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A STUDY OF EFFECTIVENESS OF EPIDURAL STEROID INJECTIONS FOR LOW BACKACHE AND SCIATICA

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ABSTRACT: BACKGROUND: Of all the causes, low back pain due to disc prolapse is one of the commonest causes. The treatment aspect can be conservative or surgical, and the question of which one is effective is always controversial. Of the treatment options epidural steroid injections have a definitive role to play in conservative line of treatment. The present study is an effort in evaluating the effectiveness of epidural steroid injection in treatment of low back pain and sciatica especially caused due to disc prolapse. **MATERIALS & METHODS:** 50 cases of low backache and sciatica who were admitted in Sri Siddhartha Medical College Hospital, Tumkur were administered a maximum of two epidural steroid injections. The cases were followed up for 12 weeks along with clinical examination and the Oswestry Low Back Pain Disability Questionnaire. **RESULTS:** Seventy percent of patients were diagnosed of single level lumbar disc prolapse and 30% with two level disc prolapse. Most patients (74%) received only single injection and the rest (26%) received two injections. The patients with acute onset of symptoms had better results compared to patients with chronic symptoms. There was a highly significant difference (p value <0.00001) between the mean ODI scores before, during and at each follow up of treatment. The overall success rate of the procedure was 78%. **CONCLUSIONS:** We found that epidural steroid injection is a simple, safe, effective, low cost and minimally invasive modality for management of symptomatic herniated discs especially radiculopathy and can be widely used as an intermediate treatment in an attempt to relieve low back pain and sciatica symptoms in disc prolapse.

KEYWORDS: Spine, Intervertebral disc, Epidural, Corticosteroid, Disc herniation.

INTRODUCTION: Back pain has haunted mankind since time immemorial. It is now an international health issue of major significance. About 80% suffer from this at some time in their life, ranked as the most frequent cause of limitation of activity in people younger than 45 years by the National Centre for Health Statistics. Only routine examinations, post operative checkups and upper respiratory tract symptoms surpass back problems as a cause of office visits to physicians¹. It is also an important cause of sickness absenteeism in our country, therefore finding the most appropriate treatment for it is prudent. Disc herniation is an important cause of low back pain and L3-4 and L4-5 showed the greatest degree of disc degeneration.^{2,3}

Of all the causes, low back pain due to disc prolapse is one of the commonest causes. The relationship between lumbar disc lesion and low back pain is well established but at the same time regarding the treatment aspect can be conservative or surgical, and which one is effective is always controversial.⁴ Choosing the best form of treatment has always posed a challenge to the treating physician. Popular forms of conservative treatment are physical therapy, epidural steroid injection, chiropractic, anti inflammatory agents and opioid analgesics which are a lot cheaper and less invasive than surgical techniques.⁵

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Since the last two decades our diagnostic and treatment options have advanced enormously, especially considering the enormous contributions of CT and MRI. Of the treatment options the role of epidural steroid injections in low back pain and sciatica especially due to disc lesion have a definitive role to play in conservative line of treatment due to its effectiveness.

Epidural steroid injection is a very popular and low risk alternative to surgical intervention in lumbar disc herniation. It enjoys reasonable success rates for alleviation of radicular symptoms from lumbar herniated discs.⁶

The present study of role of epidural steroid injections in management of low back pain is an effort in evaluating the effectiveness and functional outcome in daily activities of patients after epidural steroid injection in treatment of low back pain and sciatica especially caused due to disc prolapse.

MATERIALS AND METHODS: Fifty patients with low backache and sciatica who were not responding to conservative management and who gave the consent for epidural steroid injection admitted during the period of study were included as study sample. Patients in the age group of 20 to 50 years diagnosed with acute lumbar disc protrusion or prolapse of 1 or 2 levels, those with predominant radiculopathy, without neurological deficits and not responding to conservative treatment were considered for this procedure. The exclusion criteria included patients aged more than fifty years, cases of lumbar disc extrusion or sequestration, disc prolapsed of more than two levels or those associated with spondylolisthesis, presence of gross neurological deficits and those associated with uncontrolled diabetes mellitus, systemic Infections or bleeding diathesis.

Patients were assessed clinically, a thorough history and clinical examination was carried out, the subjective symptoms and objective signs were recorded in a proforma. This was followed by routine preoperative investigations as well as a MRI scan of the lumbosacral spine of all the patients to confirm the diagnosis. The level of the disc is predetermined by MRI and the drug was injected to one level higher to the level of greatest disc herniation causing compression. Steroid injections were given through interlaminar approach at an interval of two weeks and repeated if there had been less than 50% improvement within two weeks after previous injection (Figure 1).

A maximum of three injections were administered. Methyl prednisolone acetate was used due to its marked potency, anti-inflammatory action and cost effectiveness compared to the other injectable corticosteroids. Sterile distilled water was used to obtain wider dispersion of the steroid. The study was conducted for a period of 12 weeks on a patient that included reviews at fourth, eighth and twelfth weeks during which time a thorough clinical examination was done, SLRT and Oswestry Disability Index (ODI) was used to assess the functional outcome of the patient (Figure 2). The results were analyzed by the EPI Info 3.4.3 software using paired t test method. Success was defined as a reduction of 10 points or more (or a reduction of 20% or more), which was considered as significant clinical improvement.

Fig. 1: Injection of steroid into the epidural space through the interlaminar route

Fig. 2: Assessment of patient after administration of epidural steroid injection

OBSERVATIONS AND RESULTS: A total of 50 cases were included of which 32 cases were below 40 years of age and 18 cases above 40 years of age. The mean age obtained from our study was 39.04 yrs. In our study of 50 cases 39 were males and 11 were females. The male to female ratio is 3.5:1 (Graph 1).

Graph 1: Gender Distribution

About 25 patients (50%) were found to be involved in occupations requiring lifting of heavy weights or strenuous manual activity. In about 10 patients (20%), there was a previous history of trauma to the back whereas 15 patients (30%) had no obvious precipitating factors (Table 1).

Obvious precipitating factors	No. of Cases	Percentage (%)
Occupational Strain	25	50
Previous trauma	10	20
No obvious factor	15	30
Total	50	100

Table 1: Precipitating factors

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Acute onset of symptoms (less than 3 months) was seen in 26 patients (52%) and chronic onset (more than 3 months) was seen in 24 patients (48%). In this series, 13 patients (26%) had right sided sciatica and 12 patients (24%) had left sided sciatica, whereas 25 patients (50%) had sciatica in both lower limbs (Graph 2).

Graph 2: Side involved in sciatica

In our study, 27 patients (54%) had obliteration of lumbar lordosis. In the present study 14 (28%) patients presented with sciatic scoliosis with convexity towards the affected site (Table 2).

Sciatica scoliosis	Frequency	Percent
Absent	36	72.00%
Present	14	28.00%
Total	50	100.00%

Table 2: Sciatic Scoliosis

There were 49(98%) patients with tenderness around the affected spine. Reduced mobility of the spine was seen in 38 patients (76%) out of the total 50. Eighteen patients (36%) had altered sensations with no loss of muscle power.

In our series SLRT was positive in all of our patients. In 18 patients it was less than 45 degrees and in 32 patients it was more than 45 degrees of the right lower limb. In 21 patients SLRT was less than 45 degrees and 29 patients had SLRT of more than 45 degrees over the left side (Table 3).

SLRT	Number of Patients	Percentage (%)
<45	32	64
>45	18	36
Total	50	100

Table 3: Straight Leg Raising test

Thirty five cases presented with single level herniations and fifteen patients had two level herniations. Out of the single level herniations, the commonest level of affected lumbar disc was L4-L5 (14 patients, 40%), followed by L5-S1 (10 patients, 28%), L3-L4 (8 patients, 23%) and L2-L3 (3 patients, 8%) (Table 4).

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Level of herniation	Number	Percentage
L4-L5	14	40
L5-S1	10	29
L3-L4	8	23
L2-L3	3	8

Table 4: Single level of Disc Herniations

In two level herniations L4-5, L5-S1 (9 patients, 60%) was the commonest level seen, followed by L3-L4, L4-L5 (3 patients, 20%) and L2-L3, L3-L4 (3 patients, 20%) consequently (Table 5).

Level of Herniations	Number of Patients	Percentage
L4-5, L5-S1	9	60
L3-L4, L4-L5	3	20
L2-L3, L3-L4	3	20

Table 5: Multiple levels of disc herniations

All 50 patients were given epidural steroid injection through the lumbar route after failure of conservative treatment. All patients received 8 ml mixture of methyl prednisolone acetate (80mg in 2ml), 2ml of Bupivacaine and 4 ml of distilled water. Out of all, 37 patients received only one injection and 13 patients received two doses of epidural steroid injections.

ASSESSMENT OF SHORT TERM CLINICAL RESULTS: In our series, out of the 26 acute cases, 20 cases (77%) had short term success and 6 cases (23%) had short term failure (Graph 3).

Graph 3: Short term results of acute cases

Similarly out of the 24 chronic cases of low backache with sciatica, 16(66.6%) patients had short term success and 8(33.3%) patients had short term failure to relief of symptoms (Graph 4).

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Graph 4: Short term results of chronic cases

Assessments of results after the last follow up: Among all the acute cases, 22 patients had obtained relief, whereas 4 patients reported unsatisfactory relief of symptoms (Graph 5).

Graph 5: Acute cases after completing follow up

Among the chronic cases, 17(70.83%) patients showed success of treatment and 7 patients (29.17%) showed failure of treatment to bring about relief (Graph 6).

Graph 6: Chronic cases after completing follow up

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The mean ODI scores were tabulated by using the EPI Info 3.4.3 software by using the paired t test method. The analysis between the mean ODI scores on admission and after the first injection shows highly significant changes (Graph 7).

Graph 7: Comparison of mean ODI score before and after first injection

Out of the 13 patients who underwent a second injection, the analysis between the ODI assessment before and after the second injection shows significant p value change (<0.00001) (Graph 8).

Graph 8: Comparison of mean ODI score before and after second injection

The comparisons between the mean Oswestry Disability Index scores on admission and after 4 weeks follow up show statistically significant differences (Table 6).

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Characteristic	Before treatment	Review at 4 weeks
Mean	18.2	8.34
Standard deviation	1.69	4.37
Observations	50	50
t Stat	15.45	
p value	<0.00001	

Table 6: Comparison of mean ODI score before treatment and at 4 wks

There is also a significant difference between mean Oswestry Disability Index scores on admission and on eighth week review (Table 7).

Characteristic	Before treatment	Review at 8 weeks
Mean	18.2	7.08
Standard deviation	1.69	4.26
Observations	50	50
t Stat	17.52	
p value	<0.00001	

Table 7: Comparison of mean ODI score before treatment and at 8 wks

At the final follow up, the mean Oswestry Disability Index scores show statistically significant differences as compared to the scores obtained on admission of the patients (Table 8).

Characteristic	Before treatment	Review at 12 weeks
Mean	18.2	4.1
Standard deviation	1.69	4.37
Observations	48	48
t Stat	21.96	
p value	<0.00001	

Table 8: Comparison of mean ODI score before treatment and at 12 wks

We did not encounter any intra dural rupture of membranes during the time of injections and there were no other major complications encountered during or after the injections. Out of the 50 patients included in the study, three (6%) patients had pain at the injection site which resolved after two days with supplementation of oral analgesics.

DISCUSSION: In our study of 50 cases with low back ache and sciatica, the maximum incidence was found in the mean age of 39.04 years. This correlates with O'Connell's series of 500 patients where maximum incidence was seen in age group of 20 to 40 years.⁷ Males accounted for 78% of the cases and 22% were females with a male to female ratio of 3.5:1. The reason for higher incidence in males may be linked to the nature of their occupation. About 25 patients (50%) were found to be involved in occupations requiring lifting of heavy weights or strenuous manual activity, ten patients (20%)

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had a previous history of trauma to the back and 15 patients (30%) had no obvious precipitating factors. These results are comparable to the studies done in developing countries. O'Connell's series had 85% of patients giving history of occupational strain. Acute onset of symptoms (less than 3 months) was seen in 26 patients (52%) and chronic onset (more than 3 months) was seen in 24 patients (48%) which was comparable to O'Connell's⁷ series of 500 patients where they presented with symptoms less than 1 year in one third of his cases and over one year in the remaining.

Thirteen patients had right sided sciatica and twelve patients had left sided sciatica, whereas twenty-five patients had sciatica in both lower limbs. The right side was slightly more affected compared to the left. In O'Connell's series there were 90% of patients with sciatica symptoms in one lower limb only. In our study 18 patients (36%) had altered sensations with no loss of muscle power. In O'Connell's series altered sensation in lower limbs were seen in 50% of the cases. Reduced mobility of the spine was seen in 38 patients (76%). Reduced mobility of the spine was observed in all patients of O'Connell's series, tenderness of lumbosacral region was seen in 80% of cases, sciatic scoliosis in about 30% of the cases with the convexity usually towards the painful side. In 32 (64%) patients Straight Leg Raising Test (SLRT) was less than 45 degrees and in 18 (36%) patients it was more than 45 degrees out of the total fifty patients. This conforms to O'Connell's series where SLRT was positive in 99% of cases.

Out of the single level herniations, the commonest level of affected lumbar disc was comparable to the studies conducted by Baral et al⁸ and current literature (Table 9).

Series	Number of Injections			Total number of patients
	One	Two	Three	
Mathews et al ⁹	0	21	32	53
Cuckler et al ¹⁰	17	19	0	36
Present study	39	11	0	50

Table 9: Comparison of number of injections with similar studies

Out of the total fifty patients, 37 patients received only one injection and 13 patients (26%) received two doses of epidural steroid injections. In John M Cuckler's series of 36 cases, it is reported that 19 of his patients received a second injection.¹⁰

The common and only complication faced by 3 patients (6%) was pain at the injection site after the procedure which subsided with oral analgesics for two days. No other major complications were encountered. This is similar to the study done by Baral.⁸ F. W. Brown¹¹ in his series of 56 cases reported no complications except where pre-existing infections were present (Table 10).

Series	Number of patients	Complication
Dilke et al ¹²	82	NO
Serrao et al ¹³	10 out of 23	Headache, nausea
Baral et al ⁸	3 out of 50	Pain at injection site
Present Study	3 out of 50	Pain at injection site

Table 10: Comparison of complications with similar studies

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Overall, out of the total 50 cases, 36 cases (72%) had short term success of treatment and 14 cases (28%) had failure of treatment. In John M Cuckler's series 33.3% had short term success and 66.6% had short term failure.

Out of all the patients with acute symptoms, 22 patients (85%) reported a positive outcome and 4 patients (15%) reported with inadequate ODI scores suggesting failure. Among the chronic cases, 17(70.83%) patients showed success of treatment and 7 patients (29.17%) showed failure of treatment to bring about relief. In our study, all of the patients except two were followed up till 12 weeks. Two patients were followed up until 8 weeks and failed to improve with conservative management. They underwent surgery on a later date.

The comparison between the mean Oswestry Disability Index scores on admission, with every injection and after 4 weeks, 8 weeks and 12 weeks follow ups respectively show significant difference each, with a p value of <0.00001. This is considered a highly significant change. These favourable outcomes are also comparable to the studies done by Kawu and Schaufele et al who obtained p value of <0.01 each in their respective studies.^{14,15} Schaufele et al and Riew et al also noted that ESI decreases the need for discectomies for lumbar disc herniations. This was also noted in this study where the surgery rate was 6.1% (Table 11).^{14,16}

Series	P value	Interpretation
Schaufele et al ¹⁴	<0.01	Highly significant
Riew et al ¹⁶	<0.004	Highly significant
Kawu et al ¹⁵	<0.01	Highly significant
Present study	<0.00001	Highly significant

Table 11: Comparison of mean ODI analysis with other series

Overall 39 patients (78%) had significant benefit from the injections while 11 patients (12%) had no significant benefit. Our results are comparable with the study done by Baral et al and Mathews et al.⁹ Our findings also support the studies done by Swerdlow et al and Winnie et al.^{17,18} They reported the success rates ranging from 63% to 80%. The following table also highlights the final outcome of various series (Table 12).

Series	Percentage of success obtained
Baral et al ⁸	90%
Mathews et al ⁹	67%
Dilke et al ¹²	45%
Present Study	78%

Table 12: Comparison of results with other series

CONCLUSION: Epidural steroid injection as a semi- invasive therapeutic procedure has certainly got a place in conservative line of management of disc prolapse. It is a simple, safe, effective, low cost and minimally invasive modality for management of acute symptomatic herniated discs especially radiculopathy and has improved the functional outcome in the daily activities of the patients like social life, personal care, lifting and walking after treatment. Thus it can be widely used as an

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intermediate treatment in an attempt to relieve low back pain and sciatica symptoms in disc prolapse. The study was limited by the sample size, non-randomized control trial and short follow-up.

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