

## Our experience with epidural steroid injections in management of low backpain and sciatica

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### Abstract

**Background:** Low back pain and sciatica is a common clinical condition. It is a most common orthopaedic complaint in the Kaski region of Nepal. The reason for its increased incidence may be hilly terrain, difficult working and living environment of the region.

The initial treatment of Low back pain is conservative. Epidural steroid injection is being slowly established as a reliable mode of conservative management in many orthopaedic centres of the world. This is a preliminary report of on-going study of the use of epidural steroid in the management of low back pain cases coming to the orthopaedic department of Manipal Teaching Hospital.

**Methods:** Prospective clinical trial was carried out on the patients reporting with low back pain and sciatica not responding to other modes of conservative treatment. Pre and post injection evaluation was done clinically. The level of pain, improvement in physical signs and ability to do activities of daily living were noted.

**Results:** Fifty two patients were observed for the average duration of 2.87 months. Average duration of symptoms was for 10 months. After first epidural steroid injection 83% of patients reported relief on day one. In some cases the onset of analgesia was delayed. Four patients reported no relief after first injection. Fifteen patients were given two injections and four received three injections. The average duration between two injections was three weeks. Average duration of pain relief was 20days. At the end of 3 months, good results were seen in 39%, fair in 33% and bad results in 27%. Overall 59% of patients were able to do activities of daily living. Three patients (5.76%) required operation for disc prolapse. Postoperatively two patients reported back with back pain. Most common complaint of patients after injection was pain at the injection site. No major complications were encountered.

**Conclusion:** Epidural Steroid Injection is a safe and effective mode of treatment of Low Back Pain. It provides pain free period to enable the patient for physiotherapy which helps in early recovery.

**Keywords:** Epidural steroid Injection, Low Back Pain, Sciatica.

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Low back pain (LBP) is one of the commonest presenting complaints in orthopaedics.<sup>1</sup> It is reported in all age groups and by all sections of society. The life time incidence of LBP in western society is about 80%.<sup>1</sup> It is a disabling condition and lasts for months or years. Clinic standard advisory group conducted a study which showed that once a person is out of work for 6 months, the chances of returning to previous job is only 50%.<sup>2</sup>

There are various causes of LBP, specific as well as non-specific. Diagnosing the exact cause requires a thorough history, knowledge of working and living conditions, clinical examination, and routine as well as special investigations. In some patients psychological evaluation is also required.<sup>3</sup>

LBP treatment varies from conservative to operative modalities with varied results. Conservative treatment includes rest, analgesics, traction and

sometimes spinal manipulation. Those not responding may require surgical treatment. But complete relief may not be obtained even after surgery (failed back syndrome). In selected patients epidural steroid injections (ESI) has been used with gratifying results. They are combination of long acting steroid and epidural anaesthetic. They provide analgesia for variable periods during which patient can go for rehabilitation exercises.<sup>4</sup>

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The aim of our present study was to observe the effect of epidural steroid injection in cases of LBP and sciatica in Nepalese population.

### **Material and methods**

A prospective uncontrolled study was conducted in the Department of Orthopaedics, Manipal Teaching Hospital, Pokhara, Nepal. Fifty two patients were observed over a period of eleven months from May 2004 to March 2005.

Inclusion criteria for this study were - (i) patients not responding to conservative treatment, (ii) patients with sensory symptoms without motor deficit. Exclusion criteria were - i) motor deficit (ii) prior lumbar disc surgery.

Patients meeting the inclusion criteria and without any exclusion criteria were included in the study. Thorough history was taken and clinical examination was done. In clinical examination straight leg raising test (SLR), motor and sensory deficit, and deep tendon reflexes (DTR) were noted. Routine laboratory investigations like total and differential leukocyte count; erythrocyte sedimentation rate, bleeding time and clotting time were done. Random blood sugar was also done to rule out any subclinical diabetes. Before the procedure written consent was taken.

Then ESI was given by trained anaesthetist in sterile operation theatre conditions. Fluoroscope was not used in any case. 80 mg of Methyl prednisolone was diluted in 10 ml of normal saline and injected in epidural space in lumbar region in L<sub>2</sub>-L<sub>3</sub> or L<sub>3</sub>-L<sub>4</sub> space through trans-lumbar route. The patients were advised to lie supine or on the side of sciatic radiation for 24 hours after injection. During this period they were observed for any possible complications. This was also to let the steroid settle near the inflamed site. The amount of pain, radiation and subjective improvement was noted after 24 hours.

The patients were first reviewed after two or three weeks. During further follow up at 1 month, 3 months & 6 months, subjective improvement in pain, level of activity, SLR, motor and sensory deficit and DTR were recorded. After 3 weeks second injection was given routinely to all patients who reported in time. Third ESI was given to only those who responded earlier and later reported with back pain again. Those not responding to two injections were considered for surgery.

Our criterion of success was achievement of pain free state to do the activities of daily living (ADL) freely. We classified the results as good, fair and bad. The criteria for good results were subjective feeling of well being, significant pain reduction, ADL unrestricted and back to job. Fair results were having subjective feeling of well being, occasional pain, ADL unrestricted and back to lighter profession. Bad results were those having no improvement in pain, required help for ADL and were unable to go back to work.

### **Tools**

Verbal Pain Scale was used for grading of pain. For motor power and tendon reflexes the Medical Research Council grading was used.

Success rate was calculated by deducting relapse from total patients relieved of pain at that period of time. For analysis of data mean and median were used. For the number of patients benefited percentage of data was calculated. The denominator for all calculations was total number of patients.

### **Results**

Fifty two patients (30 males and 22 females) were observed for an average duration of 2.87 months (15 days to 16.5 months). The mean age of patients was 37.9 yrs (range, 20 - 65 yrs). The average duration of symptoms was for 10.8 months (range, 3 days to 7 years). (Table- 1, 2) The commonest complaint was sciatica (83%). Among sciatica patients SLR positive patients were 80%. X rays were done in all cases. It showed degenerative changes (4 cases), L<sub>5</sub> sacralization (1 case), L<sub>5</sub> wedging (1 case), L<sub>4</sub>-L<sub>5</sub> spondylosis (2 cases), spina bifida occulta of S<sub>1</sub> (1 case) and was normal in 43 cases. CT - myelography was done in 14 cases (26.92%). Single level disc prolapse was seen in 6 cases and multi level disc prolapse in 7 cases. One case showed normal scan. MRI was done in 6 cases. It showed disc prolapse at L<sub>4</sub> - L<sub>5</sub> level in 4 cases and prolapse at two levels in 2 cases.

A total of 75 ESI were given to 52 patients. Thirty three patients received single injection, 15 received two and 4 received three injections. Average duration between ESI 1 and ESI 2 was 21 days. The duration between ESI 2 and ESI 3 was 23 days. The minimum interval was 5 days & maximum was 43 days between two injections. (Table -2) Level of ESI was L<sub>3</sub> - L<sub>4</sub> in 64 patients, L<sub>2</sub> - L<sub>3</sub> in 10 patients and one was given in L<sub>4</sub> - L<sub>5</sub> space. After first ESI, pain relief within 24 hours was seen in 43 out of 52 patients (82.69%). Four patients had no relief. Out of

4 one patient was diagnosed to have myopathy and he was excluded from study. In the remaining patients, 3 (5.88%) reported relapse of pain in one week, 8 (15.68%) in one month and 11 (21.56%) in 6 months. Average duration of pain relief was 20.7 days (range, 2 days to 9 months). (Table - 2)

Thirty seven (72.54 %) of the 51 patients reported improvement. Of the improved, good results were seen in 20 and fair results in 17. 14 cases showed bad results. At 3 months 58.62% of patients were relieved

of pain and were able to do activities of daily living comfortably. No complications were seen except local pain over injection site in 3 patients.

Three patients (10%) who showed no relief after two ESI required surgical treatment. Microdiscectomy, conventional discectomy and fenestration were done in each patient. Two patients reported back with leg pain 14 months and 15 months after surgery respectively.

**Table 1: Age distribution**

Age	Male	Female	Total
< 30yrs	9	7	16
31-40 yrs	12	4	16
41-50 yrs	7	7	14
51-60 yrs	2	2	4
> 60 yrs	0	2	2
<b>Total</b>	<b>30</b>	<b>22</b>	<b>52</b>

	mean	median	minimum	maximum
<b>Age(years)</b>	37.96	36.5	20	65
<b>Symptom duration(month)</b>	10.86	3.00	0.25	84
<b>Duration between ESI-1 and ESI-2(Days)</b>	21.21	20.00	5.00	43.00
<b>Duration between ESI-1 and ESI-2(days)</b>	22.5	22.0	19.00	27.00
<b>Duration of pain relief ( days)</b>	20.77	3.00	0.00	270
<b>Duration of follow up (months)</b>	2.87	1.00	0.50	16.50

**Table 2: Durations**

**Table 3:** duration of ESI

<b>Days</b>	<b>Between ESI-1 and ESI- 2</b>	<b>Between ESI-2 and ESI- 3</b>	<b>Relief after ESI</b>
<b>&lt; 7 days</b>	<b>1</b>	<b>0</b>	<b>22</b>
<b>8 – 14 days</b>	<b>3</b>	<b>0</b>	<b>3</b>
<b>15 – 21 days</b>	<b>4</b>	<b>1</b>	<b>5</b>
<b>22 – 28 days</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>&gt; 28 days</b>	<b>5</b>	<b>0</b>	<b>11</b>
<b>No response</b>	<b>-</b>	<b>-</b>	<b>4</b>
<b>Missing</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>Total</b>	<b>15</b>	<b>4</b>	<b>52</b>

## Discussion

The treatment of LBP has been a matter of controversy. Since the cause of LBP is multifactorial, the modality of treatment varies accordingly. Mild cases of LBP improve with rest alone without medication while some requires analgesics. Deyo et al found two days of bed rest as optimum duration without any difference in clinical outcome on long term follow up.<sup>5</sup> Exercises are essential for rehabilitation of LBP patients. It is recommended according to patient's tolerance and need.<sup>6</sup> Use of NSAID for pain relief is controversial, as it does not treat the cause; it has lots of side effects and abuse potential. It is recommended for shorter duration. Short-term corticosteroids can be given with good results. Antidepressants have also shown good results.

There are other modes of treatment like transcutaneous electrical nerve stimulation (TENS), traction and ultrasound. The scientific efficacy of many of these treatment modalities is not proved.<sup>7</sup> Surgery is indicated in cases with definite surgically correctable pathological lesions. The failure rate is as high as 30%.<sup>8</sup> The incidence of persistent back pain after surgery was found to be inversely proportional to the degree of herniation.<sup>8</sup> Hence the patients with small herniation are not good candidates for surgery.

Historically the first published report of therapeutic spinal injection for the treatment of LBP & sciatica dates back to 1901. Cocaine was the first drug tried in LBP. Then procaine, Ringer's solution and saline were used. But the first reported use of epidural steroid was in 1952 by Robecchi and Capra.<sup>9</sup> They used hydrocortisone as periradicular injection in the first sacral root. Later on various researchers used depomedrol for injection and reported better results compared to procaine and other anaesthetic agents. Beliveaus showed that depomedrol was more effective in long standing back pain and sciatica.<sup>10</sup>

Recent research has shown the role of pro-inflammatory chemicals in patho-physiology of LBP. The release of phospholipase A<sub>2</sub> from damaged nucleus pulposus is supposed to produce pain. Saal et al showed high levels of phospholipase A<sub>2</sub> in human discs compared to other human tissues.<sup>11</sup> Burke et al. reported high levels of interleukin-6 (IL-6), interleukin-8 (IL-8), & prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) in the disc of the patients undergoing fusion for discogenic pain. Leukotriene B<sub>4</sub> and thromboxane B<sub>2</sub> also has been discovered within herniated human discs after surgery. These inflammatory substances

are supposed to produce radicular pain.<sup>12</sup> Proposed hypothesis of action of epidural steroids are three. They inhibit the neuropeptide synthesis and suppress inflammation. They are supposed to stabilize the membrane and have some anaesthetic action, which reduces sensory symptoms. It was also demonstrated that presence of methyl prednisolone in epidural space inhibits transmission in unmyelinated C fibres, which are the main nociceptive pathway.<sup>13</sup>

Several studies have shown that ESI is effective in LBP. According to Bogduk, out of 40 studies on more than 4000 patients on lumbar and caudal steroid injections, 36 recommended in favour of the use of ESI in lumbosacral pain.<sup>14</sup> In 1973, Dilke & colleagues published a double blind, controlled and randomized prospective study in 100 patients. Their over all success rate was 45%.<sup>15</sup> Other authors reported success rates ranging from 63% to 80%.<sup>16, 17, 18.</sup> ESI is also endorsed by the North American Spine Society and the Agency for Health care Policy and Research as an integral part of non-surgical management of radicular pain from lumbar spine disorders.<sup>13</sup> As such the reported success rate in the literatures varies from 20% to 100%. The average success rate was 60% to 75%.<sup>19</sup> The long term success rate at 6 months was 30% to 40% in most studies.<sup>2</sup> In our study we found 59% success rate at 3 months. There are several factors for varied results like patient selection, technique of injection, dosage of steroid & follow up. After all precautions, the failure rate in other studies was 25% to 30%.<sup>20, 21.</sup> We found that obese patients, those with large disc prolapse and multi level disc prolapse showed poor response to ESI. It may be due to epidural fat inhibiting the spread of drug or canal stenosis. Apart from discogenic LBP, ESI can also be used in radicular pain due to spinal stenosis, lumbar compression fracture and facet or nerve root cyst.<sup>13</sup> There were reports by Cuckler et al., Snoek et al. & Klenerman et al. showing no significant effect of ESI in LBP.<sup>22, 23, 24.</sup>

Interestingly therapeutic decay phenomenon has been observed with ESI. White & colleagues prospectively studied 300 patients and reported good results in early periods. The effect of ESI was found to decrease with time. They reported 82% pain relief for one day, 50% for two weeks & 16% for two months.<sup>20</sup> This therapeutic decay prompted many physicians to recommend multiple injections. The local effect of steroids has been shown to last at least 3 weeks at a therapeutic level.<sup>2</sup> The acceptable time interval between two injections is still debatable but

some studies have shown that 7-10 days interval is appropriate.<sup>2</sup> In our study the average interval between first and second injection was 21 days (range, 5-32 days) and between second and third injection was 23 days (range, 19-27 days). Epidural injections are a relatively safe procedure as total complications in most series were 5%.<sup>2</sup> There have been reports of epidural abscess, epidural hematoma, and duro-cutaneous fistula, Cushing syndrome, bacterial meningitis and post-dural puncture headache. None of these were seen in our study. Only 4 (7.69%) patients reported with local pain over the injection site, which subsided without treatment.

Contraindications to ESI are infection at the injection site, systemic infection, bleeding diathesis, uncontrolled diabetes, congestive heart failure and patients' unwillingness.<sup>12</sup>

### Conclusion

ESI is a safe, effective, & economical treatment modality for LBP. It reduces the period of hospitalization, analgesic intake & facilitates the institution of early rehabilitative programs. We recommend ESI as a conservative mode of treatment of back pain with or without radicular symptoms with no motor deficit not responding to other modes of conservative treatment.

### References

1. Hult L: The Munkfors investigation. *Acta Ortho Scand Suppl* 1954; 16:1.
2. Keith D William and Ashley L. Park- Low back pain and disorders of intervertebral discs. In: S.Terry Canale, editor - *Campbell's operative orthopedics*. Vol-II. 10th ed. Mosby, 2003:1961-2003.
3. WHO Technical Report Series 919, Table-6, 2003:38-39.
4. Glenn R. Buttermann - Treatment of lumbar disc herniation: epidural steroid injection compared with discectomy: a prospective, randomized study. *JBJS* 2004; 86-A: 670-679.
5. Deyo RA, Diehl AK, Rosenthal M - How many days of bed rest for acute low back pain: a randomized clinical trial. *N Engl J Med* 1986; 315: 1064.
6. Malmivaara A, Hakkinen U, Aro T, et al - The treatment of low back pain – bed rest, exercises or ordinary activity? *N Engl J Med* 1985; 332: 1786.
7. Maher C.G. - *Effective Physical Treatment for Chronic Low Back Pain*. Ashish D.

- Diwan, Safdar N. Khan., editors - *Ortho Clin of N Am*. 2004: 57-64.
8. Spangfort EV - The lumbar disc herniation. A computer-aided analysis of 2,504 operations. *Acta Orthop Scand Suppl*. 1972; 142:1-95.
9. Robecchi A and Capra R - Hydrocortisone (compound F); first clinical experiments in the field of rheumatology. *Minerva Med*. 1952 Dec 6; 43(98):1259-63.
10. Beliveau P – A comparison between epidural anesthesia with and without corticosteroid in the treatment of sciatica. *Rheumatol Phys Med*. 1971; 11: 40.
11. Saal JS, Franson RC, Dobrow R, Saal JA, White AH and Goldthwaite N. - High levels of inflammatory phospholipase A2 activity in lumbar disc herniation. *Spine*. 1990 Jul; 15(7):674-8.
12. Burke JG et al. - Intervertebral discs causing LBP secrete high levels of pro inflammatory mediators. *JBJS* 2002; 84 B: 196-201.
13. Boqing Chen, <http://www.medicine.com/pmr/topic223.htm> 2004, 1-8, date 28<sup>th</sup> Jan 2004.
14. Bogduk N, Cherry D - Epidural corticosteroid agents for sciatica. *Med J Aust*. 1985 Oct 28; 143(9):402-6.
15. Dilke TF, Burry HC, Grahame R. - Extradural corticosteroid injection in management of lumbar nerve root compression. *Br Med J*. 1973 Jun 16; 2(5867):635-7.
16. Breivic H., Hesla PE, Molnar I, Lind B - Treatment of chronic low back pain and sciatica: comparison of caudal epidural injections of bupivacaine and Methylprednisolone with bupivacaine followed by saline. In Bonica, J.J., and Albe – fessard, D. (eds.): *advances in pain research and Therapy*. New York, Raven Press, 1976: 927.
17. Swerdlow M and Sayle–Creer W - A study of extradural medication in the relief of lumbosciatic syndrome. *Anesthesia* 1970; 25: 341.
18. Winnie AP, Hartman JT, Meyers HL, Ramamurthy S, and Barangan V.- Pain clinic II: intradural and extradural corticosteroids in sciatica. *Anesthesia analg* 1972; 51:990.
19. Ronald J. Wisneski, Steven R. Garfin, Richard H.Rothman, Gregory E. Lutz-Lumbar disc disease. In: Harry N. Herkowitz, Steven R. Garfin, Richard A.

- Balderston, Frank J. Eismont, Gordon R. Bell, Sam W. Wiesel, editors - *The Spine*. Vol I. 4<sup>th</sup> ed. Philadelphia: W.B.Saunders, 1999: 656 – 659.
20. Stewart HD, Winnel, RC, Dann N - Epidurography in the management of sciatica. *Br J Rheumatol* 1987; 26: 424 -29.
  21. White AH, Derby R, and Wynne G - Epidural injections in the diagnosis and treatment of low back pain. *Spine* 1980; 5: 78 - 82.
  22. Cuckler JM, Bemini PA, Wiesel SW, et al - a prospective randomized double blind study of the use of epidural steroids in the treatment of radicular pain. *J. Bone and Joint Surgery* 1985; 67A:63.
  23. Snoek W, Weber H, and Jorgenson B - Double blind evaluation of extradural Methylprednisolone for herniated lumbar discs. *Acta Orthop Scand* 1977; 48: 635-641.
  24. Klenerman L, Greenwood R, Davenport HT, et al - Lumbar epidural injections in the treatment of sciatica. *Br J Rheumatol* 1984; 23:35-38.