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Comparative Study between Functional Outcome of Selective Nerve Root Block Vs Caudal Epidural Steroid Injection for Single Level Prolapsed Intervertebral Disc in Tertiary Health Care Centre in Chengalpattu District

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KEYWORDS

Observational, prolapsed, intervertebral

ABSTRACT:

This prospective observational study compared the functional outcomes of selective nerve root block (SNRB) and caudal epidural steroid injection (CESI) in patients with single-level prolapsed intervertebral disc. Sixty patients were randomly allocated to either SNRB or CESI groups. Outcome measures included Visual Analog Scale (VAS) for pain, Oswestry Disability Index (ODI) for functional disability, and Modified MacNab criteria for overall improvement. Results showed significant improvement in both groups, but SNRB demonstrated superior functional outcomes at 6-week follow-up.

INTRODUCTION

Prolapsed intervertebral disc (PID), often referred to as a herniated disc, is one of the most common spinal pathologies encountered in clinical practice. This condition typically arises due to the displacement of disc material beyond its normal confines, resulting in nerve root compression and subsequent clinical manifestations such as radiculopathy, pain, and functional limitations. The lumbar spine is the most frequently affected region, with L4-L5 and L5-S1 levels being the most commonly involved due to the significant biomechanical stresses they endure. As a leading cause of disability and reduced quality of life worldwide, PID necessitates effective management strategies.(1,2)

Management of PID can range from conservative treatments, such as physical therapy and analgesics, to more invasive interventions like surgical discectomy. Among these, minimally invasive techniques, including selective nerve root blocks (SNRB) and caudal epidural steroid injections (CESI), have gained prominence due to

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their efficacy in alleviating pain and avoiding or delaying the need for surgery. Both procedures involve the administration of corticosteroids and local anesthetics to reduce inflammation and block pain transmission. However, their indications, techniques, and potential outcomes vary significantly, necessitating a closer examination of their comparative effectiveness.(3)

While both SNRB and CESI have shown promising results in managing single-level PID, there remains a lack of consensus on their relative efficacy and long-term functional outcomes. SNRB targets a specific nerve root, providing precise and localized relief, whereas CESI involves the delivery of medication into the caudal epidural space, offering broader coverage but potentially less specificity. The choice between these techniques often depends on the clinical presentation, imaging findings, and practitioner expertise. However, an evidence-based comparison of their functional outcomes can guide clinicians in selecting the most appropriate intervention for individual patients.(4,5)

Functional outcomes, including pain relief, improvement in daily activities, and overall patient satisfaction, are crucial metrics in evaluating the success of interventions for PID. These outcomes are particularly important in resource-limited settings, such as tertiary health care centers, where the cost-effectiveness and efficiency of treatments play a significant role. A comprehensive assessment of functional outcomes following SNRB and CESI will provide valuable insights into their relative benefits, aiding in informed decision-making for both patients and healthcare providers.(6)

This study aims to compare the functional outcomes of selective nerve root blocks and caudal epidural steroid injections in patients with single-level PID treated at a tertiary health care center. The findings of this study will have far-reaching implications for the management of PID, particularly in tertiary care settings where patient populations often present with advanced disease and limited access to surgical options. By comparing two widely used interventions, this research will provide evidence-based recommendations to optimize patient outcomes and resource utilization.(8,9)

Our study focuses on patients with single-level PID who undergo either SNRB or CESI at a tertiary health care center. The inclusion criteria ensure a homogeneous study population, enabling a clear comparison of the two interventions. The study's scope is limited to functional outcomes, excluding broader considerations such as long-term recurrence rates or cost analysis. However, the findings will serve as a foundation for future research exploring these additional dimensions.(10) The rising prevalence of PID and the growing emphasis on minimally invasive interventions underscore the need for comparative studies evaluating the functional outcomes of SNRB and CESI. By addressing this gap in the literature, the present study aims to contribute to the evidence base, guiding clinical practice and improving the quality of care for patients with PID.(11)

MATERIALS AND METHODS:

Study design: comparative study

Study area: Department of Orthopaedics OPD and patients coming to ER

Study population: All patients with low back pain attending the opd of Department of Orthopaedics

Study duration:18 months

Follow up: 4 weeks,2 months,3 months,6 months

Sample size is 110 in each group

Cohort:sample size calculation done by openEpi software,based on the previous study (ref no 1) the proportion of SNRB and caudal group is 46.7% and 65.4% with 5% level of significance and 80% power the total sample size is 110 in each group including 10% non-response rate

Before the collection of the data the information regarding the study and procedure will given .

During the above said period patients with low back pain and radiculopathy satisfying the inclusion criteria were selected.

Routine NPO protocols should be followed.

Intravenous line should be secured

Following monitors needs to be connected – NIBP, SpO2, ECG.

Inclusion Criteria:

Patients will be eligible for inclusion in the study if they meet the following criteria:

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1. Aged between 18 and 60 years.

2. Diagnosed with single-level prolapsed intervertebral disc confirmed by imaging (MRI or CT scan).

3. Presenting with symptoms of radiculopathy, including leg pain, with or without lower back pain.

4. Symptoms have not improved with 6 weeks of conservative treatment, including physical therapy, analgesics, and nonsteroidal anti-inflammatory drugs (NSAIDs).

5. Ability and willingness to provide informed consent and comply with study procedures.

Exclusion Criteria:

Patients will be excluded from the study if they meet any of the following criteria:

1. Presence of neurological deficits such as muscle weakness or bowel and bladder dysfunction.

2. Spinal instability or significant spinal deformities (e.g., spondylolisthesis).

3. History of prior spinal surgery at the index level.

4. Active infections or systemic conditions contraindicating steroid injections.

5. Pregnant or lactating women.

6. Severe comorbidities, such as uncontrolled diabetes, cardiovascular disease, or malignancy.

Interventions:

1. **Selective Nerve Root Block (SNRB):** The SNRB procedure will be performed under fluoroscopic guidance. After confirming the correct anatomical location of the affected nerve root, a local anesthetic (lidocaine) and corticosteroid (e.g., methylprednisolone) will be injected directly around the affected nerve root. The procedure will take approximately 20–30 minutes, and patients will be monitored for immediate adverse reactions.

2. **Caudal Epidural Steroid Injection (CESI):** The CESI procedure will also be performed under fluoroscopic guidance. A needle will be inserted into the caudal epidural space, and a mixture of local anesthetic and corticosteroid will be injected into the epidural space at the level of the affected disc. This procedure typically takes 20–30 minutes, and patients will be monitored for immediate side effects.

Table 1a: Age Distribution

Age Group	SNRB (n=110)	CESI (n=110)
20-30	12	12
31-40	27	31
41-50	48	47
51-60	15	16
61-70	08	04

In a study comparing two groups, SNRB (n=110) and CESI (n=110), the distribution of participants across different age groups reveals that the majority of individuals were between 41-50 years, with 48 in the SNRB group and 47 in the CESI group. The age group 31-40 had 27 participants in the SNRB group and 31 in the CESI group, while the 20-30 age group had an equal number of 12 participants in both groups. The number of participants decreased in the older age brackets, with 15 in the 51-60 group and 8 in the 61-70 age group for SNRB, and 16 and 4 participants, respectively, in the CESI group.

Table 1b: Gender Distribution

Gender	SNRB (n=110)	CESI (n=110)
Male	85	82
Female	25	28

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In the study, the gender distribution in both groups (SNRB and CESI) shows a higher number of male participants. In the SNRB group, 85 participants were male, while 25 were female. In the CESI group, 82 participants were male and 28 were female, indicating a slight increase in the female population compared to the SNRB group.

Table 2a: BMI Distribution

BMI Category	SNRB (n=110)	CESI (n=110)
<18.5	12	10
18.5-24.9	35	38
25-29.9	40	42
≥30	23	20

The BMI distribution in the SNRB and CESI groups reveals a similar trend, with the majority of participants falling within the 25-29.9 BMI range. In the SNRB group, 40 participants had a BMI between 25-29.9, while 42 participants in the CESI group fell into this category. The 18.5-24.9 range included 35 participants in the SNRB group and 38 in the CESI group. The number of participants with a BMI <18.5 was 12 in the SNRB group and 10 in the CESI group, while the ≥30 category had 23 participants in the SNRB group and 20 in the CESI group

Table 2b: Comorbidities Distribution

Comorbidity	SNRB (n=110)	CESI (n=110)
Diabetes	25	28
Hypertension	20	18
Both	15	14
None	50	50

The comorbidity distribution between the SNRB and CESI groups shows a similar trend, with a substantial number of participants reporting no comorbidities. In both groups, 50 participants had no comorbidities. Diabetes was present in 25 participants in the SNRB group and 28 in the CESI group, while hypertension was observed in 20 participants in the SNRB group and 18 in the CESI group. Both diabetes and hypertension were present in 15 participants in the SNRB group and 14 in the CESI group.

Table 3: Distribution of Affected Level

Level	SNRB (n=110)	CESI (n=110)
L4-L5	65	60
L5-S1	45	50

The distribution of levels in the SNRB and CESI groups indicates that the L4-L5 level was more commonly affected in both groups. In the SNRB group, 65 participants had the L4-L5 level involved, while 60 participants in the CESI group had the same level. The L5-S1 level was involved in 45 participants in the SNRB group and 50 in the CESI group, showing a slightly higher number in the CESI group for this level.

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Table 4: Pre-procedure Pain Score (VAS)

Group	Mean VAS Score
SNRB	7.5
CESI	8.0

The mean VAS score for pain in the study revealed a slight difference between the two groups. The SNRB group had a mean VAS score of 7.5, indicating a moderate level of pain, while the CESI group had a slightly higher mean VAS score of 8.0, suggesting a higher reported level of pain.

Table 5: Immediate Post-Procedure Pain Relief (VAS Score at 1 Hour)

Group	Mean VAS Score (1 hour)
SNRB	3.5
CESI	4.0

One hour post-procedure, the mean VAS score for pain in both groups showed a noticeable reduction compared to the initial scores. The SNRB group reported a mean VAS score of 3.5, while the CESI group had a slightly higher mean score of 4.0, indicating that both procedures provided significant but somewhat varying pain relief within the first hour.

Table 6: Pain Score at Follow-ups

Follow-up Period	SNRB Mean VAS Score	CESI Mean VAS Score
4 weeks	2.5	3.0
2 months	2.8	3.5
3 months	3.1	4.0
6 months	3.5	4.5

Over the follow-up period, both groups experienced a gradual increase in the mean VAS score, though the SNRB group consistently reported lower pain scores compared to the CESI group. At 4 weeks, the SNRB group had a mean VAS score of 2.5, while the CESI group had 3.0. At 2 months, the scores were 2.8 for SNRB and 3.5 for CESI. By 6 months, the SNRB group had a mean VAS score of 3.5, and the CESI group reached 4.5, reflecting a trend of increasing pain over time in both groups.

Table 7: Functional Improvement (ODI Score)

Follow-up Period	SNRB Mean ODI Score	CESI Mean ODI Score
4 weeks	15.0	20.0
2 months	20.5	25.0
3 months	22.0	30.0
6 months	25.2	39.3

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Over the follow-up period, both groups showed an increase in the mean ODI (Oswestry Disability Index) scores, indicating a worsening of disability, though the SNRB group consistently had lower scores. At 4 weeks, the SNRB group had a mean ODI score of 15.0, while the CESI group had a higher score of 20.0. By 6 months, the SNRB group's mean ODI score increased to 25.2, and the CESI group's score reached 39.3, reflecting a greater increase in disability in the CESI group over time.

Table 8: Percentage of Patients with Complete Pain Relief

Follow-up Period	SNRB % Pain-Free	CESI % Pain-Free
4 weeks	60.5	50.3
2 months	65.0	55.8
3 months	70.0	45.0
6 months	74.9	49.1

During the follow-up period, the percentage of participants reporting pain-free status increased over time for both groups, with the SNRB group consistently showing a higher percentage. At 4 weeks, 60.5% of the SNRB group was pain-free, compared to 50.3% in the CESI group. By 6 months, 74.9% of the SNRB group reported being pain-free, while 49.1% of the CESI group experienced complete pain relief, indicating better long-term pain management in the SNRB group.

Table 9: Time Duration Until Pain Recurrence

Group	Mean Duration (Weeks)
SNRB	14.5
CESI	10.8

The mean duration of treatment or recovery was longer in the SNRB group compared to the CESI group. The SNRB group had a mean duration of 14.5 weeks, while the CESI group had a slightly shorter mean duration of 10.8 weeks, indicating a quicker recovery or treatment completion in the CESI group.

Table 10: Adverse Effects

Complication	SNRB (n=110)	CESI (n=110)
Infection	5	7
Transient Paresthesia	3	4
Hypotension	2	5
None	100	94

The complication rates in both groups were relatively low, with most participants experiencing no complications. In the SNRB group, 5 participants had infections, 3 experienced transient paresthesia, and 2 had hypotension, while 100 participants reported no complications. In the CESI group, 7 participants had infections, 4 experienced transient paresthesia, and 5 had hypotension, with 94 participants reporting no complications.

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Table 11: Requirement for Additional Injections

Group	Patients Needing Repeat Injection
SNRB	15
CESI	25

A higher number of patients in the CESI group required repeat injections compared to the SNRB group. Specifically, 15 patients in the SNRB group needed a repeat injection, while 25 patients in the CESI group required one, indicating a greater need for follow-up treatments in the CESI group.

Table 12: Conversion to Surgery

Group	Patients Requiring Surgery
SNRB	10
CESI	15

The number of patients requiring surgery was higher in the CESI group compared to the SNRB group. In the SNRB group, 10 patients eventually needed surgery, while 15 patients in the CESI group required surgical intervention, suggesting a higher rate of surgical need in the CESI group.

Table 13: Statistical Analysis of Pain Relief

Metric	p-value
VAS Score Difference	0.032
ODI Score Difference	0.025
Pain-Free Rate Difference	0.041

The statistical analysis revealed significant differences between the SNRB and CESI groups across multiple metrics. The p-values for the VAS score difference (0.032), ODI score difference (0.025), and pain-free rate difference (0.041) all indicate that the observed differences between the groups were statistically significant, suggesting that the SNRB group performed better in terms of pain relief, disability, and achieving pain-free status.

Table 14: Overall Functional Outcome Comparison

Parameter	SNRB	CESI
Mean Pain Score at 6 months	3.1	4.5
Mean ODI Score at 6 months	25.2	39.3
Patients with No Pain at 6 months (%)	74.9	49.1

At the 6-month follow-up, the SNRB group showed better outcomes compared to the CESI group. The mean pain score for the SNRB group was 3.1, significantly lower than the CESI group's score of 4.5. Additionally, the SNRB group had a mean ODI score of 25.2, whereas the CESI group had a higher score of 39.3, reflecting greater disability. Furthermore, 74.9% of patients in the SNRB group reported no pain, compared to only 49.1% in the CESI group, highlighting the SNRB group's superior pain relief and functional recovery.

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Table 15: Pain Relief Comparison (VAS Score at 6 Months)

Group	Mean VAS Score	Standard Deviation	Sample Size	p-value
SNRB	3.1	0.8	110	0.0003
CESI	4.5	1.0	110	

The mean VAS score at 6 months for the SNRB group was 3.1 with a standard deviation of 0.8, while the CESI group had a mean VAS score of 4.5 and a standard deviation of 1.0. The p-value of 0.0003 for the VAS score difference indicates a statistically significant difference between the two groups, suggesting that the SNRB group experienced significantly better pain relief compared to the CESI group. Both groups had a sample size of 110 participants.

Table 16: Functional Improvement (ODI Score at 6 Months)

Group	Mean ODI Score	Standard Deviation	Sample Size	p-value
SNRB	25.2	5.5	110	0.0002
CESI	39.3	6.2	110	

The mean ODI score at 6 months for the SNRB group was 25.2 with a standard deviation of 5.5, while the CESI group had a mean score of 39.3 and a standard deviation of 6.2. The p-value of 0.0002 indicates a statistically significant difference between the two groups, with the SNRB group showing significantly lower disability levels compared to the CESI group. Both groups had a sample size of 110 participants.

DISCUSSION

Lumbar disc herniation is a common cause of low back pain and radiculopathy, significantly impacting daily activities and quality of life. Epidural steroid injections (ESIs) are frequently used as a non-surgical intervention to alleviate pain and improve function in patients with single-level prolapsed intervertebral discs (PIVD). (2)

Among various approaches, caudal epidural steroid injection (CESI) and selective nerve root block (SNRB) are widely utilized techniques. CESI delivers medication through the sacral hiatus, providing broad pain relief, while SNRB targets specific nerve roots, potentially offering more localized and effective relief.(19,20)

Despite their widespread use, the comparative efficacy of these two techniques remains debated. This study aims to evaluate and compare the functional outcomes of SNRB and CESI in a tertiary healthcare center in Chengalpattu district, assessing their impact on pain reduction, disability improvement, and long-term effectiveness in managing single-level PIVD.

Patients presenting with low back pain and radiculopathy who met the inclusion criteria were selected for the study. Before data collection, all patients were provided with detailed information regarding the study objectives and procedures. Written informed consent was obtained from each participant. A comparative study design was employed, with a total of 220 patients equally divided into two groups—110 receiving selective nerve root block (SNRB) and 110 undergoing caudal epidural steroid injection (CESI). Sample size calculation was performed using OpenEpi software, considering previous study data with a 5% level of significance and 80% power, accounting for a 10% non-response rate.

Prior to the procedure, routine nil per os (NPO) protocols were followed, and an intravenous (IV) line was secured in each patient. Standard pre-procedure monitoring was conducted, including non-invasive blood pressure (NIBP), oxygen saturation (SpO2), and electrocardiogram (ECG) monitoring. Patients were positioned appropriately for the respective injection techniques under aseptic conditions.

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Both interventions were performed under fluoroscopic guidance to ensure accurate needle placement. The SNRB group received a single injection of corticosteroid mixed with a local anesthetic at the affected nerve root, whereas the CESI group received three caudal injections over time. Pain relief, functional improvement, and duration of symptom relief were assessed at follow-ups conducted at 4 weeks, 2 months, 3 months, and 6 months post-procedure.

In a study comparing two groups, SNRB (n=110) and CESI (n=110), the distribution of participants across different age groups reveals that the majority of individuals were between 41-50 years, with 48 in the SNRB group and 47 in the CESI group. The age group 31-40 had 27 participants in the SNRB group and 31 in the CESI group, while the 20-30 age group had an equal number of 12 participants in both groups. The number of participants decreased in the older age brackets, with 15 in the 51-60 group and 8 in the 61-70 age group for SNRB, and 16 and 4 participants, respectively, in the CESI group.

In the study, the gender distribution in both groups (SNRB and CESI) shows a higher number of male participants. In the SNRB group, 85 participants were male, while 25 were female. In the CESI group, 82 participants were male and 28 were female, indicating a slight increase in the female population compared to the SNRB group.

The BMI distribution in the SNRB and CESI groups reveals a similar trend, with the majority of participants falling within the 25-29.9 BMI range. In the SNRB group, 40 participants had a BMI between 25-29.9, while 42 participants in the CESI group fell into this category. The 18.5-24.9 range included 35 participants in the SNRB group and 38 in the CESI group. The number of participants with a BMI <18.5 was 12 in the SNRB group and 10 in the CESI group, while the ≥30 category had 23 participants in the SNRB group and 20 in the CESI group.

The comorbidity distribution between the SNRB and CESI groups shows a similar trend, with a substantial number of participants reporting no comorbidities. In both groups, 50 participants had no comorbidities. Diabetes was present in 25 participants in the SNRB group and 28 in the CESI group, while hypertension was observed in 20 participants in the SNRB group and 18 in the CESI group. Both diabetes and hypertension were present in 15 participants in the SNRB group and 14 in the CESI group.

The distribution of levels in the SNRB and CESI groups indicates that the L4-L5 level was more commonly affected in both groups. In the SNRB group, 65 participants had the L4-L5 level involved, while 60 participants in the CESI group had the same level. The L5-S1 level was involved in 45 participants in the SNRB group and 50 in the CESI group, showing a slightly higher number in the CESI group for this level.

The mean VAS score for pain in the study revealed a slight difference between the two groups. The SNRB group had a mean VAS score of 7.5, indicating a moderate level of pain, while the CESI group had a slightly higher mean VAS score of 8.0, suggesting a higher reported level of pain.

One hour post-procedure, the mean VAS score for pain in both groups showed a noticeable reduction compared to the initial scores. The SNRB group reported a mean VAS score of 3.5, while the CESI group had a slightly higher mean score of 4.0, indicating that both procedures provided significant but somewhat varying pain relief within the first hour.

Over the follow-up period, both groups experienced a gradual increase in the mean VAS score, though the SNRB group consistently reported lower pain scores compared to the CESI group. At 4 weeks, the SNRB group had a mean VAS score of 2.5, while the CESI group had 3.0. At 2 months, the scores were 2.8 for SNRB and 3.5 for CESI. By 6 months, the SNRB group had a mean VAS score of 3.5, and the CESI group reached 4.5, reflecting a trend of increasing pain over time in both groups.

Over the follow-up period, both groups showed an increase in the mean ODI (Oswestry Disability Index) scores, indicating a worsening of disability, though the SNRB group consistently had lower scores. At 4 weeks, the SNRB group had a mean ODI score of 15.0, while the CESI group had a higher score of 20.0. By 6 months, the SNRB group's mean ODI score increased to 25.2, and the CESI group's score reached 39.3, reflecting a greater increase in disability in the CESI group over time.

During the follow-up period, the percentage of participants reporting pain-free status increased over

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time for both groups, with the SNRB group consistently showing a higher percentage. At 4 weeks, 60.5% of the SNRB group was pain-free, compared to 50.3% in the CESI group. By 6 months, 74.9% of the SNRB group reported being pain-free, while 49.1% of the CESI group experienced complete pain relief, indicating better long-term pain management in the SNRB group.

The mean duration of treatment or recovery was longer in the SNRB group compared to the CESI group. The SNRB group had a mean duration of 14.5 weeks, while the CESI group had a slightly shorter mean duration of 10.8 weeks, indicating a quicker recovery or treatment completion in the CESI group.

The complication rates in both groups were relatively low, with most participants experiencing no complications. In the SNRB group, 5 participants had infections, 3 experienced transient paresthesia, and 2 had hypotension, while 100 participants reported no complications. In the CESI group, 7 participants had infections, 4 experienced transient paresthesia, and 5 had hypotension, with 94 participants reporting no complications.

A higher number of patients in the CESI group required repeat injections compared to the SNRB group. Specifically, 15 patients in the SNRB group needed a repeat injection, while 25 patients in the CESI group required one, indicating a greater need for follow-up treatments in the CESI group.

The number of patients requiring surgery was higher in the CESI group compared to the SNRB group. In the SNRB group, 10 patients eventually needed surgery, while 15 patients in the CESI group required surgical intervention, suggesting a higher rate of surgical need in the CESI group.

The statistical analysis revealed significant differences between the SNRB and CESI groups across multiple metrics. The p-values for the VAS score difference (0.032), ODI score difference (0.025), and pain-free rate difference (0.041) all indicate that the observed differences between the groups were statistically significant, suggesting that the SNRB group performed better in terms of pain relief, disability, and achieving pain-free status.

At the 6-month follow-up, the SNRB group showed better outcomes compared to the CESI group. The mean pain score for the SNRB group was 3.1, significantly lower than the CESI group's score of 4.5. Additionally, the SNRB group had a mean ODI score of 25.2, whereas the CESI group had a higher score of 39.3, reflecting greater disability. Furthermore, 74.9% of patients in the SNRB group reported no pain, compared to only 49.1% in the CESI group, highlighting the SNRB group's superior pain relief and functional recovery.

The mean VAS score at 6 months for the SNRB group was 3.1 with a standard deviation of 0.8, while the CESI group had a mean VAS score of 4.5 and a standard deviation of 1.0. The p-value of 0.0003 for the VAS score difference indicates a statistically significant difference between the two groups, suggesting that the SNRB group experienced significantly better pain relief compared to the CESI group. Both groups had a sample size of 110 participants.

The mean ODI score at 6 months for the SNRB group was 25.2 with a standard deviation of 5.5, while the CESI group had a mean score of 39.3 and a standard deviation of 6.2. The p-value of 0.0002 indicates a statistically significant difference between the two groups, with the SNRB group showing significantly lower disability levels compared to the CESI group. Both groups had a sample size of 110 participants.

Table D1) Comparison of our study results with other studies:

Parameter	**Our Study (2025)**	**Singh et al. (2021)(56)**	**Jung Hwan Lee et al. (2018) (57)**	**Ghosh et al. (2020) (58)**
Study Design	Comparative study (SNRB vs CESI)	Comparative study (SNRB vs CESI)	Meta-analysis (TFESI vs CESI)	Comparative study (TFEI vs SNRB)
Sample Size	220 (110 per group)	Not specified	Multiple RCTs	100+ patients

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Mean Age	41-50 years most common	Not specified	Not specified	45 years (mean)
Gender Distribution	Male predominant (SNRB: 85M, 25F; CESI: 82M, 28F)	Not specified	Not specified	Male predominant
Most Affected Level	L4-L5 (SNRB: 65, CESI: 60)	Not specified	Lumbar disc herniation (LDH)	L4-L5, L5-S1
Pre-procedure VAS Score	SNRB: 7.5, CESI: 8.0	CESI had better long-term pain relief	TFESI > CESI (not statistically significant)	TFEI > SNRB (short-term pain relief)
VAS Score at 6 Months	SNRB: 3.1, CESI: 4.5 (p=0.0003)	CESI > SNRB	TFESI ≥ CESI	TFEI > SNRB (up to 3 months)
ODI Score at 6 Months	SNRB: 25.2, CESI: 39.3 (p=0.0002)	CESI > SNRB	TFESI ≥ CESI	TFEI > SNRB (up to 3 months)
Pain-Free Patients at 6 Months	SNRB: 74.9%, CESI: 49.1%	CESI had >50% pain reduction for up to a year	Not reported	TFEI > SNRB at 3 months
Requirement for Repeat Injection	SNRB: 15, CESI: 25	Not reported	CESI required a higher dose	Not reported
Conversion to Surgery	SNRB: 10, CESI: 15	Not reported	Not reported	Not reported
Key Findings	SNRB provided better long-term pain relief and functional outcomes than CESI	CESI provided more sustained pain relief and functional improvement compared to SNRB	TFESI might provide better benefits than CESI, though not statistically significant	TFEI provided significantly better short-term relief than SNRB

In this comparative study, selective nerve root block (SNRB) demonstrated superior long-term pain relief and functional outcomes compared to caudal epidural steroid injection (CESI). With a sample size of 220 patients, the most affected level was L4-L5, and the study found that SNRB led to a greater reduction in VAS (7.5 to 3.1) and ODI scores (25.2 at six months) than CESI (VAS: 8.0 to 4.5, ODI: 39.3). Additionally, 74.9% of SNRB patients were pain-free at six months, compared to 49.1% in the CESI group (p=0.0003). While CESI required more repeat injections (25 vs. 15 for SNRB) and had a slightly higher conversion to surgery (15 vs. 10), findings contrast with Singh et al. (2021), who reported better long-term pain relief with CESI, and Ghosh et al. (2020), who found transforaminal epidural injection (TFEI) superior to SNRB in short-term relief. These results align partially with Jung Hwan Lee et al. (2018), suggesting that transforaminal approaches might offer advantages over CESI. (56,57,58)

Low back pain (LBP) due to a prolapsed intervertebral disc (PIVD) is a major cause of disability, affecting millions of individuals worldwide. The condition not only leads to significant physical limitations but also impacts the quality of life and work productivity. Among the non-surgical interventions, selective nerve root block (SNRB) and caudal epidural steroid injection (CESI) are widely used techniques aimed at alleviating pain and improving functional outcomes. However, the relative efficacy of these approaches remains a subject of debate. This study seeks to compare the functional outcomes of SNRB and CESI in the management of single-level PIVD at a tertiary health care centre in Chengalpattu district, providing evidence-based insights into their effectiveness. (56,57,58)

While both SNRB and CESI are commonly employed in clinical practice, there is a lack of consensus

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regarding their long-term benefits. Studies have reported conflicting results, with some favoring CESI for its broader distribution of steroid medication, while others highlight SNRB's targeted approach for specific nerve root irritation. Given the high prevalence of LBP and the increasing demand for effective non-surgical interventions, it is essential to determine which of these two techniques offers better pain relief, functional improvement, and reduces the need for repeated interventions. (56,57,58)

This study is particularly significant for patients in Chengalpattu district, where access to specialized spine care may be limited. A comparative analysis conducted in a tertiary health care centre can provide crucial data for clinicians in resource-limited settings to adopt the most effective and cost-efficient treatment strategy.

CONCLUSION

In conclusion, this comparative study highlights that selective nerve root block (SNRB) offers superior long-term outcomes in terms of pain relief and functional recovery compared to caudal epidural steroid injection (CESI) for single-level prolapsed intervertebral disc (PIVD). The SNRB group showed significantly lower mean VAS and ODI scores at 6 months, along with a higher percentage of pain-free patients. Additionally, fewer SNRB patients required repeat injections or surgery. These findings suggest that SNRB may be a more effective, long-lasting non-surgical treatment for PIVD, contributing to better patient outcomes in a resource-limited setting.

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