International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(3): 246-253

www.orthopaper.com
Received: 06-05-2021
Accepted: 11-06-2021

B Sahithya
Assistant Professor (M.S. Orthopaedics), Mamata General and Super Speciality Hospital, Khammam, Telangana, India

Gopal Arunkumar
Senior Resident (M.S. Orthopaedics), Mamata General and Super Speciality Hospital, Khammam, Telangana, India

Corresponding Author:
Gopal Arunkumar
Senior Resident (M.S. Orthopaedics), Mamata General and Super Speciality Hospital, Khammam, Telangana, India

A prospective study of role of epidural steroid injection in intervertebral disc prolapse in adults

B Sahithya and Gopal Arunkumar

DOI: https://doi.org/10.22271/ortho.2021.v7.i3d.2755

Abstract
Back pain is a major issue in our country and its effective management remains a challenge. Prolapsed intervertebral disc is one of the major cause of illness leading to low back ache which is mostly affecting adults in their fourth decade of life. We have selected a study group of 120 people with single and double level disc bulges and prolapses, who underwent MRI for their low backache and managed them with ESI by different approaches, among which 63 patients were given interlaminar approach, 21 transforaminal approach and 36 caudal approach at the end we got fair to good results in our study, by this the time interval for surgical intervention has been increased.

Keywords: low back pain, intervertebral disc prolapse, epidural steroid injection

Introduction
Back pain is now an international health issue of major significance, Disc prolapse amounts for 5% low back disorders & is one of the most common cause for surgery. Degenerative disc disease is an important cause of low back pain, which is commonly sen in lumbar discs, L3-L4 and L4-L5 intervertebral disc levels showed the greatest area of disc degeneration [1, 2]. Treatment for lumbar disc herniation can be conservative or surgical & which one is effective is always controversial [3]. Epidural steroid injection is very popular & low risk alternative to surgical intervention in lumbar disc herniation [4]. ESI enjoys reasonable success rates for alleviation of radicular symptoms from lumbar herniation discs. Different approaches of epidural steroid injection has different outcome on patients treated for low backache. Even though all 3 modalities deliver medication into the epidural space, there are important differences among these approaches [5-9]. So, for this we have conducted a prospective study on patients with disc prolapse at lumbar level and tried different approaches of epidural steroid injection, which has shown a statistically significant results.

Aims and Objectives
a. To study the efficacy of epidural steroid injection in alleviating symptoms caused by prolapsed intervertebral disc.
b. To compare the outcome with different approaches of epidural steroid injection.
c. To study the risks following epidural steroid injection.

Material and Methods
This interventional study was conducted in the Orthopaedic department of Mamata general and super speciality hospital, Khammam.
The case selection criteria includes

Inclusion Criteria
1. Back pain for more than 6weeks in an adult with evidence of lumbar disc herniation on MRI, with failed conservative management (tractions, analgesics, physiotherapy).
2. Disc herniation with radiculopathy.

Exclusion Criteria

1. Back pain less than 6weeks.
2. Patient with focal neurological deficit's.
3. Patient with multiple level intervertebral discs involvement.
4. Those without evidence of lumbar disc herniation on MRI.
5. Osseous cause for lumbar canal stenosis on MRI.
6. Signs of lumbar disc degeneration without lumbar disc herniation on MRI.
7. Presence of other associated spinal pathologies.
8. Those with "caudaequina syndrome".
9. Those with prior spine surgery.

The period for inclusion of patients was from march 2019 to march 2021 and all the patients were followed up for a minimum period of 1½ year.

Procedure

Technique of epidural injection It is an aseptic procedure done in the operation theatre under the guidance of an, Anaesthetist to face any complications associated with ESI. An IV cannula should be placed in situ for at least 4 hrs to be able to tackle any hypotension that ensures. There are three common methods for delivering steroid into the epidural space:

Interlaminar injection: the needle is inserted into the space between adjacent vertebral laminae (posterior wall of the vertebra) to reach the epidural space.

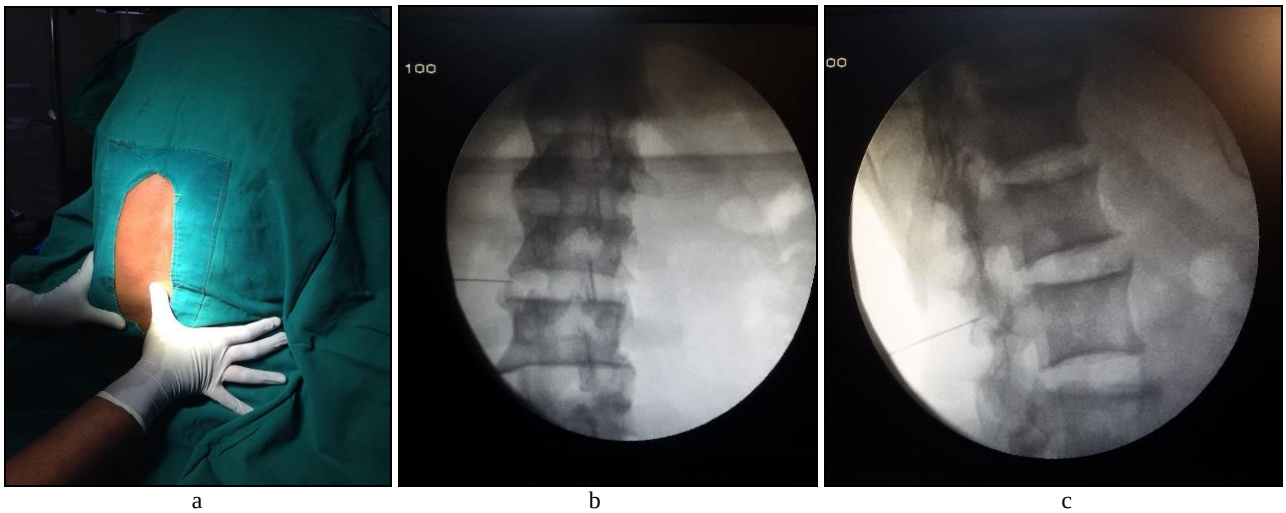
Transforaminal injection: the needle is inserted into the epidural space through the intervertebral foramen on the side of the spinal canal.

Caudal injection: the needle is placed into the sacral area below the lumbar spine through an opening called the sacral hiatus.

Before the injection is given the procedure is carefully explained to the patient, who is told to expect increase in intensity of his symptoms during the injection.

Fig 1: Epidural kit

Fig 2: Drugs used



a b c

Fig 3: a) Identifying the correct level of disc bulge by palpating the spinous process **b, c)** Fluoroscopic guided placement of spinal needle at the level of disc bulge

a b c

Fig 4: a) Caudal ESI**, b)** Interlaminar ESI**, c)** Transforaminal ESI

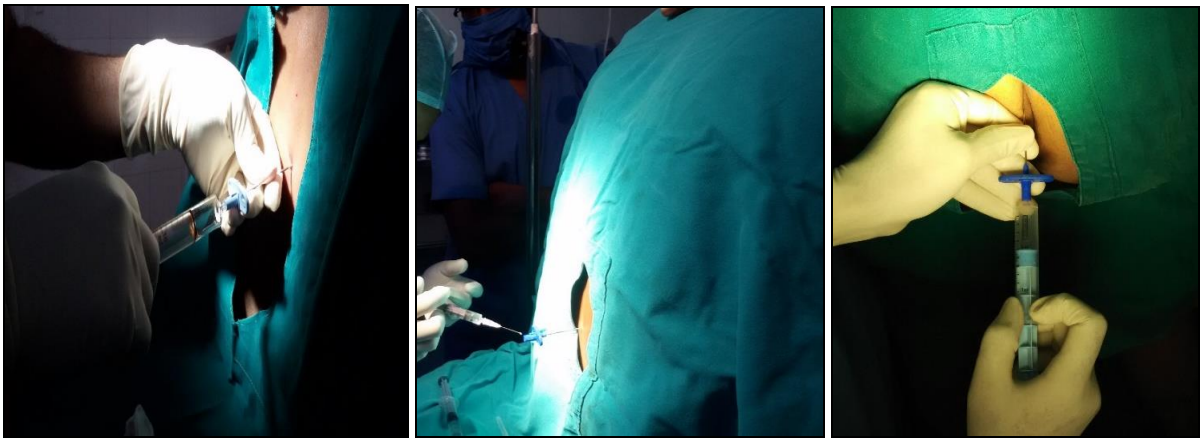


Fig 5: Confirming the correct placement of needle in epidural space by doing lose of resistance and hanging drop technique

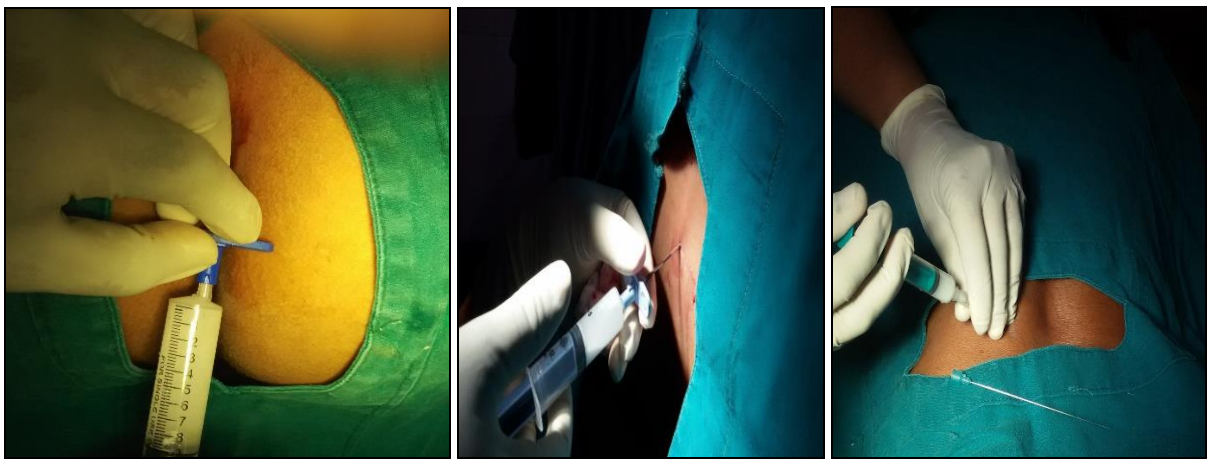


Fig 6: Injection of epidural steroid by 3 different approaches

Post procedure advice

Post procedure patient is advised bed rest, avoid straining / bending. Patient is advised to sleep in propped up position, plenty of oral fluids.

Number and Frequency of ESI

If the first injection fails to relieve symptoms, further injections can be given at 2-week intervals. The number of injections is a matter of personal choice, but a total of three injections would appear to be a reasonable limit.

Observation and Results

A total of 148 patients with low back ache are taken in this study, out of which only 120 patients attended the study, so 28 patients were excluded from this study, All the patients presented in the outpatient department with pain in the lower back radiating to one or both the lower limbs with paresthesia and difficulty in performing daily activities, These patients had a failed trial of conservative line of management like medications, pelvic traction, physiotherapy and other treatment modalities for more than 6 weeks. These patients were analysed clinically and radiological by taking an x-ray, lastly by taking an MRI for all those who fulfilled our inclusion and exclusion criteria were planned for epidural steroid injection. All the patients were evaluated before and after the ESI using VAS, ODI and SF36, later the patients

were followed at 1month, 2month, 3month, 6months,1year and 1½ year after injection. The mean age was 47.7 with maximum patients lying in the age group between 41-50years, 80 out of 120 patients were females and 40 out of 120 were males. (Table 1)

Table 1: Age and Sex distribution of the patients

Age	Sex		Total
	Male	Female	
20-30	4	6	10
31-40	7	13	20
41-50	18	30	48
51-60	6	16	22
61-70	8	12	20

We have selected patients with single level disc bulge on MRI, and based on the type and level of disc bulge we opted for best approach. (Table 2 & 3)

Table 2: Distribution of study subjects according to the type of discs

Type of discs	No. of patients	Percentage
Disc bulge	68	56.6%
Protrusion	32	26.6%
Extrusion	20	16.6%
Sequestration	0	0%
Total		

Table 3: Distribution of study subjects according to Types of approaches

Types of approaches	No. of patients	Percentage
Interlaminar	63	52.5%
Transforaminal	21	17.5%
Caudal	36	30%
Total	120	

Once collected, the data was exported to Statistical Analyzing System (SAS Institute Inc.,
Cary, N.C.) for statistical analysis. Repeated ANOVA was used to study the effectiveness of treatment, and independent sample mean comparisons to compare treatments
The following are the results obtained in the study.
Base line characteristics (N=120)

Table 4a: showing Mean, SD, P. values based on the different outcome measures

		VAS				ODI				SLRT			
		N	Mean	SD	P. value	N	Mean	SD	P. value	N	Mean	SD	P. value
Before ESI	IL	63	5.524	1.554	0.909	63	32.762	5.899	0.155	63	31.603	3.549	0.617
	TF	21	5.429	1.690		21	31.286	4.173		21	31.667	2.817	
	C	36	5.611	1.420		36	34.333	6.520		36	32.222	2.231	
At 1mth	IL	63	2.317	0.820	0.752	63	32.825	5.575	0.142	63	3.143	0.353	0.714
	TF	21	2.381	0.805		21	31.286	4.173		21	3.190	0.402	
	C	36	2.222	0.797		36	34.333	6.520		36	3.111	0.319	
At 6mths	IL	63	3.492	0.878	0.001	63	23.603	5.738	0.015	63	2.429	0.499	0.002
	TF	21	4.000	0.000		21	24.952	4.466		21	2.190	0.402	
	C	36	3.944	0.333		36	26.889	5.115		36	2.111	0.319	
At 1yr	IL	63	4.032	0.439	0.375	63	25.508	4.310	0.228	63	2.143	0.353	0.714
	TF	21	4.095	0.436		21	24.952	4.466		21	2.190	0.402	
	C	36	3.944	0.333		36	26.889	5.115		36	2.111	0.319	
At 1.5yrs	IL	63	4.095	0.560	0.086	63	31.603	3.549	0.617	63	2.143	0.353	0.714
	TF	21	4.476	0.873		21	31.667	2.817		21	2.190	0.402	
	C	36	4.167	0.737		36	32.222	2.231		36	2.111	0.319	

SF36:
The patients were followed at 1st month, 2nd month, 3rd month, 6th month, 1year and 1½ years and mean and standard deviation were calculated.

Table 4b: Descriptive statistics of SF36 in IVDP.

		N	Mean	Std. deviation	P-value
Role limitations due to emotional problems	Interlaminar	63	65.778	28.476	0.031
	Transforaminal	21	47.333	34.236	
	Caudal	36	66.306	26.561	
Pain	Interlaminar	63	58.024	9.927	0.011
	Transforaminal	21	51.238	12.881	

	Caudal	36	52.444	11.312	
General health	Interlaminar	63	46.984	7.045	0.014
	Transforaminal	21	41.905	8.437	
	Caudal	36	47.222	6.912	

Table 4c: Statistical analysis of SF36 in IVDP.

Dependent Variable	(I) type of esi	(J) type of esi	Mean Difference (I-J)	P-value
Role limitations due to emotional problems	Interlaminar	Transforaminal	18.444	0.013
		Caudal	-0.528	0.931
	Transforaminal	Interlaminar	-18.444	0.013
		Caudal	-18.972	0.019
	Caudal	Interlaminar	0.528	0.931
		Transforaminal	18.972	0.019
Pain	Interlaminar	Transforaminal	6.786	0.015
		Caudal	5.579	0.016
	Transforaminal	Interlaminar	-6.786	0.015
		Caudal	-1.206	0.688
	Caudal	Interlaminar	-5.579	0.016
		Transforaminal	1.206	0.688
General health	Interlaminar	Transforaminal	5.079	0.006
		Caudal	-0.238	0.876
	Transforaminal	Interlaminar	-5.079	0.006
		Caudal	-5.317	0.009
	Caudal	Interlaminar	0.238	0.876
		Transforaminal	5.317	0.009

Table 5: Distribution of study subjects according to different complication following ESI

Complications	No. of Patients
Injection site pain	7
Transient head ache	5
Steroidal side effects(hypotension)	2
Dural puncture	2
PDPH (post dural puncture headache)	-
Nerve injury	3
Others	-

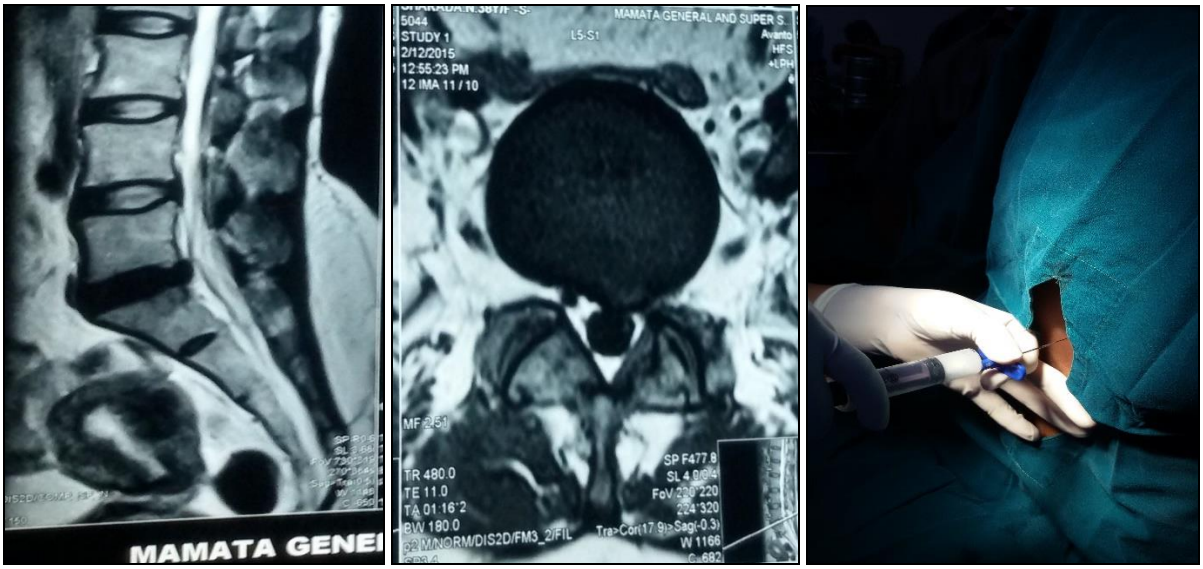
In our study among 120 patients, 15 of them had immediate hypotension following ESI, 18 patients had nerve injury, 5 patients faced dural puncture with CSF leakage, and the rest 5 had post dural puncture headache there were no risks like infection, HPA axis suppression and spinal arachnoiditis following ESI.

The following results were analysed and they have proven to be highly significant statistically at 2nd, 3rd and 6th month, After 3 months, there was no significant differences between the groups, and among the approaches interlaminar was superior to transforaminal which is again superior to caudal approach. Epidural steroid injection is definitely showing good and short term improvement in patients with intervertebral disc herniations.

Cases

Case 1

Name:	Sharada
Age/Sex:	38yr/f
Diagnosis:	IVDP L5-S1
Type of approach	Interlaminar



(a) (b) (c)

MRI Findings: Interlaminar Approach

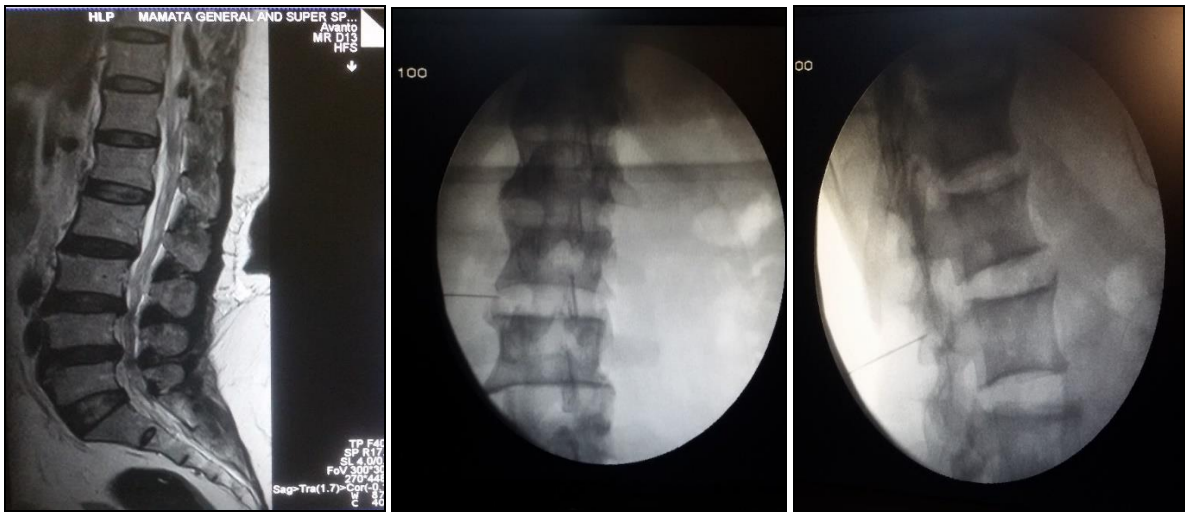
Outcome measures

	VAS score	ODI	SLRT
Pre-ESI	8	31	2
1mth of ESI	4	26	4
1½year ESI	4	17	3

There is significant improvement in the scores before and after ESI.

Case 2

Name	B. krishna
Age/Sex	63yr/M
Diagnosis	L4-L5
Type of approach	Transforaminal



MRI Findings Transforaminal Approach

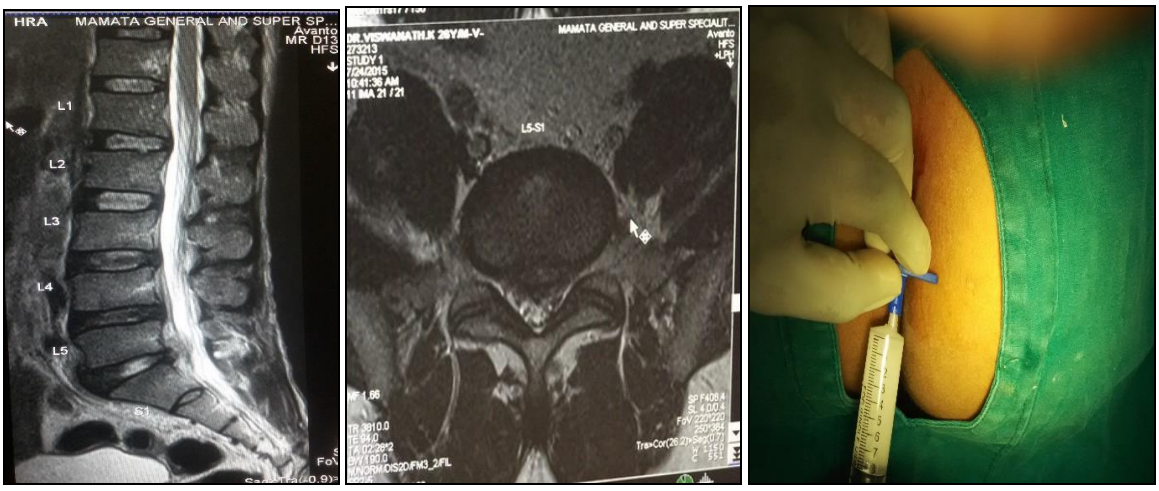
Outcome measures

	VAS score	ODI	SLRT
PRE-ESI	8	31	2
1mth of ESI	6	26	4
1½year ESI	4	17	3

There is significant improvement in the scores before and after ESI.

Case 3

Name	Vishwanath
Age/Sex	26y/m
Diagnosis	IVDP L5-S1
Type of approach	Caudal



MRI Findings Caudal Approach

Outcome measures

	VAS score	ODI	SLRT
PRE-ESI	8	31	2
1mth of ESI	6	26	4
1½year ESI	4	26	3

There is significant improvement in the scores before and after ESI.

Discussion

Epidural steroid injections are commonly used to relieve pain and radicular symptoms caused by lumbar disc herniations, and have shown good short term improvement with out surgery [10-13]. Its use in chronic degenerative disc disease with canal stenosis due to other causes is still debatable [14]. Medicare data files shows that the number of ESI performed in the united states increased from 444,000 in 1993 to 636,000 in 1998 but dropped to 482,000 in 1999. [13] Anesthesia

providers performed atleast 75% of these procedures every year and 85% in 1999.While interlaminar and caudal approach [15] is the traditionally used approach, recently there is interest in transforaminal approach [15, 16] and this approach has shown slight advantage over interlaminar approach but technically more demanding. This approach needs image guidance. According to reports, epidurals from the 1920s-1940s involved using high volumes of normal saline and local anesthetics. Injection of corticosteroids into the epidural space for the management of lumbar radicular pain was first recorded in 1952. Epidural steroid injection is one of the therapeutic interventional therapy. There are a multitude of interventional techniques in the management of chronic pain, including not only neural blockade but also minimally invasive surgical procedures such as peripheral nerve blocks, trigger-point injections, facet joint injections, sympathetic blocks, neuroablation techniques, intradiscal thermal therapy, disc decompression, morphine pump implantation, and spinal cord stimulation.

In our study we have laid emphasis on treating radiculopathy and pain caused by invertebral disc prolapse with epidural steroid injection by 3 different approaches based on the type of disc prolapses, this is the simple and relatively effective method in improving the symptoms of the patients. It is one of the best treatment modality in order to postpone the early surgical treatment. we have conducted our study on 120 patients. In our study the mean age of the patient was 47.7 with the maximum patients between 41-50 years, according to the literature intervertebral disc prolapse occurs above >35years of age. Age appears to be one of the important factors in the aetiology of this condition, among 120 patients there were 40 male and 80 female patients, out of 120 patients 63(52.5%) patients were tried with interlaminar approach, 21 out of 120 patients were tried with transforaminal approach and 36 out of 120 patients were tried with caudal approach. All patients were clinically evaluated for improvement in pain, disability status, quality of life and functional status. Outcome was assessed using Visual analogue score on a scale of 0 to 10 for pain, Oswestry disability index [17, 18] for function, slrt for functional outcome and sf36 for assesing the quality of life. Outcome was measured at consecutive months and lastly 1yr, 1. 5yrs. Two way Anova test was used to analyse these results as the data is normally distributed.

The VAS score has ranged between 2 to 8 per patient with the mean for IL, TF and C as 5.533±1.55, 5.429±1.69 and 5.611±1.420.The patients were followed after 1month, 2months, 3months, 6months, 1year and 1½ year respectively. when statistical analysis was done compairing the mean VAS scores before and after inection for different approaches the results obtained were highly significant at (p<0.01) 2nd, 3rd and 4th follow up's. The ODI for LBA patients ranged between 13% to 42% per patient with a mean ODI for different approaches IL, TF and C is 32.762±5.8, 31.286±4.1 and 34.333±6.2 respectively. The patients were followed after 1month, 2months, 3months, 6months, 1year and 1½ year respectively. Among the 8 components of SF36, in our study 3 components were selected to access the quality of life of the patients. when statistical analysis was done compairing the mean VAS, ODI, SLRT and SF36 scores before and after injection for different approaches the results obtained were highly significant at (p<0.01) 2nd, 3rd and 4th follow up's. when statistical analysis was done by multiple comparisions in between 3 approaches, at 2nd, 3rd, 4th follow up's has shown interlaminar approach to be superior when compaired to transforaminal and caudal approach, in between TF and C, TF was superior at 2nd, 3rd and 4th follow up's. In our study among 120 patients 5 of them had injection site pain, 6 out of 120 had transient head ache and 2 out of 120 developed hypotension. By carefull evaluation of the effects of these injections the drawbacks and advantages of this procedure could be concluded.

Conclusion

Epidural steroid injection will serve an important role in alleviating the symptoms caused by herniated disc. The ESI offered a more simple and easy method of treatment, it definitely is more appealing due to less deleterious effects and being a minimally invasive procedure.

Epidural steroid is a good low cost alternative to fenestration discectomy for temporary relief of symptoms of lumbar disc herniation especially radiculopathy.

ESI therapies have many different compositions and approaches for application, they all try to alleviate the symptoms caused by herniated disc.

Among the 3 different approaches in our study interlaminar approach gave superior results when compaired to transforaminal and caudal.

The vast majority of complications related to ESI are minor. Common complications include injection site pain or soreness, infections, allergy, and inadvertent dural puncture with spinal headache.

SF 36 is a useful questionnaire to evaluate quality of life in an Indian setting though some aspects of it are not applicable to the rural population especially pertaining to physical functioning.

Acknowledgement: The study includes no funding

References

1. Postacchini F. Results of surgery compared with conservative management for lumbar disc herniations. Spine 1996;21(11):1383-7.
2. Loupasis GA, Stamos K, Katonis PG, Sapkas G, Korres DS, Hartofilakidis G. Seven- to 20-year outcome of lumbar discectomy. Spine 1999;24(22):2313-7.
3. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Med Care 1992;30(6):473-83.
4. Wang JC, Lin E, Brodke DS, Youssef JA. Epidural injections for the treatment of symptomatic lumbar herniated discs. J Spinal Disord Tech 2002;15(4):269-72.
5. Manchikanti L, Abdi S, Atluri S, Benyamin RM, Boswell MV, Buenaventura RM *et al*. An update of comprehensive evidence-based guidelines for interventional techniques in chronic spinal pain. Part II: guidance and recommendations. Pain Physician 2013;16(2Suppl):S49-283.
6. Manchikanti L, Nampiaparampil DE, Manchikanti KN, Falco FJE, Singh V, Benyamin RM *et al*. Comparison of the efficacy of saline, local anesthetics, and steroids in epidural and facet joint injections for the management of spinal pain: A systematic review of randomized controlled trials. Surg Neurol Int 2015;6(Suppl4):S194-235.
7. Manchikanti L, Kaye AD, Manchikanti K, Boswell M, Pampati V, Hirsch J. Efficacy of Epidural Injections in the Treatment of Lumbar Central Spinal Stenosis: A Systematic Review. Anesth Pain Med [Internet] 2015, 5(1). [cited 2016 Nov 25] Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4350165/

8. Manchikanti L, Benyamin RM, Falco FJE, Kaye AD, Hirsch JA. Do Epidural Injections Provide Short- and Long-term Relief for Lumbar Disc Herniation? A Systematic Review. Clin Orthop Relat Res 2015;473(6):1940-56.
9. Manchikanti L, Nampiaparampil DE, Candido KD, Bakshi S, Grider JS, Falco FJE *et al*. Do cervical epidural injections provide long-term relief in neck and upper extremity pain? A systematic review. Pain Physician 2015;18(1):39-60.
10. Buchner M, Zeifang F, Brocai DR, Schiltenwolf M. Epidural corticosteroid injection in the conservative management of sciatica. Clinical orthopaedics and related research 2000;375:149-56.
11. Buttermann GR. Lumbar disc herniation regression after successful epidural steroid injection. Journal of spinal disorders & techniques 2002;15(6):469-76.
12. Ackerman III WE, Ahmad M. The efficacy of lumbar epidural steroid injections in patients with lumbar disc herniations. Anesthesia & Analgesia 2007;104(5):1217-22.
13. Radcliff K, Kepler C, Hilibrand A, Rihn J, Zhao W, Lurie J *et al*. Epidural steroid injections are associated with less improvement in the treatment of lumbar spinal stenosis: a subgroup analysis of the SPORT. Spine 2013;38(4):279.
14. Vad VB, Bhat AL, Lutz GE, Cammisa F. Transforaminal epidural steroid injections in lumbosacral radiculopathy. Spine 2002;27(1):11-6.
15. Schaufele MK, Hatch L, Jones W. Interlaminar versus transforaminal epidural injections for the treatment of symptomatic lumbar intervertebral disc herniations. Pain Physician 2006;9(4):361.
16. Fairbank JC, Couper J, Davies JB, O'brien JP. The Oswestry low back pain disability questionnaire. Physiotherapy 1980;66(8):271-3.
17. Fairbank JC, Pynsent PB. The Oswestry disability index. Spine 2000;25(22):2940-53.
18. Wang JC, Lin E, Brodke DS, Youssef JA. Epidural injections for the treatment of symptomatic lumbar herniated discs. Journal of spinal disorders & techniques 2002;15(4):269-72.