

Efficacy of epidural steroid injections in management of low back pain - a prospective study

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Abstract

Context: Low back pain is one of the leading problems of patients coming to pain clinics. Epidural steroid injection for chronic low back pain is the most common minimally invasive procedure performed in the pain clinics.

Aim: This study was conducted to evaluate the efficacy of epidural steroid injection for various causes of low back pain.

Materials and methods: This is prospective observational study. It was carried on patients with low back pain not responding to conservative management. Injection methyl prednisolone 80 mg(2ml) with 3ml of 2% lignocaine was added to 5ml of normal saline and injected into the lumbar epidural space of segments involved. Sixty patients received epidural steroid injection (ESI). Data regarding the age of patients, indication for steroid injection, frequency of steroid injections, outcome of the procedure and complications if any were noted.

Conclusion: Epidural steroid injection using interlaminar approach is a simple, effective and safe option for treatment of lumbar radicular pain.

Keywords: Epidural steroid injection, herniated lumbar disc, low back pain, pain clinics

Introduction

Low back pain is a major cause of morbidity and causes significant detrimental effect to the person and to the society in terms of loss of working days. Epidural steroid injections (ESI) are used in treatment of low back pain caused by prolapsed intervertebral disc (PIVD), degenerative disc disease and spondylolisthesis that result in compression of spinal nerves. Steroids may reduce inflammation^{1,2} by several mechanisms, including inhibition of pro-inflammatory mediators (like phospholipase A₂, neural

peptides, acid hydrolases, histamine, kinins). They work by the abolition of the rate limiting step by the enzyme phospholipase A₂ to liberate arachidonic acid from cell membranes. The other mechanisms by which they act are stabilization of hyper excitable nerve membranes and reduction of capillary permeability. These actions lead to a decrease in intra neural edema and venous congestion there by reducing ischemia and pain. It is used to ease pain of inflammatory origin in cervical and thoracic regions too.

Therefore, the long acting epidural steroid injection has been widely used and slowly established as a reliable mode of minimally invasive treatment modality in many pain clinics of the world.

This study was carried out to assess the efficacy of epidural steroid injection in the patients with low back pain attending pain clinic.

Materials and methods

This study was approved by the hospital ethical research committee. This is a prospective observational study conducted over a period of one and half years, from January 2013 to June 2014. This study is done on patients referred to pain clinic from neurosurgery and orthopaedic departments of our institute with the complaints of low back pain due to PIVD, degenerative disc disease and spondylolisthesis and were treated with the epidural long acting steroid injection. During this period, sixty patients with complaint of low back pain radiating to legs were studied. Patients having back pain with MRI proven lumbar disc prolapse at different levels not responding to conservative treatment i.e. Non-steroidal anti-inflammatory drugs (NSAIDs), antidepressant, oral steroids, trans-cutaneous electrical nerve stimulation (TENS), traction, were included in the study.

Exclusion criteria included local infection at the injection site, motor deficit, prior lumbar disc surgery, uncontrolled diabetes, bleeding disorder, accidental dural puncture during ESI and patient refusal.

Inclusion criteria included patients above 18 years of age and who gave written informed consent.

The history was taken and clinical examination including sensory and motor examination of the patient was done. Patients under medication with aspirin, clopidogrel, and warfarin were advised to stop the medications a week before the procedure. They were given epidural steroid only after the coagulation status was within

normal limits. Written and informed consent was obtained from each patient.

The findings of straight leg raising test (SLR), motor and sensory deficit, and deep tendon reflexes (DTR) were noted. Routine laboratory investigations including prothrombin time, bleeding time, clotting time, platelet count, random blood sugar were done. The ESI was given by trained anesthesiologist in operation theatre. During the procedure, peripheral venous access was secured in all the patients with 20 G intravenous cannula. Patients were connected to monitors like ECG, non-invasive blood pressure (NIBP), and pulse oximetry. All the patients were kept in sitting position. Cleaning and draping of the back were done under aseptic precautions.

The disc level for ESI was located by surface anatomy. Using strict aseptic technique, 2ml of 2% lidocaine was infiltrated into the skin and subcutaneous tissue for surface anesthesia. An 18 gauge Tuohy epidural needle was inserted into the epidural space of the herniated lumbar disc through inter-laminar approach. The epidural space was identified by loss of resistance to air technique.

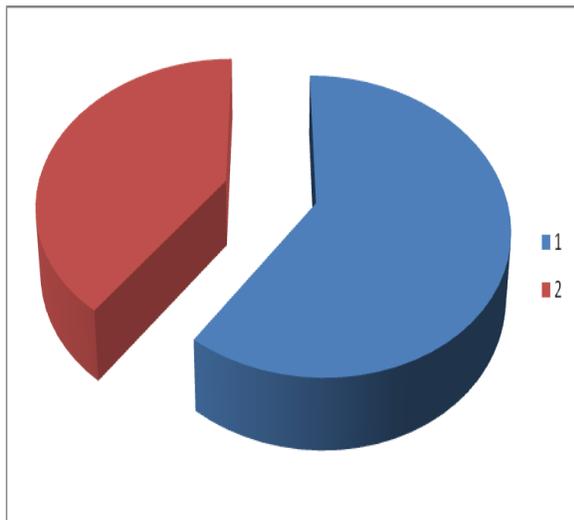
Injection methyl prednisolone 80 mg in 2ml and 3ml of 2% lignocaine added to 5ml of normal saline (total volume of 10 ml) injected into the lumbar epidural space. After the procedure, patients were advised to lie supine. During this period they were observed for any possible complications. Post procedure vitals were also noted. Few patients had heaviness of lower limbs which was relieved spontaneously after 30 min to one hour. Patients were discharged in about two hours after checking motor and sensory activity, with advice of normal activity but avoiding lifting heavy objects. All patients were advised to take mild analgesics (Tab. diclofenac 75mg orally thrice a day for one day) during the post injection period. The patients were first reviewed after one week, and then further follow up was carried out at

one month & six months after the epidural steroid injection.

On follow up, VAS score was used for assessment of current status of back and lower extremity pain, ranging from 0 (no pain) to 10 (worst pain possible). If a patient subjectively reported a decrease in pain within one week after a single injection, no more injections were administered. If the patient did not have improvement within a week, a second injection was performed. Patients with low back pain not responding to a second dose of ESI were considered as failure of ESI and considered for surgery.

Any complications like pain at the site of injection, flushing and headache were also enquired and noted if experienced. The frequency of the epidural steroid injection at the time of visit was also noted.

The success rate of epidural steroid injection was presented as percentage.



- 1 → 60% patients received single dose
- 2 → 40% patients received second dose

Fig. 1: Percentage of Patients and Frequency of ESI.

Results

Out of sixty patients with the low back pain group majority was due to PIVD (74%). The others in descending order of numbers were

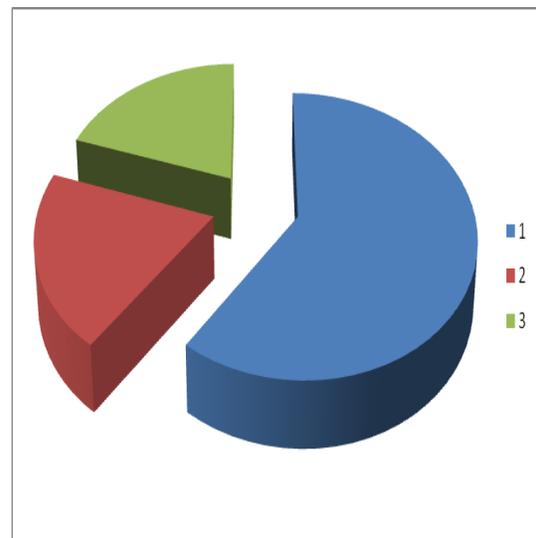
non specific back pain, spondylolisthesis, degenerative disc disease.

Out of sixty patients who received epidural steroid injections, 36(60%) patients received single dose only whereas 24(40%) required second dose. Among these 24 patients 12 improved and 12 were planned for surgery. Among the patients who had pain relief with epidural steroid (48 patients), 36 (75%) had significant relief of the symptoms and signs with significant improvement of functional status, whereas 12(25%) patients had moderate relief.

Significant reduction in pain intensity was observed 80% (48 out of 60).

Significant Functional status improvement was observed 60% (36 out of 60).

20 % patients showed no improvement of pain (12 out of 60).



- 1 → Significant improvement in functional status 60%
- 2 → Moderate improvement in functional status 20%
- 3 → No improvement in functional status 20%

Fig. 2: Improvement of Pain in Patients Receiving ESI.

Discussion

Epidural steroid injection is minimally invasive and effective treatment modality in many pain management clinics. The first

reported use of epidural steroid was in 1952 by Robecchi and Capra³ and is still an integral part of non-surgical management of low back and radiating pain.

In the patients experiencing backache with radiation towards one of the lower limbs PIVD is the most common followed by spondylolisthesis, fractures, spinal canal stenosis, dislocations and cauda equina syndrome⁴.

Epidural steroids are used for the treatment of spondylosis, non-specific radiculitis, and spinal stenosis (central canal stenosis, foraminal and lateral recess stenosis) where as in compression fracture of the lumbar spine with radicular pain, facet or nerve root cyst with radicular pain would warrant epidural steroids.

Absolute contraindications to performing epidural injections include known hypersensitivity to agents, systemic infection or local infection at the planned site of injection, local malignancy, bleeding diathesis and anticoagulation therapy. Relative contraindications include congestive heart failure (due to possible fluid retention after steroid therapy), uncontrolled diabetes mellitus (insulin-dependent diabetics are at risk of elevated blood sugars after steroid injections), pregnancy and immunocompromised patients who may require antibiotic prophylaxis for the procedure.

Risks associated with the needle placement or with injectate (local anaesthetic, steroid, or adjuvants) include infection (more common in immunocompromised patients and can include epidural abscess and meningitis), bleeding especially in proximity to the nerve roots, the spinal cord, or both (epidural hematoma—occurs in 0.02% of procedures), transient numbness or weakness, paralysis, allergic reaction, adrenal suppression, and fluid retention with systemic manifestations. There is also a potential for minor subcutaneous infection, backache, postdural puncture headache (0.5–1% for lumbar translaminar injections),

nausea, vomiting, dizziness, and vasovagal reactions. All patients should be warned before the procedure that the technique may fail to produce pain relief.

The interlaminar approach is the most common way of performing an epidural injection for all indications in regional anaesthesia. It is performed by placing a Tuohy needle (18 G) between the spinous processes in the midline of two vertebrae and just traversing the ligamentum flavum with a loss of resistance technique being the standard. The main benefit is one of familiarity as this is the most common method. This can be done with or without fluoroscopic guidance, but one of the many queries with regard to the varying efficacy of epidural steroid in studies has been the uncertainty of whether by interlaminar route, the steroid has been accurately placed at the required site. Fluoroscopic-guided procedures enhance the safety and improve the accuracy of placing the steroid at or nearer the site of the pathology.

The transforaminal approach is a selective injection aimed at a specific level and is always done under fluoroscopic guidance. The foraminae are the small lateral openings between the vertebrae through which the nerve roots traverse to exit the spinal canal. This approach demands high technical capability for proper placement of drug epidurally.

There are several types of steroid being used for epidural steroid like hydrocortisone, betamethasone, triamcinolone and methylprednisolone. However different studies have failed to prove superiority of one steroid above the other^{5,6,7}. We are using methylprednisolone 80 mg as it has relatively long duration of action. Methyl prednisolone is well known for its anti-inflammatory properties⁸ and also stabilizes neural membranes, suppress ectopic neural discharges⁹ and may have direct anaesthetic effect on small unmyelinated nociceptive C-fibers¹⁰.

Regarding the volume of injectate, Winnie et al have found that high volume does not have significant benefit over the low volume¹¹. However it is found that the minimum volume should not be less than 4 ml. The volume of drug injected helps in flushing out the local inflammatory mediators and breaks the adhesions too⁵. Though the local anesthetics like bupivacaine or lignocaine are used along with epidural steroid, there is no added long term advantage by adding local anesthetic. One practical benefit is that if sensory and/or motor block is noted, then it gives us clue about the proper placement of the epidural drug.

The success rate also depends upon the duration of the back pain. For the duration less than 3 months, the success rate is 83 – 100 %, and the success rate declines as the duration of symptoms increases^{12,13}. Patient selection plays a key role in successful conduction of epidural steroid injection.

Conclusion

We conclude that the interlaminar epidural steroid injection for lumbar radicular pain is a minimally invasive, simple, safe and effective method of treatment for low back pain of selected etiology.

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