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Comparison of Transforaminal Epidural Versus Intra-Articular Facet Joint Injection for Treatment of Lumbar Radiculopathy

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ABSTRACT

Objective: To compare the analgesic efficacy of intra-articular facet joint block versus transforaminal epidural injection in patients with lumbar radiculopathy.

Study Design: Randomized controlled trial (IRCT trial id number 73631)

Place and Duration of Study: Anesthesia Department, Combined Military Hospital Rawalpindi, Pakistan, from Jun to Nov 2023.

Methodology: Patients were divided into two groups of 45 each, the facet-joint group (Group-A) and the epidural group (Group-B). Primary variables observed were median scores on standard visual analog scale (VAS), with 0 being no pain to 10 being excruciating pain, numeric rating scale (NRS), with 0 being no pain to 100 being excruciating pain and disability classification according to the Oswestry disability index (ODI).

Results: Median pain score on visual analog scale (VAS) was 3.00 (IQR=1.00) in Group-A versus 4.00 (IQR=0.00) in Group-B on follow-up after four weeks (p=0.002). The same assessment done after 3 months between both groups showed a median VAS score of 4.00 (IQR=0.00) in Group-A versus 4.00 (IQR=0.00) in Group-B (p=1.000). Assessment on the Oswestry disability index showed median scores of 15.00 (IQR=8.00) in Group-A versus 15.00 (IQR=10.00) in Group-B after 4 weeks. Similar assessment done at 3 months showed median score of 20.00 (IQR=20.00) in Group-A versus 25.00 (IQR=18.00) in Group-B (p=0.399).

Conclusion: We conclude that facet-joint injection provides adequate analgesia with better pain scores than transforaminal epidural injections for treatment of lumbar radiculopathy.

Keywords: Epidural, Facet, Intra-Articular, Lumbar, Radiculopathy.

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INTRODUCTION

Low back pain can be both acute or chronic and adversely affects quality of life.[1] It is now estimated that around 23% of all adults globally suffer from chronic low back pain due to various factors.[2] One-year recurrence is also reported to be from 24-80% depending on the cause and treatment taken. Lumbar radiculopathy is a specific type of back pain that occurs when a nerve root in the lower spine is compressed or irritated, causing pain, numbness, tingling, or weakness in the leg along the nerve distribution, which is often caused by a herniated disc, spinal stenosis, or spondyloarthropathy.[3]

The prevalence of lumbar radiculopathy is estimated to be 3-5% of the population, affecting both men and women.[4] Age is a primary risk factor, as it occurs secondary to the degenerative process within the spinal column.[5] Symptoms typically begin in midlife, with men often affected in the 40s while women are affected in the 50s and 60s. However, some populations may have a higher risk of lumbar radiculopathy, such as females with physically demanding careers.[6]

The treatment of lumbar radiculopathy depends on the severity of symptoms, the underlying cause, and the patient's preference. Even though transforaminal epidural injections have been used extensively to treat lumbar radiculopathy, the incidence of adverse effects and complications including vascular penetration as well as vasovagal responses warrants the use of alternate methods to achieve similar or better results.

Facet joint injections have recently been used increasingly to achieve similar results in the treatment of lumbar radiculopathy with a proposed better adverse effect profile and pain relief. We aimed to use these novel regional block strategies in our demographic area to compare the analgesic efficacy

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when comparing intra-articular facet joint injection versus transforaminal epidural in patients with lumbar radiculopathy.

METHODOLOGY

This randomized controlled trial was carried out at the Department of Anesthesiology, Combined Military Hospital Rawalpindi, Pakistan, from Jan to Jun 2023, after approval from the Ethical Review Board (vide letter no. CMH/RWP/412) and was registered in IRCT (IRCT trial ID number 73631).

Inclusion Criteria: Patients of either gender, between the ages of 30 to 60 years presenting in the pain clinic after confirmation of lumbar radiculopathy diagnosed by standard MRI imaging studies were included.

Exclusion Criteria: Patients with debilitating cardiac or respiratory disease, tumors of the spine with or without metastatic disease, those with known allergy to lignocaine, bupivacaine or steroids, and those with a regional block done for pain in the last one year were excluded.

Sample size was calculated for two groups keeping the mean difference of pain scores from baseline in the transforaminal group at 45.21±3.52 on the pain scale and 24.26±7.55 for the facet joint group after intervention.7 Minimum sample size calculated was 08 for the transforaminal and 27 for the facet joint group. We included 45 patients in each group divided into the facet-joint (Group-A) and transforaminal epidural group (Group-B) after randomization, which was done via lottery method (Figure-1).

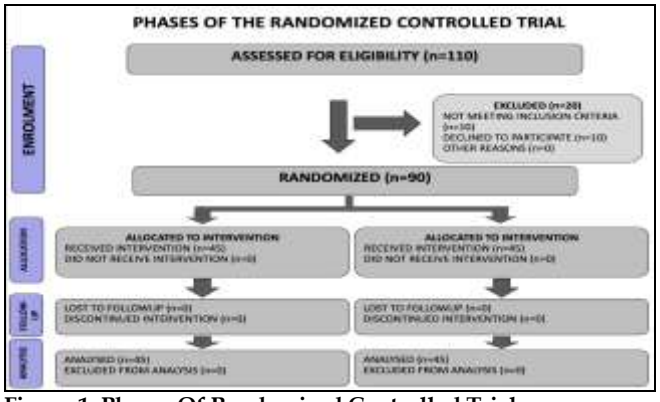

Figure-1: Phases Of Randomized Controlled Trial

Patients were recruited using non-probability consecutive sampling, after taking infomed consent and patients in both groups were explained in detail about the procedure and possible complications. Standard monitoring including non-invasive blood pressure, heart rate, capnography and ECG were attached to participants in both groups.

Both interventions were carried out by consultant pain specialists with a minimum 5 years of experience, unaware of the study protocol. In the facet-joint group (Group-B), the procedure was started after taking an informed written consent and thoroughly explaining the risk-benefits of the procedure. Patient were kept nil per oral for four hours in case sedation was needed for anxious patients. The procedure was carried out under fluoroscopic guidance with the patient in the prone position under strict aseptic measures. The site of needle insertion was anesthetized using 1% lignocaine on the skin and subcutaneous tissue. Spinal needle (22 G) was inserted, and sequential fluoroscopic views taken. Once appropriate position was reached, 2.5 ml contrast was injected through minibore tubing attached to the needle to confirm correct placement, and rule out intravascular placement. Upon confirmation, 2 ml of 1% preservative-free lignocaine (20mg) with 60 mg of methylprednisolone was injected at the facet-joint site. In the epidural group (Group-B), similar measures were taken for consent and aseptic measures. Patients were placed in the prone position with the targeted site away from the interventionist. An AP scout was done at vertebral level T12-S1 to confirm position and level before the procedure. Under fluoroscopic guidance, 2 ml of 1% preservative-free lignocaine (20mg) with 60 mg of methylprednisolone was injected once the needle was in the correct placement after confirmation with 2.5 ml of iodinated contrast.

Patients were kept in the recovery room till stable and were advised to comply to regular follow-ups at 4 weeks and 3 months. Primary variables observed median scores on standard visual analog scale (VAS), with 0 being no pain to 10 being excruciating pain), numeric rating scale (NRS), with 0 being no pain to 100 being excruciating pain, and disability classification according to the Oswestry disability index (ODI).[8-10]

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 26. Demographic were described as mean and SD, and frequencies and percentages, when appropriate. Independent sample t-test was used to compare statistically significant means between both groups. Mann Whitney-U test was used to compare statistical difference between primary median values for non-parametric data. A *p*-value of <0.05 was considered statistically significant.

RESULTS

A total of 110 patients were evaluated for the study, out of which 10 patients did not meet the inclusion criteria and 10 did not give consent to be included in the study. We therefore included 90 patients in the final study. They were divided into the face-joint intervention group (Group-A) and the epidural intervention group (Group-B).

Mean age of patients in Group-A was 49.62±4.19 years versus 49.11±4.39 years in Group-B (*p* 0.574). Mean weight was 67.93±3.97 kg in Group-A versus 67.84±3.81 kg in Group-B (*p*=0.914). Gender distribution showed a total of 30(66.7%) males and 15(33.3%) females in Group-A versus 27(60%) males and 18(40%) females in Group-B (Table-I).

Table-I: Age and Height Characteristics across Groups (n=90)

Variable	Group-a (n=45)	Group-b (n=45)	*p*-value
Mean age (years)	49.62±4.19	49.11±4.39	0.574
Mean weight (kg)	67.93±3.97	67.84±3.81	0.914
Gender	n (%)	n (%)	
Male	30(66.7%)	27(60%)	-
Female	15(33.3%)	18(40%)	-

When assessing the primary variables under study, median pain score on visual analog scale (VAS) was 3.00 (IQR=1.00) in Group-A versus 4.00 (IQR=0.00) in Group-B on follow-up after four weeks (*p*=0.001). The same assessment done after 3 months between both groups showed a median VAS score of 4.00 (IQR=0.00) in Group-A versus 4.00 (IQR=0.00) in Group-B (*p*=0.873). On the numeric rating scale (NRS), median pain score at 4 weeks was 10.00 (IQR=20.00) in Group-A versus 20.00 (IQR=20.00) in Group-B (*p*=0.001). Assessment for the same NRS score at 3 months between both groups showed median pain score of 20.00 (IQR=20.00) in Group-A versus 25.00 (IQR=10.00) in Group-B (*p*=0.654).

Assessment on the Oswestry disability index showed median scores of 15.00 (IQR=8.00) in Group-A versus 15.00 (IQR=10.00) in Group-B after 4 weeks (*P*=0.443). Similar assessment done at 3 months showed median score of 20.00 (IQR=20.00) in Group-A versus 25.00 (IQR=18.00) in Group-B (*p*=0.379), which can be seen in Table-II.

DISCUSSION

Our study showed a mean age of onset in the late forties in majority of the cases which is in-line with international studies for lumbar radiculopathy.[11,12] The gender distribution also showed male pre-dominance with a 60:40 ratio, which is again aligned with current literature.[13] All patients included in our study were assessed and diagnosed cases of lumbar radiculopathy confirmed on MRI lumbosacral spine with their ODI (Oswestry disability index) more than a score of 20 signifying moderate to severe disability.[14]

Table-II: Comparison of Primary Variables between Groups (n=90)

Variable	Group-a (n=45) Median (IQR)	group-b (n=45) Median (IQR)	*p*-value
Median vas at 4 weeks	3.00 (1.00)	4.00 (0.00)	0.001
Median vas at 3 monhts	4.00 (0.00)	4.00 (0.00)	0.873
Median nrs at 4 weeks	10.00 (20.00)	20.00 (20.00)	0.001
Median nrs at 3 months	20.00 (20.00)	25.00 (10.00)	0.654
Median score odi at 4 weeks	15.00 (8.00)	15.00 (10.00)	0.443
Median score odi at 3 months	20.00 (20.00)	25.00 (18.00)	0.379

VAS: Visual Analogue Scale, ODI: Oswestry Disability Index

Primary variable factors showed that both the interventions were effective in relieving the pain of all participants which acceptable reductions in pain scores. However, the facet-joint intervention was superior when compared to the epidural injection group in more effectively decreasing the pain scores and statistically significant improvement at the 4-week follow-up.[15] This is in line with an international study by Lindemann *et al.*[16] The VAS score reduction was comparable between both groups at the 3-month follow-up window showing both interventions were equally effective, but pain scores remained in the tolerable range but were increased from the 4-week follow-up. Similar findings were seen in long-term follow-ups by Kuebler *et al.*[17] The NRS score assessment showed similar results consistent with significant improvement and superiority of the facet-joint intervention at the 4-week interval, as pain scores remained reduced but were comparable between both groups at the 3-month follow-up.[18]

When talking about the Oswestry disability index (ODI), which is considered the most pertinent test to assess improvement in disability and quality of life in patients with low back pain, both interventions were similar in improving and decreasing the disability score below 20 which is considered acceptable for good mobilization and quality of life. No intervention proved statistically superior to the other at the 4-week and 3-month follow-up intervals.[19]

LIMITATION OF STUDY

The limitations are that the study is single center only. A multi-center study would result in a wider demographic

area with more confirmative results. The expertise required for successfully doing the block requires more patient prep-time and experience regional block consultants not readily available in our demographic area. Long term follow-up to one-year would provide better assessment of pain scores.

CONCLUSION

We conclude that facet-joint injection provides adequate analgesia with better pain scores than transforaminal epidural injections for treatment of lumbar radiculopathy.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

HT & MRI: Data acquisition, data analysis, critical review, approval of the final version to be published.

ASK & AYZ: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

AR & SAAS: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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