

CAUDAL EPIDURAL STEROID INJECTION: A PROSPECTIVE STUDY IN THE PATIENTS WITH LOW BACK PAIN

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Abstract

Background: Low back pain (LBP) is the most persistent pain and experienced in almost 60%–80% of the population at some point in their lifetime. With the increasing prevalence of chronic persistent low back pain, epidural injections are the most accessible treatment modality. Therefore, this study aimed to determine the effectiveness of the caudal epidural steroid injection in the patients of the chronic low back pain. **Methodology:** This Prospective study was conducted at the Department of Orthopaedics and Regional Spine Injury Centre N.S.C.B. Medical College & Hospital, Jabalpur (M.P.) from 1st Jan 2021 to 31st June 2022 with the sample size of 55 diagnosed cases satisfying the inclusion-exclusion criteria. The analysis was done with the use of Statistical Package for Social Sciences (SPSS) software, IBM manufacturer, Chicago, USA, version 23.0. **Results:** Total of 55 patients, majority were male (63.6%) with the age group from 30 to 75 years with mean age of 51.07 ± 7.95 years. Majority (93%) were symptomatically better and had good functional outcome after 6 months of follow up, who underwent Caudal epidural steroid injection, while, only 7% had poor results in VAS score at the end of 6 months of follow up underwent laminectomy. **Conclusion:** Caudal epidural steroid injections proved to be the treatment of choice for chronic low back pain when compared to other modalities. Majority were satisfied with the relief in pain and return to functional capacity and restore day-to-day activity by avoiding surgery. Thus, this study demonstrates that with the execution of good conservative techniques, including proper needle position, proper insertion of steroid and local analgesics cocktail, and proper patient selection, a satisfactory pain relief and functional outcome can be obtained for majority of the patients.

INTRODUCTION

Low back pain (LBP) is the most persistent pain and experienced in almost 60%–80% of the population at some point in their lifetime.^[1] Andersson estimated the annual worldwide of LBP incidence in adults is 15% and the point prevalence is 30%. Moreover, some studies have demonstrated that LBP is one of the most common cause of visits to a physician and with no sex discrimination with mild, moderate or severe disability.^[2-4] Lower back Pain may be transmitted by either of the route i.e., intervertebral discs, facet joints, ligaments, fascia, muscles, sacroiliac joint, and nerve root dura, and the tissues capable of transmitting pain in the lower back.^[5,6]

With the increasing prevalence of chronic persistent low back pain, numerous treatments modalities have been exploding. Among the commonly utilized modalities, epidural injections are the most accessible one done through multiple routes including caudal, transforaminal, and interlaminar.^[7-10] While, there has been a significant difference described between these 3 approaches. With the caudal approach, multiple advantages include being target specific for a lower level, that it can be safely performed in cases of post-surgery syndrome with hardware.^[11] Therefore, this study aimed to determine the effectiveness of the caudal epidural steroid injection in the patients of the chronic low back pain.

MATERIALS AND METHODS

This Prospective study was conducted at the Department of Orthopaedics and Regional Spine Injury Centre N.S.C.B. Medical College & Hospital, Jabalpur (M.P.) from 1st Jan 2021 to 31st June 2022 after taking the Ethical committee approval for this study. All patients were informed about the study and written consent taken.

Sample size: 55 patients been admitted at N.S.C.B. Medical College & Hospital, Jabalpur (M.P.)

Inclusion Criteria

- Degenerative lumbar disease
- Lumbar disc prolapse
- Spinal stenosis

Exclusion Criteria

- Tumours
- Cauda equina syndrome
- Infections.
- Autoimmune disease
- Compression fractures
- Sacroiliac joint dysfunction

Equipment

- 21-gauge, 3.5 cm green colour needle
- fenestrated or chuck-drapes, image intensifier
- radio opaque dye such as Iohexol (2ml)
- local anaesthetic, e.g., 2% lignocaine (4ml)
- Triamcinolone 2ml (40mg/ml)
- long-acting local anaesthetic, e.g., 0.5% bupivacaine (3ml)
- Distilled water (21ml)

Method

Fluoroscopy-Guided Caudal Pain Block,^[13]

Because of the inaccuracy of blind technique, some authors have recommended that caudal epidural injection is performed under fluoroscopic guidance. The patient is usually placed in prone position for fluoroscopy-guided Caudal Pain Block.

In lateral view of fluoroscopy, the sacral hiatus could be identified as an abrupt drop off at the end of S4 lamina. The block needle trajectory can be visualized and navigated accordingly into the sacral canal. By injecting contrast medium under fluoroscopy, the placement of needle tip within the sacral epidural space can be verified, and intravascular or intrathecal needle tip placement can be detected. During caudal epidural injection, intravascular injection was reported in 3–14% of cases by conventional fluoroscopy even after negative aspiration. Fluoroscopy guidance has markedly improved the successful rate of caudal epidural block and is now considered as the gold standard in performing caudal block. However, routine use of fluoroscopy for caudal epidural block is limited by radiation exposure, cost, and special space requirement.

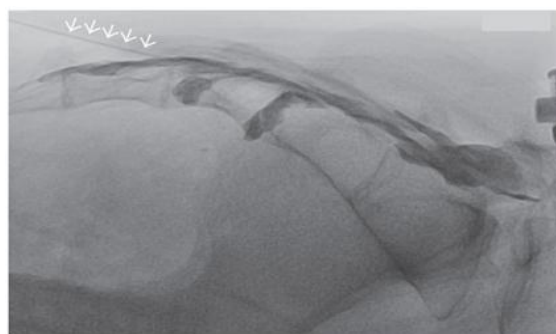


Figure 1: Fluoroscopy-guided Caudal Pain Block. Proper needle tip placement was verified by observing spread of contrast medium within the epidural space without intravascular uptake. Arrows: needle.

VAS score Activity

The visual analogue scale is a linear line, the left end of the line indicates no pain and the end of the right, indicates worst pain. There are 4 categories. A. None (0) - no pain B. Mild (1-3) - occasional pain at work. C. Moderate (4-6) – continue pain during work. D. Severe (7-10) – severe pain causes discontinuation of the work but resumed after rest. The patient was advised to put the finger on the line where the pain is in relation to the two extremities of the scale. For those who can't understand the pain scale, pain assessment was done by asking the part of one rupee

Roland–Morris Disability Questionnaire Score.

RMDQS is a clinical rating scale, that contains subjective clinical variables. The score on the RMDQS scoring scale ranges from 0 to 24, with a higher score indicating more impairment. No radiological factors were included in this score.

Technique

The sacral hiatus is palpated (bordered by the sacral cornua), and the needle advanced at approximately 45 degrees in the midline. Screening should be performed initially in AP projection to ensure midline placement and then in lateral projection for visualizing the needle ascending the sacral canal.^[6] Lateral screening can be used to plan both skin entry and degree of needle angulation.

The tip of the needle should be advanced no further than S3 to avoid the risk of Dural puncture. A pop can sometimes be felt as the needle passes through the sacrococcygeal ligament and into the hiatus.^[7]

Once reached, 1-2 mL of contrast in injected, confirming extradural and extravascular location, and acting as a visual marker for the ascent of steroid / local anaesthetic. The cocktail of therapeutic mixture is then injected consisting of 3 injections which are sequentially injected.^[8]

1st injection containing 3ml 0.5% bupivacaine + 4ml 2% lignocaine + 3ml distilled water

2nd injection containing 2ml triamcinolone + 8ml distilled water

3rd injection containing 10ml distilled water



Figure 2: 1-2 mL of contrast is injected, confirming extradural and extravascular location, and acting as a visual marker for the ascent of steroid / local anaesthetic



Figure 4: 1st injection containing 3ml 0.5% bupivacaine + 4ml 2% lignocaine + 3ml distilled water. 2nd injection containing 2ml triamcinolone + 8ml distilled water. 3rd injection containing 10ml distilled water.

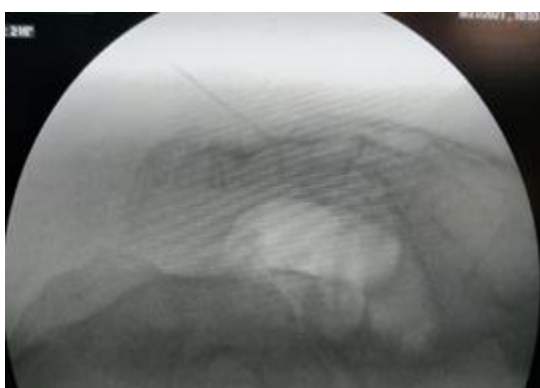


Figure 3: Cocktail of therapeutic mixture is then injected consisting of 3 injections which are sequentially injected.

Statistical Analysis

After the collection of data, SPSS version 23.0 was used for statistical analysis. Chi-square test was done for the demographic variable. Independent student t-test was done for the variables to be compared. P-value was calculated for all variables at 95% confidence interval and showed as <.001 for significant.

RESULTS

Table 1 concluded that the chronic low Back pain are often seen in the males (64%) comparatively to females (36%). It has also been observed that out of total 55 cases aged between 32-74 years (mean \pm SD age of 51.07 ± 7.95) who had history of chronic low back pain.

[Figure 1] presents, chronic low Back pain is more indicative of degenerative lumbar disease (40.0%) as compared to canal stenosis (29.1%) and lumbar disc prolapse (30.9%).

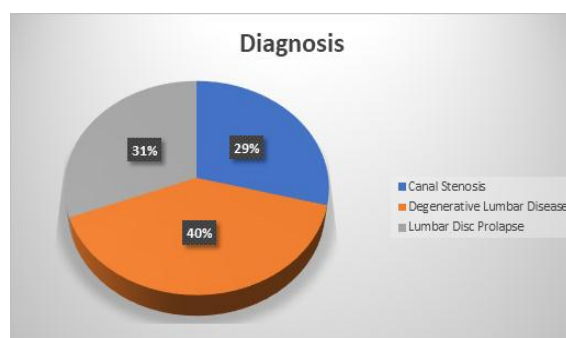


Figure 5: Distribution of study participants according to the indications of pain

Table 1: Distribution of study participants according to sex (n=55)

Sex	N	%
Male	35	63.6
Female	20	36.4
Total	55	100.0

Table 2: Assessment of VAS Score

VAS Score (in Months)	Mean ± SD	t value	p value
0	8.41 ± 0.62	17.07	0.001
1	5.38 ± 1.11		
0	8.41 ± 0.62	26.68	0.001
2	3.80 ± 0.99		
0	8.41 ± 0.62	38.16	0.001
3	2.43 ± 0.90		
0	8.41 ± 0.62	20.90	0.001
6	4.80 ± 1.14		
1	5.38 ± 1.11	14.10	0.001
2	3.80 ± 0.99		
1	5.38 ± 1.11	21.29	0.001
3	2.43 ± 0.90		
1	5.38 ± 1.11	2.74	0.001
6	4.80 ± 1.14		
2	3.80 ± 0.99	18.17	0.001
3	2.43 ± 0.90		
2	3.80 ± 0.99	5.24	0.001
6	4.80 ± 1.14		
3	2.43 ± 0.90	13.52	0.001
6	4.80 ± 1.14		

Above table stated that, over the six months for each patient, assessing the data and correlation of VAS Score from pre op baseline with post op data at 1,2,3 and 6 months, was found to be significant, where p-value: 0.001, with decreasing trend in pain perception. Similarly, correlation done with VAS Score at 1 month with VAS Score at 2,3 and 6 month and the result found at 2 months with 3 and 6 months, was found to be significant; p-value: 0.001. Hence, throughout the study, correlation of VAS Score in different months with each other was statistically significant.

Table 3: Assessment of the Roland–Morris disability questionnaire score

The Roland–Morris Disability Questionnaire Score (in Months)	Mean	t value	p value
0	19.81 ± 1.24	18.08	0.001
1	15.60 ± 0.95		
0	19.81 ± 1.24	23.09	0.001
2	13.73 ± 1.57		
0	19.81 ± 1.24	42.45	0.001
3	10.83 ± 1.18		
0	19.81 ± 1.24	20.73	0.001
6	14.50 ± 1.45		
1	15.60 ± 0.95	7.14	0.001
2	13.73 ± 1.57		
1	15.60 ± 0.95	21.34	0.001
3	10.83 ± 1.18		
1	15.60 ± 0.95	3.10	0.001
6	14.50 ± 1.45		
2	13.73 ± 1.57	18.15	0.001
3	10.83 ± 1.18		
2	13.73 ± 1.57	2.08	0.001
6	15.05 ± 4.62		
3	10.83 ± 1.18	18.73	0.001
6	14.50 ± 1.45		

[Table 3] indicated that, over the six months, each patient on assessing the data and correlation of RMDQS from pre op baseline with post op data at 1,2,3 and 6 months, was found to be significant (p-value: 0.001), with decreasing trend in pain perception. Similarly, correlation was done with RMDQS at 1 month with RMDQS at 2,3 and 6 month and the result at 2 months with 3 and 6 months, was found to be significant (p-value: 0.001). Hence, throughout the study, correlation of RMDQS in different months with each other was found to be statistically significant.

Table 4: Assessment of Caudal Epidural Steroid Vs Surgical Management

Variables	N	%
Patients Relieved with Caudal Epidural Steroid Injection	51	92.72%
Patients Who Went for Surgical Management	4	7.28%

Out of total 55 patients, majority (92.72%) were symptomatically better and had good functional

outcome after 6 months of follow up underwent Caudal epidural steroid injection, while, only 7.28%

had poor results in vas score at the end of 6 months of follow up went for the surgical management (laminectomy).

DISCUSSION

A better understanding of lower back and spine anatomy and functioning through the studies conducted in the recent years, as well as the increasing expectations of patients have expanded the borders of conservative as well as surgical treatment. The present study was undertaken to assess the functional outcome of conservative management of chronic low back pain with caudal epidural block. We evaluated our results and compared them with those obtained by various other studies utilizing different modalities of treatment.

In our study the age group ranged from 30 years to 75 years with mean age of 51.07 ± 7.95 . In our study, chronic low back pain was more common in age group of 45 to 55 years old. Willian e. ackerman et al in united states the mean age was 36 years with a standard deviation of ± 6.8 years in conventional group their study compared efficacy of lumbar epidural steroid injection in patients with lumbar disc herniation for chronic back pain.^[12] In another study by senkal s. et al the mean age group for caudal epidural steroid injection was 63.34 years only and this reflects the increased life expectancy in turkey when compared to the western societies, this implies the existence of younger age population in our country when compared to the above two studies it can be derived that these increased age groups reflect the country position in demographic cycles.^[13] Another study by Sergio Mendoza-lattes et al which compared effectiveness of caudal vs transforaminal epidural steroid injection reported mean age of 38.8 years in caudal group and 39.0 years in transforaminal group.^[14] Another study by laxmaiahmanchikanti et al which compared management of pain of post lumbar surgery syndrome managed with fluoroscopic guided caudal epidural injection reported mean age of 52.4 years in group 1 and 48.0 years in group 2.^[15]

Present study had a male preponderance with 35 male patients and 20 female patients. This can be attributed to the working group of population in which males are predominant working group. Willian e. ackerman et al, also reported male preponderance in caudal, interlaminar and transforaminal groups akin to which can be explained due to the higher incidence of chronic low back pain in males as the age increases. Similar results have been reported by Senkal s. et al with male preponderance in their study.^[12,13]

In current study, 55 patients with chronic low back pain with maximum VAS Score of 9 and minimum VAS Score of 7 (mean \pm SD VAS 8.41 ± 0.62) at baseline which decreased at 6-month follow-up to maximum VAS Score of 7 and minimum VAS Score of 2 (mean \pm SD VAS 4.80 ± 1.14). The VAS

Score was minimum 1 and maximum 4 at 3-month follow-up (mean \pm SD VAS 2.43 ± 0.90). In the study conducted by Chou R et al the VAS Score showed difference at 1 month and no difference at 3-month follow-up in steroid injection vs paracetamol and local analgesics method of treatment. In study conducted by Cohen et al no significant difference was found in between the two groups on gabapentin and steroid injection at 3-month of follow-up.^[16,17] In study conducted by Dincer et al both groups showed improvement on caudal steroid injection and NSAIDS at 3-month follow-up, while, a study conducted by Vad et al injection group showed significant improvement at 1 and 4 years of follow-up as compared to the group that were given no treatment at all. In study conducted by Buchner et al no difference was noted between the 2 group, one group with epidural steroid injection and another group with rest, analgesia, electroanalgesia, postural exercise, spinal mobilization physiotherapy combined, however in our study conducted all patients were given caudal epidural steroid injection and followed up for 6 months and compared with their baseline VAS Score, and the results were found to be significant.^[18-20]

Following study presented with maximum RMDQ Score of 22 and minimum RMDQ Score of 18 (mean \pm SD RMDQ 19.81 ± 1.24) at baseline which decreased at 6-month follow-up to maximum RMDQ Score of 18 and minimum RMDQ Score of 12 (mean \pm SD RMDQ 14.50 ± 1.45). The VAS Score was minimum 9 and maximum 13 at 3-month follow-up (mean \pm SD RMDQ 11.83 ± 1.18). In the study conducted by Chou R et al the RMDQ Score showed difference at 1 month and no difference at 3-month follow-up in steroid injection vs paracetamol and local analgesics method of treatment. In study conducted by Vad et al injection group showed significant improvement at 1 and 4 years of follow-up as compared to the group that were given no treatment at all, however in our study conducted all patients were given caudal epidural steroid injection and followed up for 6 months and compared with their baseline RMDQ Score, and the results were found to be statistically significant.^[16,19]

CONCLUSION

Caudal epidural steroid injections proven to be the treatment of choice for chronic low back pain when compared to other modalities. They were found to be equivalent, and allowed patients to avoid surgery in approximately 93% of the cases. Regardless of the efficacy of caudal block, 7% of the patients required surgical management for their chronic low back pain, however, rest all the patients belongs to majority group were satisfied with the relief in pain and return to functional capacity and restore day-to-day activity. Thus, this study demonstrates that with the execution of good conservative techniques,

including proper needle position, proper insertion of steroid and local analgesics cocktail, and proper patient selection, a satisfactory pain relief and functional outcome can be obtained for majority of the patients.

Recommendations

Easy access to epidural space through caudal approach is biologically comparable to other methods of epidural steroid injection can maintain pain relief thus reducing disability and increases daily activity. The technique emphasis that it has an excellent functional outcome with minimal complications thus proving that it is one of the best modalities of treatment to avoid spine surgery in patients with chronic low back pain. Moreover, intensive research is an utmost requirement for the technique specifically in geriatric population to avoid the surgical procedure and to maintain life longevity.

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