



EFFECTIVENESS OF CAUDAL EPIDURAL STEROIDS IN DIFFERENT LUMBAR SPINE PATHOLOGIES

Orthopaedics

Dr. Vishal Bansal	Associate Professor, Department of Orthopaedics, People's College of Medical Sciences and Research Centre, Bhopal (462037)
Dr. Dhruv Lashkare*	Senior Resident, Department of Orthopaedics, People's College of Medical Sciences and Research Centre, Bhopal (462037) *Corresponding Author
Dr. PV Siddhartha	Assistant Professor, Department of Orthopaedics, Chirayu Medical College and Hospital
Dr. Shubham Jain	PG 2nd Year, Department of Orthopaedics, People's College of Medical Sciences and Research Centre, Bhopal (462037)

ABSTRACT

Background- Epidural steroids are being used for the management of PIVD and central lumbar canal stenosis through different routes. Most common routes to administer epidural steroids for such patients include interlaminar, caudal and transforaminal. Controversy persists regarding the efficacy of epidural steroids in reducing the pain associated with various lumbar spine pathologies as well as controversy exist regarding the preferred route of injection.

Aim- The present study was done to assess the effectiveness of caudal epidural steroid injection in patients with various lumbar spine pathologies.

Methodology- This was a retrospective study on patients diagnosed as lumbar canal stenosis and PIVD and who received caudal epidural steroid injections in the last 6 months. Data regarding presenting complaints before epidural caudal steroid injection and improvement following the injection was obtained from all the patients. Back pain and leg pain were assessed separately using Visual Analogue Scale (VAS) and functional disability was measured using Oswestry Disability Index (ODI) before the procedure (assessed from records) and at the time of enrollment in the study. Statistical analysis- Data compilation was done with the help of MS Excel and data analysis was done using IBM SPSS 20 software.

Results- The present study included a total of 60 patients i.e. 30 patients diagnosed with lumbar canal stenosis (central and lateral) and 30 patients with PIVD (including multiple level PIVD). The mean VAS score and ODI significantly improved in cases of PIVD and lumbar canal stenosis but they were more effective in treatment of central lumbar canal stenosis and multiple level PIVD ($p < 0.01$) as compared to other groups.

Conclusion- Caudal epidural steroid injections are effective, easy and safe method which can be conducted as a day care procedure. They may reduce the need of subsequent surgeries. Caudal steroid injections were more effective in treatment of central lumbar canal stenosis as well as multiple level PIVD.

KEYWORDS

PIVD, central lumbar canal stenosis, caudal epidural injections, ODI, VAS

INTRODUCTION

Low back pain is one of the commonest complaints amongst patients attending orthopedic clinic.^[1] It has been estimated that approximately 80% of the population sustains an episode of low back pain (LBP) at least once during their lifetime with varying severity.^[2] As the lumbosacral region is a critical area of spinal column which is subjected to greater forces as compared to other areas of the body, the prevalence of low back pain are high.^[1] Also, low back pain is associated with sciatica in majority of cases. The etiology of low back pain includes lumbar disc herniation (prolapsed intervertebral disc), degenerative disc disease, lumbar canal stenosis, idiopathic etc.^[3]

Prolapsed intervertebral disc (PIVD) is commonly diagnosed in MRI scans even in asymptomatic adults.^[4] In PIVD, posterior longitudinal ligament gives way resulting in herniation of disc material into the spinal canal. It is characterized by acute-onset radicular or myelopathy-related symptoms on sudden exertion or lifting heavyweights.^[5]

Another common cause of low back pain includes lumbar canal stenosis and is often due to multifactorial etiology. The factors contributing to lumbar canal stenosis include degenerative changes in the spine such as spondylosis, disc degeneration, facet arthropathy, and scoliosis etc. It is characterized by low back pain alone or with lower extremity pain, weakness or sensory changes aggravated by walking.^[6] Despite the high prevalence of pain associated with lumbar canal stenosis and PIVD, the treatment remains controversial. Common treatments include conservative measures such as non-steroidal anti-inflammatory drugs (NSAIDs), activity modification, and physical therapy, whereas in a few cases, surgery is advised.^[7] Epidural steroids are being used for management of PIVD and lumbar canal stenosis through different routes. Most common routes to administer epidural steroids for such patients include interlaminar, caudal and transforaminal.^[8] Controversy persists regarding the efficacy of epidural steroids in reducing the pain associated with PIVD and lumbar canal stenosis as well as controversy exist regarding the preferred route of injection.^[9,10] The present study was conducted to

assess the effectiveness of caudal epidural steroid injection in patients with lumbar canal stenosis and PIVD.

Methodology

This study was conducted as a retrospective study on patients diagnosed with lumbar canal stenosis and PIVD and who received caudal epidural steroid injections in the last 6 months i.e. between 1st July 2019 and 31st December 2019. Inclusion criteria was all the patients belonging to age group of 18 to 60 years diagnosed as PIVD (including any level or multiple level) and lumbar canal stenosis (central and lateral) coming for follow up who were managed using caudal epidural steroid injections during the last 6 months in the Department of Orthopedics, People's College of Medical Sciences and Research Centre and People's Hospital, Bhopal. The exclusion criteria was patients treated with caudal epidural steroid injections for spondylolisthesis (as revealed by MRI). All the 60 patients i.e. 30 with PIVD and 30 with lumbar canal stenosis were selected using purposive sampling. The records of all the selected patients were also obtained from the MRD Department of our institute to supplement the information obtained from the patients. Data regarding sociodemographic variables such as age, gender, socioeconomic status was obtained from all the patients. Also, presenting complaints before the caudal epidural steroid injection and improvement following the injection was obtained from all the patients and entered in a questionnaire. Back pain and leg pain were quantitatively assessed separately using the Visual Analogue Scale (VAS) and the functional disability was measured using Oswestry Disability Index (ODI) version 2.0, before the procedure (from records) and at the time of inclusion in the study.

Statistical analysis-

Data compilation was done with the help of MS Excel and data analysis was done using IBM SPSS 20 software. Grouped data was expressed as frequency and percentage whereas numerical data was expressed as mean \pm SD. Paired t test was applied to assess the improvement in VAS and ODI amongst the patients. P value < 0.05 was considered statistically significant.

RESULTS

The present study included a total of 60 patients i.e. 30 patients diagnosed with lumbar canal stenosis and 30 patients with PIVD.

Table 1- Distribution according to sociodemographic variables

Sociodemographic variables	Total (n=60)	Lumbar canal stenosis	Prolapse intervertebral disc
Mean age (years)	45.1±9.6	46.9±7.8	43.2±11.3
Range (years)	18-60	31-60	18-54
Gender (M/F)	26/34	12/18	14/16
Weight	65.1±7.4	66.8±6.6	63.3±8.1
Height	158.6±43.7	157.3±44.2	159.8±43.1

The mean age of all the patients in present study was 45.1±9.6 years whereas that in patients of lumbar canal stenosis and PIVD was 46.9±7.8 years and 43.2±11.3 years respectively. Majority of patients in present study were females. (Table 1)

Table 2- Assessment of pain and functional disability in cases with Lumbar Canal stenosis

		Central Lumbar canal stenosis (n=17)	Lateral Lumbar canal stenosis (n=13)	P value
Visual Analogue Scale	Pre-intervention	7.89±0.36	7.65±0.8	0.14
	At enrollment	3.84±0.69	4.52±0.72	0.004
	P value	0.001	0.001	
Oswestry Disability Index (%)	Pre-intervention	61.1±2.8	59.8±7.7	0.43
	At enrollment	39.6±5.1	42.7±5.3	0.03
	P value	0.001	0.001	

Out of the 30 patients with lumbar canal stenosis, 17 patients were diagnosed as central lumbar canal stenosis whereas 13 patients had lateral lumbar canal stenosis. The mean VAS scores as well as functional disability amongst the participants with central and lateral lumbar canal stenosis before intervention was comparable in both the groups of lumbar canal stenosis. Though mean VAS scores as well as functional disability (ODI %) significantly improved in both the groups following intervention, the improvement was significantly higher in patients with central lumbar canal stenosis as compared to those of lateral lumbar canal stenosis ($p<0.01$). (Table 2)

Table 3- Assessment of pain and functional disability in cases with PIVD

		Single level PIVD (n=18)	Multiple level PIVD (n=12)	P value
Visual Analogue Scale	Pre-intervention	7.58±0.77	7.80±0.76	0.1
	At enrollment	4.11±0.53	3.96±0.71	0.001
	P value	0.001	0.001	
Oswestry Disability Index (%)	Pre-intervention	60.4±8.3	61.4±5.8	0.28
	At enrollment	43.3±5.1	40.1±3.4	0.01
	P value	0.001	0.001	

Out of 30 patients with PIVD, 18 patients were diagnosed as single level PIVD whereas 12 patients were diagnosed as multiple level PIVD. The mean VAS score as well as functional disability amongst participants with single level PIVD and multiple level PIVD before intervention was comparable in both the groups of lumbar canal stenosis. Though mean VAS scores as well as functional disability (ODI %) significantly improved in both the groups following intervention, the improvement was significantly higher in patients with multiple level PIVD as compared to those of single level PIVD ($p<0.01$).

DISCUSSION-

The utilization of epidural steroid injections for pain relief is practiced since 1952. They can be used as an invaluable non-surgical treatment for low-back pain radiating to the lower extremities.^[11] Epidural steroid injections can be used by various approaches such as caudal, interlaminar or transforaminal.^[3] All three routes are associated with certain advantages and complexities. The caudal route utilizes larger volumes of drug and is given away from the pathology site, but it is the easiest and safest route with minimal risk of dural puncture.^[12,13] In the present study, caudal approach for administration of epidural steroid injections was used.

Though caudal epidural steroid injections are effective in the treatment of low back pain, the purported mechanisms of action remains

unknown.^[14] The steroids by their anti-inflammatory as well as immunosuppressant action along with membrane stabilization and inhibition of neural peptide synthesis help in reducing pain and improve outcome amongst patients with PIVD and lumbar canal stenosis.^[15]

Ackerman et al in their study assessed the efficacy of lumbar epidural steroid injections amongst patients with lumbar disc herniations. They documented that pain score and functional score improve after 2 weeks of injections.^[15] Singh et al in their study assessed the role of caudal epidural steroid injections in lumbar disc prolapse and documented significant pain relief in all the patients except one after 24 hours. However, symptomatic improvement was observed in 97.5% of the cases after 3 weeks whereas after 6 months, symptomatic improvement was seen in 67.5% of the cases.^[16] These findings supported the findings of the present study i.e. significant improvement in pain as well as functional disability was observed in patients of PIVD following caudal epidural steroid injections.

Manchikanti et al also documented caudal epidural injections of local anesthetic with or without steroids to provide significant relief in patients with chronic function-limiting low back and lower extremity pain secondary to spinal canal stenosis.^[17] Park et al conducted a study to assess the relationship between the severity of lumbar spinal stenosis using a grading system (grade 1 = mild stenosis with separation of all cauda equina; grade 2 = moderate stenosis with some cauda equina aggregated; grade 3 = severe stenosis with none of the cauda equina separated) and evaluated the response of patients with the help of short-term epidural steroid injections. They observed improvement (including reports of slightly improved, much improved, and no pain) in 78.7% patients at 2 weeks and 77.6% at 8 weeks after the procedure. However, they observed no association of degree of pain relief with grading of lumbar canal stenosis.^[18] Statistically significant improvement in pain and functional disability was observed in cases of central lumbar canal stenosis following caudal epidural steroid injections in our study.

Literature suggests a varying success rate of epidural steroid injections. However, for a short term, maximum studies report a good success rate.^[16] Choi et al in their study assessed the long-term benefits of epidural steroids in cases of LBP and studied its effect on pain, disability and need for subsequent surgery. The authors documented that ESI are effective for less than six months only.^[19] In contrast, Sreen et al observed benefits of pain relief for 9 to 12 months after caudal ESI in patients with chronic back pain.^[3] However, in the present study, we included the patients retrospectively i.e. those treated at least 4 weeks prior and no follow up was done and significant improvement was noticed for both pain as well as ODI in cases with multiple level PIVD and central lumbar canal stenosis.

Singh et al compared the efficacy of caudal epidural steroid injections with selective nerve block and documented >50% pain reduction till 6 months in selective nerve block group, while in the caudal group, >50% reduction of pain was maintained till 1 year. Similarly, the reduction in ODI in nerve block group was 52.8% till 3 months, 48.6% till 6 months, and 46.7% at 1 year, while in the caudal group, the improvement was 59.6%, 64.6%, 65.1%, and 65.4% at corresponding follow-up periods, respectively.^[20] Similar results were documented by the present study in which mean VAS score as well as Mean ODI percentage improved significantly in cases with central lumbar canal stenosis and multiple level PIVD.

CONCLUSION

Caudal epidural steroid injections are effective, easy and a safe method which can be conducted as a day care procedure. They may reduce the need of subsequent surgeries. Caudal steroid injections were more effective in treatment of central lumbar canal stenosis as well as multiple level PIVD.

REFERENCES

1. Freynhagen R, Baron R, Gockel U, Tölle TR. Pain DETECT: a new screening questionnaire to identify neuropathic components in patients with back pain. Current medical research and opinion. 2006 Oct 1;22(10):1911-20.
2. Anderson GB. Epidemiology features of chronic low-back pain. Lancet. 1999;354:481-5. [https://doi.org/10.1016/S0140-6736\(99\)01312-4](https://doi.org/10.1016/S0140-6736(99)01312-4)
3. Sreen S, Sahni G, Arora S, Kumar A, D. Role of caudal epidural steroid injections in the management of chronic low backache. Indian J Orthop Surg 2019;5(4):247-51.
4. Boden SD. Current concepts review-The use of radiographic imaging studies in the evaluation of patients who have degenerative disorders of the lumbar spine. JBJS. 1996 Jan 1;78(1):114-24.
5. Goel A. Prolapsed, herniated, or extruded intervertebral disc-treatment by only

- stabilization. *Journal of craniovertebral junction & spine*. 2018 Jul;9(3):133.
6. Friedly JL, Bresnahan BW, Comstock B, Turner JA, Deyo RA, Sullivan SD, Heagerty P, Bauer Z, Nedeljkovic SS, Avins AL, Nerenz D. Study Protocol-Lumbar Epidural Steroid Injections for Spinal Stenosis (LESS): a double-blind randomized controlled trial of epidural steroid injections for lumbar spinal stenosis among older adults. *BMC musculoskeletal disorders*. 2012 Dec 1;13(1):48.
 7. Harrast MA. Epidural steroid injections for lumbar spinal stenosis. *Current reviews in musculoskeletal medicine*. 2008 Mar 1;1(1):32-8.
 8. Pandey RA. Efficacy of epidural steroid injection in management of lumbar prolapsed intervertebral disc: A comparison of caudal, transforaminal and interlaminar routes. *Journal of clinical and diagnostic research: JCDR*. 2016 Jul;10(7):RC05.
 9. Wilson-MacDonald J, Burt G, Griffin D, Glynn C. Epidural steroid injection for nerve root compression: a randomised, controlled trial. *The Journal of bone and joint surgery. British volume*. 2005 Mar;87(3):352-5.
 10. Chang-Chien GC, Knezevic NN, McCormick Z, Chu SK, Trescot AM, Candido KD. Transforaminal versus interlaminar approaches to epidural steroid injections: a systematic review of comparative studies for lumbosacral radicular pain. *Pain Physician*. 2014 Jul;17:E509-24.
 11. Patel K, Upadhyayula S. Epidural Steroid Injections. (2019); Available at <https://www.ncbi.nlm.nih.gov/books/NBK470189/> Last accessed on 24 Feb 2020.
 12. Conn A, Buenaventura RM, Datta S, Abdi S, Diwan S. Systematic review of caudal epidural injections in the management of chronic low back pain. In *Database of Abstracts of Reviews of Effects (DARE): Centre for Reviews and Dissemination (UK)*. *Pain Phys*. 2009;12:109-135. 27.
 13. Manchikanti L, Staats PS, Singh V, Schultz DM, Vilims BD, Jasper JF, Kloth DS, Trescot AM, Hansen HC, Falasca TD, Racz GB. Evidence-based practice guidelines for interventional techniques in the management of chronic spinal pain. *Pain Physician*. 2003 Jan;6(1):3-81.
 14. Boscainos PJ, Sapkas G, Stilianessi E, Prouskas K, Papadakis SA. Greek versions of the Oswestry and Roland-Morris disability questionnaires. *Clinical Orthopaedics and Related Research*. 2003 Jun 1;411:40-53.
 15. Ackerman WE, Ahmad M. The efficacy of lumbar epidural steroid injections in patients with lumbar disc herniations. *Anesthesia & Analgesia*. 2007 May 1;104(5):1217-22.
 16. Singh H, Kaur M, Nagpal S, Gupta S. Role of caudal epidural steroid injections in lumbar disc prolapse. *Journal of the Indian Medical Association*. 2010 May;108(5):287-8.
 17. Manchikanti L. Results of 2-year follow-up of a randomized, double-blind, controlled trial of fluoroscopic caudal epidural injections in central spinal stenosis. *Pain Physician*. 2012 Sep;15:371-84.
 18. Chan-Hong Park, MD, PhD, Sang-Ho Lee, MD, PhD, Correlation Between Severity of Lumbar Spinal Stenosis and Lumbar Epidural Steroid Injection, *Pain Medicine*, Volume 15, Issue 4, April 2014, Pages 556-561, <https://doi.org/10.1111/pme.12348>
 19. Choi HJ, Hahn S, Kim CH, Jang BH, Park S, Lee SM, Park JY, Chung CK, Park BJ. Epidural steroid injection therapy for low back pain: a meta-analysis. *International journal of technology assessment in health care*. 2013 Jul;29(3):244-53.
 20. Singh S, Kumar S, Chahal G, Verma R. Selective nerve root blocks vs. caudal epidural injection for single level prolapsed lumbar intervertebral disc-A prospective randomized study. *Journal of clinical orthopaedics and trauma*. 2017 Apr 1;8(2):142-7.