test and significance level of 0.05, sample size of 42 patients was decided. Patient details and the pain scores were recorded in a prefixed proforma. Blood investigations were done and the physician fitness obtained for all the patients before the procedure. All transforaminal injections (SNRB) were given by a single orthopedic surgeon under C-arm guidance. All the interlaminar injections were given by a single anaesthetist at the level of disc herniation under C-arm guidance.

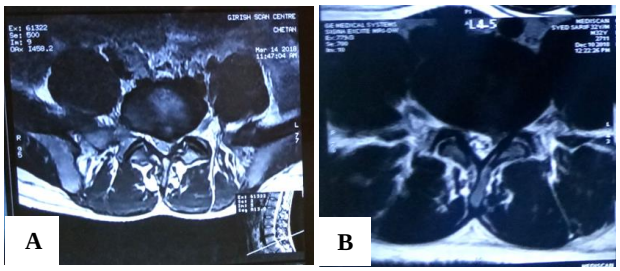

Figure 1: (A) MRI showing mild grade of disc prolapse; (B) moderate grade disc prolapse.

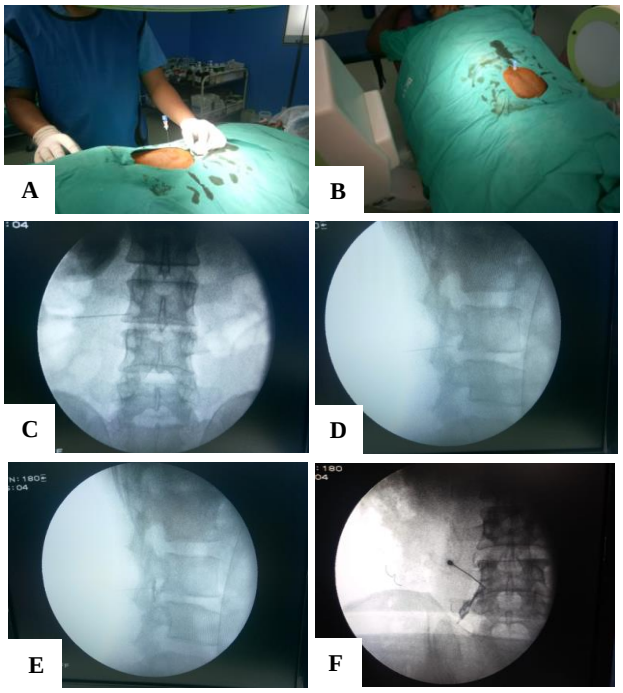

Figure 2: (A) Spinal needle inserted after confirming the level under C- arm; (B) c arm position for lateral view; (C) position of the needle in AP view- 6'o' clock position under the pedicle; (D) position of the needle in lateral view- directed towards the neural foramen; (E) C-Arm image in lateral view. spread of dye; (F) C-arm image- spread of the dye in AP view.

Technique transforminal (SNRB) injection

Patient is positioned prone on the OT table and the part was prepared and draped. The level was identified under the C-arm and the area was infiltrated with 10ml

lignociane 2%. A 20 gauge spinal needle was used which was directed towards 6'O clock position of the ipsilateral pedicle in anteroposterior view and towards the neural foramen, inferior to the pedicle in lateral view. After confirmation under the C-arm 2 ml of radioopaque dye (iodopaque) was injected to identify the root in both anteroposterior and lateral views. After confirmation 80 mg of triamcinolone mixed with 5 ml of 5% bupivacaine and 4 ml of distilled water was injected around the root (Figure 2).

Technique for interlaminar epidural injection

The entry point for epidural injection is at the level of disc herniation. After proper antiseptic dressing and draping, the proposed site of needle entry was infiltrated with local anesthetic. The procedure was performed under C-arm guidance. A 20-gauge spinal needle was introduced and advanced in cephalad direction using C-arm guidance into the epidural space The final position of needle was confirmed under C-arm. After removal of the stylus and aspiration to check for blood or CSF, the drug was injected. The drug consisting of 80 mg of triamcinolone mixed with 5 ml of 5% bupivacaine and 4 ml of distilled water was injected. Patients were asked to lie down in lateral position.

RESULTS

There were a total of 42 patients (29 men and 13 women). The mean follow up period was 3 month and the total study duration was 3 years. Each group had 21 patients. The average age was 28 (range 18–658) years in transforaminal (SNRB) group while it was 30years in interlaminar group. The average height was 170 cm (range: 152–187 cm) in transforaminal (SNRB) group and 168 cm in interlaminar group. The average weight was 78 (range: 68–99) kg in transforaminal (SNRB) group and 80 kg in interlaminal group (Table 2). The average duration of pain was 8 months in transforaminal (SNRB) group and 9 month in interlaminar group. The demographic profile of both the groups was comparable.

Intervertebral disc prolapse was seen at L1–L2 level in 3 cases (2 in transforaminal and 1 in interlaminar group), at L3–L4 level in 15 cases (10 each in transforaminal and 5 interlaminar group), at L4–L5 level in 21 cases (10 in transforaminal group and 11 in interlaminar group), and at L5–S1 level in 3 cases (2 in transforaminal group and 1 in interlaminar group).

The pain rating was done using VAS score and Roland Morris before the procedure. Straight leg raising test was done on the affected side and was positive on 33 patients.

Table 2: Demographic data of studied patients.

	SNRB	Epidural
Age	28	30
Weight	78 kgs	80 kgs
Height	170 cm	168 cm
Duration of pain	8 month	9 month

Table 3: Improvement in the VAS scores at each follow-up.

	SNRB	Improvement (%)	Epidural	Improvement (%)
Mean pre injection scores	6.86		7.04	
Mean post injection scores	4	41.69	4.09	41
2nd week	4.5	34.40	4.59	34.80
1 month	5.27	23.17	5.59	20.59
3 month	5.95	13.26	7	0.56

Table 4: Improvement in the RMDQ score.

	SNRB	Improvement (%)	Epidural	Improvement (%)
Mean pre injection scores	14		14.27	
Mean post injection scores	3.81	72.78	4.13	71.05
2nd week	6.54	53.28	6.81	52.06
1 month	9.36	33.14	10.04	29.64
3 month	12.68	9.42	13.04	8.61

Transforaminal epidural (SNRB) (Group A)

The initial mean VAS score was 6.86. There was significant improvement in each follow up with a 13.26% reduction in VAS scores at the end of 3 months (Table 3). At 3 months the difference in the VAS scores was significant compared to the pre-injection values (p=0.04). The pre injection RMDQ scores were 14. There was

significant improvement in the score immediate post injection and 2 weeks. However at the end of 3 months the difference was not significant (p=0.08) (Table 4). Two patients complained of severe pain at the site of injection for which injectable analgesics were given. One patient had two episodes of vomiting and giddiness which subsided on its own.

Interlminar epidural group (Group B)

The initial mean VAS score was 7.04. There was significant improvement in the immediate post injection period, 2 weeks and 1 month (Table 2). However at the end of 3 months the difference in the VAS scores was significant compared to the pre-injection Values (p=0.9161). The pre injection RMDQ scores were 14.27. There was significant improvement in the score immediate post injection, 2 weeks, and 1 month (Table 4). However at the end of 3 months the difference was not significant. Two patients complained of severe pain at the site of injection for which injectable analgesics were given. One patient had two episodes of vomiting and giddiness which subsided on its own.

Intergroup comparison

There was no significant difference between the groups in the VAS scores and the RMDQ at the start of the study. There was no significant difference between the two groups immediately after the injection, at 2 weeks and 1 month. However at the end of 3 months the difference between the groups was significant with better outcome in the SNRB group compared to the Epidural group (Table 5).

Table 5: Intergroup comparison of the improvements in VAS scores and RMDQ.

	Group A VAS score	Group B VAS scores	P value	Group A RMDQ score	Group B RMDQ	P value
Mean pre injection scores	6.86	7.04	0.67	14	14.27	0.7869
Mean post injection scores	4	4.09	0.87	3.81	4.13	0.8175
2nd week	4.5	4.59	0.87	6.54	6.81	0.7993
1 month	5.27	5.59	0.58	9.36	10.04	0.5232
3 month	5.95	7	0.045	12.68	13.04	0.7112

DISCUSSION

Low back pain with lumbar radiculopathy is very commonly seen in orthopaedic clinics. There is a steady increase in the incidence of patients with this condition in our daily practice. Conservative management in these patients should always be tried before attempting any form of surgical or non surgical treatments. Conservative management includes guided physiotherapy including ultrasonics and microwave diathermy, oral or injectable analgesics, steroids and neuromodulator drugs like pregabalin and its derivatives.

If patients fail to respond to the conservative treatment spinal injections can be attempted. These include interlaminar injections, transforaminal injections (SNRB), caudal injections etc. These injections provide a middle path between conservative management and surgical decompression. Many steroids have been used in spinal injections. Many surgeon use methyl prednisolone based preparations for this purpose.[10] Triamcinolone and betamethasone based preparations are also in use.[11] We have used triamcinolone in our study. Steroids act by reducing the perineural oedema and control of inflmmantion. This gives the nerves space to breathe and thus reduces the radicular pain.

Singh et al conducted a comparative study between SNRB and caudal epidural steroids in eighty patients.[12] They found that caudal steroid produced better results compared to SNRB. They used three doses of caudal steroid compared to only one dose of SNRB. This study did not provide any intergroup comparison to between the caudal and epidural steroid injections. Kumr et al studied the improvement in RMDQ scores following the SNRB injection in a group of 40 patients. They found that SNRB provides only short term relief and recurrence of symptoms are expected. They also compared the effects of SNRB in varying grades of disc herniation and found that SNRB did not help in patients with severe grade of disc herniation.[13]

In our study we found that in the transforminal group there was a significant improvement in the VAS and RMDQ score at 2 weeks, 1month however at 3 month it was not significant. We found that in interlaminar group the VAS score and RMDQ score at 2 week, 1month was significant, however at the end of 3 month it was not significant. Intergroup comparison showed that there was no significant difference between the two groups at immediate post injection, 2 weeks, 1 month. At the end of three months the results were significantly better in the trasforamional group compared to the interlaminar group.

CONCLUSION

Both tranforaminal and interlaminar epidural injection are effective form of treatment in mild to moderate grade of disc disease. At the end of 3 months both group show a relapse in the symptoms. Pain management in transforminal injection is better at three months compared to the interlaminar injection. Both the technique provides

short lasting relief in the symptoms associated with disc pathology and have minimal side effect. Thus these techniques can be considered for delaying surgery and providing intermitant relief.

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Ethical approval: The study was approved by the institutional ethics committee

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