Original Article

Is Caudal Epidural Steroid Injection Effective In Chronic Low Back Pain Due To Multiple Lumbar Disc Prolapse? A Prospective Study

Bansal V, P V Siddhartha, Rao H, Ray B

Investigation performed at Department of Orthopaedics, Peoples College of Medical Sciences, Bhopal , Madhya Pradesh, India

Abstract

Background: Chronic low back pain has multiple aetiologies, and multiple bulged or prolapsed lumbar intervertebral discs are a frequent finding on MRI. Epidural steroid injections are an established mode of conservative management, working by spreading up and down the epidural space and reducing inflammation. We prospectively investigated the caudal method of epidural steroid injections for such patients with MR proven multiple disc bulges.

Material and Methods: A cohort of 38 patients was enrolled in the study from May 2014 to April 2015. We included patients older than 18 years with history of chronic low back pain with or without neurological claudication, with MRI findings of multiple prolapsed lumbar intervertebral discs not responding to conservative management. Patients were evaluated at baseline, three weeks, three months and six months using Objective Parameters of Straight Leg Raise test (SLRT) and Claudication distance and subjective parameters of pain using Numeric Pain Rating Scale (NPRS) and Disability using Oswestry Disability Index (ODI).

Results: The 38 patients (27 male and 11 females) had a mean age of 48.34 years, and their mean duration of back pain was 18.2 months. Mean NPRS and ODI improved from 7.21 and 41.8 at baseline to 4.6 and 26.8 respectively at 6 m. Similarly Mean SLRT and Claudication distance improved from 40.8 degrees and 350 m at baseline to 62.9 degrees and 500 m at 6 months. Change in NPRS, ODI and SLRT were statistically significant.

Conclusion: Caudal epidural injections are an effective modality of treatment in managing chronic low back pain due to multiple lumbar disc bulges. They provide significant pain relief, improvement in functional status and facilitate return to work.

Keywords: Caudal Epidural, Low back pain, Multiple disc bulges, Lumbar prolapse.

Address for Correspondence: Dr Vishal Bansal, Assistant Professor, People's medical college and research center, Bhopal, MP, India.

Email: drbigb@rediffmail.com

How to site this article: Bansal V, P V Siddhartha, Rao H, Ray B. Is Caudal Epidural Steroid Injection Effective In Chronic Low Back Pain Due To Multiple Lumbar Disc Prolapse? A Prospective Study OrthopJMPC 2017;23(1):19-25.

Introduction

The importance of Low Back Pain (LBP) is due to its high lifetime prevalence (80%) in the community and its effect on the individual in terms of pain and disability. Thirteen per cent of population suffers with persistent back pain of high intensity, with either

moderate or severe disability [1].

Intervertebral disc is the largest avascular tissue in the body [2], and consists of inner nucleus pulposus, outer annulus fibrosus and cartilage located superiorly and inferiorly. Intervertebral disc resists compression because of the osmotic properties of the proteoglycans. The ability of the disc to resist anterior and lateral shears along with compression and flexion makes the intervertebral disc the most important load bearing component of the spine, beside the facets [3]. Signs of degeneration includes one or all of the following: diminished disc height, narrowing of facet, osteophytes and sclerosis of upper and lower endplates, stenosis of spinal canal, narrowing of lateral recess, real or apparent desiccation, fibrosis, diffuse bulging of the annulus beyond the disc space, extensive fissuring (i.e., numerous annular tears), mucinous degeneration of the annulus, defects and sclerosis of the endplates, and osteophytes at the vertebral apophyses [4].

The most common symptom associated with lumbar disc degeneration is low back pain due to the presence of neural tissue around the intervertebral disc. The main symptom of disc degeneration after low back pain is sciatica. Features suggestive of sciatica are unilateral or bilateral leg pain radiating to the feet and toes, numbness in dermatomes distribution and positive straight leg raising test.

Neurogenic claudication (NC) is described as the classic clinical presentation of lumbar spinal stenosis (LSS), a degenerative condition of the lumbar spine normally affecting adults over the age of fifty [5], [6]. Symptoms of NC are described as pain, paraesthesia or cramping of one or both legs, brought on when walking and relieved in sitting [7]. The effect of posture on symptoms is the primary distinguishing feature of NC- symptoms are typically exacerbated when the spine is extended (in upright stance when standing or walking) and eased when the spine is flexed (stooping forwards or sitting). Clinical symptoms are believed to result from stenotic changes (narrowing) exacerbated by posture-related compression causing neural and microvascular compromise of the cauda equina and lumbosacral nerve roots [8],[9].

Epidural steroid injections are not only the most commonly used procedures in interventional pain management, but also the most contentious and misunderstood modality of treatment [10], [11]. Approaches available to access the epidural space in the lumbosacral spine include the interlaminar, transforaminal and caudal. Numerous publications have appeared in support and some in opposition of epidural injections in managing low back pain or lower extremity pain. Systematic reviews of the effectiveness of epidural steroid injections have also appeared, with conflicting opinions [12]. Perceived advantages and disadvantages of each of the three approaches also have been described [13]. More opinions have been expressed in favour of caudal epidural steroid injections, even though interlaminar lumbar epidural steroid injections have been studied more extensively [12].

The rationale behind injecting glucocorticoid into the epidural space is that it combats the inflammatory response associated with disc herniation and reduces pain. Reports of the effectiveness of epidural corticosteroids have varied from 18% to 90% [14].

The present study was planned to examine the effectiveness of caudal epidural steroid injection (CESI) in patients with back pain due to multiple disc herniation with or without symptoms of neurological claudication, which was non-responsive to

other conservative modes of treatment. Literature regarding the efficacy of such a modality is lacking especially in the Indian context.

Materials and Methods

A prospective study was conducted in the Department of Orthopaedics, People's College of Medical Sciences with the aim of assessing the efficacy of CESI in cases of multiple prolapsed intervertebral discs (PIVD), with or without neurological claudication not responding to conservative management. During Study period (May 2014 to April 2015) Fifty-one such patients were encountered; forty-five patients gave consent for the procedure and were enrolled for the study.

Inclusion criteria: Patients older than 18 years with history of chronic low back pain with or without neurological claudication, with MRI findings of multiple prolapsed lumbar intervertebral discs not responding to conservative management.

Exclusion criteria: Patients not giving consent for the study, with history of previous spine surgery, having spinal structural abnormalities, uncontrolled medical illness or psychiatric disorders precluding assessment were excluded from the study.

All the patients were explained about the procedure. Informed written consent was taken from all patients. Examination of spine and neurological examination was done at admission and subsequent follow-ups. X-ray of lumbosacral (LS) spine and magnetic resonance imaging (MRI) of LS spine, complete hemogram and biochemistry was performed.

Intervention: The patient was made to lie in prone position. A 20-gauge needle was passed through the sacral hiatus and needle placement was confirmed by "whoosh" test [15]. The epidural space was injected with 80 mg (2 ml) of Triamcinolone,1 ml Hyaluronidase and 2 ml of 2% Plain Lignocaine diluted in 15 ml normal saline. Following the injection, the patient remained on bed rest for a day in the hospital with regular monitoring of pulse and blood pressure.

Patients were evaluated at baseline, three weeks, three months and six months using Objective Parameters of Straight Leg Raise test (SLRT) and Claudication distance and subjective parameters of pain using Numeric Pain Rating Scale (NPRS) and Disability using Oswestry Disability Index (ODI).

Straight Leg Raising test: The SLR test causes gliding of lumbar nerve roots which get compressed by the herniated disc proximal to neural foramina leading to radiation of pain down the leg in nerve root distribution [16]. SLR less than 30 degree was considered positive.

Neurological Claudication distance: While walking on level ground, the distance at which symptoms of claudication became unbearable and necessitated sitting or taking rest.

Numeric Pain Rating Scale: It is an eleven-point numerical pain rating scale in which patients rate their pain ranging from zero (no pain) to ten (worst imaginable pain). A two point change on the NRS in patients with LBP represents a clinically meaningful change[17].

Oswestry Disability Index : The Oswestry Disability Index is the recommended condition specific outcome measure for spinal disorders. It has ten sections namely pain intensity, personal care, lifting, walking, sitting, standing, sleep, social life, travelling and employment. Total scores can range from zero (highest level of function) to 50 (lowest level of function). For each section, the total score ranged zero to five according

to the deterioration of function. The total score is expressed in percentage [18].

Results

Forty-five subjects were enrolled in the study and 7 patients were lost to follow up. 38 patients completed required six-month follow-up period. The age distribution of 38 patients (27 male and 11 females) ranged from 32 to 60 years; average being 48.34 years (Table 1).

Statistical analysis was done by appropriate methods. Results were considered significant at $p<0.05$.

	Age in years			
Gender	30-40	40-50	50-60	Total
Male	4	9	14	27
Female	2	5	4	11

Table 1- Age distribution of patients

Duration of back pain ranged from nine months to 36 months, average being 18.2 months (Table 2)

Duration of back pain	No of patients
9-18 m	14 (36.9%)
18-27 m	16 (42.1%)
27-36 m	8 (21.0%)

Table 2- Duration of symptoms

Mean Straight Leg Raising(SLRT), Numeric Pain Rating Scale(NPRS), Owestry Disability Index score and Distance to claudication at baseline was 40.8 degrees, 7.21, 350 meters, and 41.8respectively (Table 3). There was improvement in all the assessment parameters post CESI. A statistically significant improvement in NRS, Mean SLRT and ODI was observed at three weeks post injection. All three parameters did not show any significant change thereafter, meaning patients remained symptomatic relief till 6 months, which was the duration of the study. Maximal improvement was found at 3-week post injection. Eight (8) patients had neurological claudication with a mean claudication distance of 350 meters at baseline. There was no significant improvement in this parameter post – CESI, with the average claudication distance at 6 months being 500m. Larger numbers might be needed to get a statistically significant result.

Parameter	Baseline	3 weeks post CESI	3 months post CESI	6 months post CESI	ANOVA F Value	Significant P value
Numeric Pain rating Scale (1-10)	7.21+/-0.45	3.1+/-0.29	3.0+/-0.88	4.6+/-0.55	429.638	0.001 (HS)
Mean SLRT (in degrees)	40.8+/-4.46	55.6+/-0.78	57.8+/-1.88	62.9+/-2.55	113.745	0.001 (H)

Oswestry Disability Index (0-50)	41.8+/-5.45	23.5+/-1.29	27.0+/-3.88	26.8+/-6.55	113.745	0.001 (H)
Distance to Claudication (in meters)	350+/-55.8	440+/-23.29	450+/-73.88	500+/-62.5	45.643	0.24

Table 3- The four parameters evaluated at baseline and follow up.

Only five patients reported side-effects after receiving CESI. All 5 (13.1%) reported transient mild headache which improved by day two. Three patients with lumbar canal stenosis and neurological claudication had no relief with CESI and opted for surgery at 6-9 months. All three had symptomatic relief after laminectomy.

Discussion

The effects of caudal epidural steroid injections were first reported by Goebert and colleagues [19]. They administered three injections of procaine and hydrocortisone into the epidural space to 239 patients with sciatica and reported greater than 60% relief of symptoms in 58% of the patients. Since that time, the technique and indications of epidural steroid injections have been changing constantly. Various studies have observed the effects of caudal epidural steroid injections on a single prolapsed intervertebral disc, but studies on multiple disc bulges are infrequent. The search term 'caudal epidural steroid in multiple disc bulges' yielded no relevant results on PubMed.

Chronic low backache with MRI findings of multiple disc bulges is a frequent finding in spine clinics across the world. We postulated that a caudally injected steroid would spread throughout the epidural space and relieve inflammation at multiple levels, leading to a clinically significant result.

We observed significant reduction in pain by Numeric Pain Rating scale after CESI at third week follow-up and no significant change in subsequent follow-ups; however, the improvement in the pain score persisted till 6 months. Wilson–MacDonald et al also observed significant early reduction in pain in their study but found no long-term effect [20]. Similar results were obtained by Buchner et al with greatest relief in pain in the initial two weeks and no significant improvement at six weeks and six months follow-up [21].

A statistically significant improvement in Straight Leg Raise was observed in our study which persisted till 6 months. The mean SLRT of 40.8degrees at baseline increased to a mean of 62.9 degrees at 6 months follow up. Buchner et al observed significant improvement in SLR at two weeks and six weeks follow-up but no significant change at six months follow-up [21]. Similarly, Sayeh et al also observed negative SLR in 88% of patients six months post injection [22].

The improvement in the Owestry Disability Index(ODI) in our study was significant at three weeks follow-up. There was minimal change at six weeks and six months follow-up. Significant improvement in ODI was maintained till 6 months. Thus, improvement in ODI score within three weeks showed early improvement in physical function leading to better activities of daily living and quality of life. Manchikanti et al also observed significant improvement in ODI score at three months but no further improvement at six months and one year follow-up [1]. Sayeh et al observed significant change in ODI at one month post

injection with no significant change at one year follow-up [22].

There was no statistically significant difference in claudication distance in our study, though five of eight patients had clinically improved walking tolerance. This finding is in concurrence with Botwin et al, whose 59%patients had an improved walking

tolerance at 6 weeks and, 56% at 6 months and 51% at 12 months [23]. Because of the small number of patients in our study suffering from claudication symptoms, another study with large sample size is needed to comment on the findings.

Conclusion

Caudal epidural injections are an effective modality of treatment in managing chronic low back pain due to multiple lumbar disc bulges. They provide significant pain relief, though there was no statistically significant improvement in claudication distance.

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