COMPARISON OF ANALGESIC EFFICACY OF TRANSFORAMINAL VS CAUDAL EPIDURAL APPROACHES FOR UNILATERAL LUMBAR RADICULOPATHY

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ABSTRACT

Objective: To compare the analgesic efficacy of transforaminal epidural vs. caudal epidural approaches for unilateral lumbar radiculopathy.

Study Design: Quasi experimental study.

Place and Duration of Study: Department of Pain Medicine, Combined Military Hospital (CMH) Rawalpindi, from Jul 2017 to Mar 2018.

Methodology: Total 96 patients of unilateral radiculopathy were randomly assigned into two equal groups. Group A (n=48) received transforaminal epidural injection of local anesthetic 2.5ml of 0.125% bupivacaine with steroid triamcinolone 40mg and group B received caudal epidural injection Local anesthetic 25ml of 0.125% bupivacaine with triamcinolone 40mg. Pain score was assessed at 0 (PRe procedural baseline), 4, and 12 weeks intervals after intervention by using numerical rating scale and values at 0 and 12 weeks compared for analysis.

Results: Mean numerical rating scale pain score in group A and group B were 7.5 ± 0.99 and 3.1 ± 1.6, 7 ± 1.10 and 5.55 ± 1.0 at 0 and 12 week respectively. There was a reduction in mean pain score from baseline to 12 week in both the groups with statistical significance more in group A compared to group B (p<0.05).

Conclusion: Pain relief score was found to be statistically significant in transforaminal epidural as compared to caudal epidural for unilateral radiculopathy at 12 weeks post procedure.

Keywords: Caudal epidural, Efficacy, Epidural, Radiculopathy, Sciatica.

INTRODUCTION

Low back pain is one of the most common musculoskeletal complaints encountered in clinical practice. The incidence of low back pain is estimated to be anywhere between 5% to more than 30% with a lifetime prevalence of 60% to 90%[1]. Most occurrences of low back pain are self-limited and resolve without intervention. Approximately 50% of cases will resolve within one to two weeks. 90% of cases will resolve in six to 12 weeks[1]. The differential for low back pain is broad, and amongst other diagnoses, should include lumbosacral radiculopathy[2].

Lumbar radiculopathy is characterized by neuropathic pain originating in the spine radiating down a limb and resultant in disability. In about 90% of cases radiculopathy is caused by a herniated disc with nerve root compression, but lumbar stenosis and (less often) tumours are possible causes[3]. Various treatment strategies have been employed. A meta- analysis was carried out on effectiveness of various treatment strategies in 2013 and it found that there was a statistically significant improvement following non-opioid analgesia, epidural injections, disc surgery, manipulation, and acupuncture[4]. Traction, percutaneous discectomy, and exercise therapy were significantly inferior to epidural injections or surgery[5]. For pain as the outcome, epidural injections and biological agents were significantly better but similar findings for disc surgery were not statistically significant. Biological agents were significantly better for pain reduction than bed rest, non-opioids, and opioids. Opioids, education/ advice alone, bed rest, and percutaneous discectomy were inferior to most other treatment strategies[6]. Lumbar epidural steroid injection (LESI), first suggested as a conservative treatment for radicular pain in 1952 by Robecchi and capra, has

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evolved as one of the most common interventions for radiculopathy[7].

Transforaminal approach is favored because the injection site is adjacent to the nerve root and relatively small volume of medication is needed[8]. The caudal route is easiest and the safest route, however, this approach requires relatively large volumes of medication and is less specific to the site of pathology[9]. Transforaminal epidural steroid injection seems to be more effective at reducing pain, improving functionality, and preventing spinal surgery, based on the data reported in systematic review[10].

METHODOLOGY

After approval of ethical review committee of the hospital, patients consent and explaining the risks and benefits to the patients, this prospective quasi experimental study was conducted in the department of Pain Medicine, Combined Military Hospital Rawalpindi. The duration of the study was nine months from July 2017 to March 2018.

The sample size was calculated by using WHO sample size calculator. The total sample size of study was 96, (48 in each group) by keeping level of significance (α) 5%, Power of the test 95% (1-β), anticipated population proportion (P1) & (P2) were 5% and 30% respectively. Consecutive non probability sampling technique used for sampling. All the patients with the history of unilateral sciatic pain with Lumbar radiculopathy, unilateral straight leg raising sign positive (SLR less than 60o) with MRI evidence of neuralforaminal compression or lateral recess compression supported by NCS evidence of nerve compression were included in this study. Patients with history of previous low back surgery, known allergy to LA/steroids, coagulopathy, infection at site of needle placement and patient refusal were excluded.

Patients were allocated in two groups (group A and group B) by computer generated Random number allocation method on daily basis. As per study protocol, all the patients were interviewed, briefed and counseled about the procedure. Before the procedure; patient history, clinical examination and investigations were reviewed and vital signs of all the patients were recorded and selected for intervention.

Group A received transforaminal injection via 90-mm 25 gauge spinal needle into transforaminal epidural space under fluoroscopy. 2.5ml of a mixture of 0.125% bupivacaine and triamcinolone 40mg was administered.

Group B received caudal epidural injection of LA and steroid into caudal epidural space using fluoroscopy with 25 gauge spinal needles. Then total volume of 25 ml local anesthetic in a concentration of 25ml 0.125% bupivacaine with steroid triamcinolone 40mg was administered.

Pain score of all the patients were assessed at interval (preprocedural baseline) and subsequently on follow up visits at 4, and 12 weeks interval after intervention by using numerical rating score (NRS) and NRS values at 0 and 12 weeks were used for analysis. NRS ranges from 0-10 and a score of 0 was taken as no pain, whereas 10 was worst pain imaginable. Score 1-3 was considered as minimal pain, 3-6 considered as moderate pain while 7-10 as severe pain.

Computer software statistical package for social sciences (SPSS) version 22.0 was used to manage and analyze the data. Descriptive statistics were used to describe the results i.e. Mean and standard deviation (SD) for quanti-tative variables while frequency and percentages for qualitative variables. Chi square test was used for qualitative variables while Independent sample t-test was used to compare means. The *p*-value <0.05 was considered as significant.

RESULTS

Total 96 patients were included in the study, divided into two groups. Both groups had 48 patients in each group. Mean age in group A and group B were 42 ± 8.35 years and 43.04 ± 9.25 years respectively (p=0.57). Weight was also statistically insignificant between two groups (table-I). There were 60% and 72% male in group

A and B, while 39.6% and 27.1% were female in group A and B respectively (table-II).

There was no statistically significant difference of pain score at base line 0 week between group A vs. B. At 4, 8 and 12 weeks, there was statically significant difference of NRS between group A vs group B as shown in table II. There was a reduction in mean pain score from baseline to 12 weeks in both the groups. Group A NRS pain scale was found to be at upper limit of mild intensity at 12 weeks while group B NRS pain scale remained at moderate intensity.

Table-I: Patient demographic data.

Patient Parameters	Group A n=48	Group B n=48	*p*-value
Age (years) (Mean ± SD)	42 ± 8.35	43.04 ± 9.25	0.57
Weight (kg) (Mean ± SD)	60.79 ± 7.30	58.43 ± 9.25	0.17
Gender			
Male	29 (60.4%)	35 (72.9%	0.19
Female	19 (39.6%)	13 (27.1%)	

Table-II: Mean Numeric Rating Scale (NRS) Pain score.

Week	GP A (n=48) (NRS)	GP B (n=48) (NRS)	*p*-value
0	7.3 ± 0.99	7 ± 1.18	0.18
4	4 ± 1.8	5.5 ± 1.7	0.001
8	4.0 ± 0.77	5.35 ± 1.25	<0.001
12	3 ± 1.7	5.75 ± 0.9	<0.001

NRS pain scale 0=no pain 1-3=mild pain 4-7=moderate pain 7-10=severe pain.

DISCUSSION

In 1952, Robecchi and Capra first described lumbar epidural steroid injection (LESI) and suggested as one of the method for conservative treatment for radicular pain[7-8]. Steroids are used to reduce inflammation in the epidural space[6–10]. There are different approaches to performed LESI and among these are, transforaminal (TF), caudal, or interlaminar approaches[11-12]. There are different advantages and disadvantages of each approach, which ultimately affects the outcomes. When we compared TF approach with caudal, it is superior because the injection site is closest to the nerve root, and a small volume of medication is required for injection[13-16]. The caudal route is both the easiest and the safest route and also seems to provide the most favorable analgesic effects[17-18]. However, this approach requires relatively large volumes of medication and is less specific to the site of pathology[19]. In this study, effectiveness of transforaminal-ESIs and caudal-ESIs with respect to pain were compared in patients suffering from lumbar radiculopathy.

As per our results there was no difference of pain score at base line 0 week between Groups. At 4, 8 and 12 week there was statically significant difference of NRS between group A vs group B. There was a reduction in mean pain score from baseline to 12 weeks in both the groups, group A NRS pain scale was found to be mild in intensity at 12 week while group B NRS remained at pain scale of moderate intensity. Transforaminal ESI seems to be more effective at reducing pain, improving functionality. Some relevant research has already been conducted comparing the effectiveness of the TF versus caudal routes. Ploumis *et al* showed that significantly greater number of stenosis patients showed pain relief at 6 months post injection with TFSI (90%) than with CESI (54.54%). All patients with TFSI showed improvement of function at 6 months while only three (27.27%) patients with caudal epidural improved functionally. Out of the total 31 patients, two patients from group A underwent a second CESI at 15 days post injection and decompressive spine surgery between 3 and 6 months post injection[20].

Mac-Vicar *et al*, reported that up to 70% of patients achieved 50% relief of pain at 1 or 2 months after treatment and about 30% achieved complete relief in TFESI group. 53 (77%) of 69 patients avoided surgery for 12 months after treatment with TFESI. TFESI seems to be more often effective than blind, caudal, or interlaminar injections of steroids[21].

Lee *et al*, in a retrospective study of 233 patients with radiculopathy secondary to spinal stenosis or herniated disc, found that satisfaction and pain scores up to 2 months were superior for patients who underwent TFESI than CESI[22].

However, different injectate volumes did not affect the final outcome irrespective of administration route. A meta analysis by Jin Lui, which included 6 prospective and 2 retrospective studies involving 664 patients showed that TF and C approaches are equally effective in reducing pain and improving functional scores, and demonstrated similar efficacies in the management of lumbosacral radicular pain[22].

Singh *et al*, found that in SNRB group, pain reduced by more than 50% up till 6 months, while in caudal group more than 50% reduction of pain was maintained till 1 year. The reduction in ODI in SNRB group was 52.8% till 3 months, 48.6% till 6 months, and 46.7% at 1 year, while in caudal group the improvement was 59.6%, 64.6%, 65.1%, and 65.4% at corresponding follow-up periods, respectively, and concluded that caudal epidural block is an easy and safe method with better pain relief and improvement in functional disability than selective nerve root block[23]. The result of our study is comparable with other studies and shown promising similar results as there is reduction of mean pain score in transforaminal group. It is proven to reduce pain intensity, improved mobility and quality of life with relatively few side effects and though remained viable treatment option for radicular pain.

However, it remains debatable whether TF or C approaches should be utilized in clinical practice, and no definitive standards pertaining to LESI exist. It is therefore necessary to compare the clinical efficacies of different procedures to generate data that can be used to formulate clinical guidelines.

LIMITATION OF STUDY

The small sample size would warrant further study with view to achieve improvement in technique besides enhancing its expertise among pain care practitioners to address any confounders. The duration of pain relief from ESI varies and can reach up to a year but in our study we followed the pain relief till 12 weeks and further studies need to be conducted to document long term relief of pain in each modality.

CONCLUSION

TFESI reduced the pain intensity, improved mobility and quality of life with relatively few side effects and thus remains viable treatment option for radicular pain when compared with caudal epidural approach.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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