"FUNCTIONAL OUTCOME OF SELECTIVE NERVE ROOT BLOCK FOR LUMBAR RADICULOPATHY IN INTERVERTEBRAL DISC PROLAPSE"

BY

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DISSERTATION SUBMITTED TO

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, KOLAR, KARNATAKA

In partial fulfilment of the requirements for the degree of

MASTER OF SURGERY

IN

ORTHOPAEDICS

Under the Guidance of

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DEPARTMENT OF ORTHOPAEDICS

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ABSTRACT

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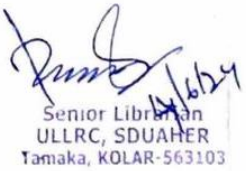

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FUNCTIONAL OUTCOME OF SELECTIVE NERVE ROOT BLOCK FOR LUMBAR RADICULOPATHY IN INTERVERTEBRAL DISC PROLAPSE ABSTRACT

Background: A leading cause of physical disability is radiculopathy accompanied by back discomfort in the lower back, which can be caused by prolapsed intervertebral discs (PIVD). Acupuncture, painkillers containing oral steroids, and bed rest are some of the conservative methods for treating LR. To diagnose and treat LR, an identified perturbed nerve root might be targeted using a local injection technique called a Selective Nerve Root Block (SNRB). Aim and Objective: By assessing

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FUNCTIONAL OUTCOME OF SELECTIVE NERVE ROOT BLOCK FOR LUMBAR RADICULOPATHY IN INTERVERTEBRAL DISC PROLAPSE

ABSTRACT

Background:

A leading cause of physical disability is radiculopathy accompanied by back discomfort in the lower back, which can be caused by prolapsed intervertebral discs (PIVD). Acupuncture, analgesics, oral steroids and bed rest are some of the conservative methods for treating lumbar radiculopathy (LR). An identified perturbed nerve root might be targeted to diagnose and treat LR using a local injection technique called a Selective Nerve Root Block (SNRB).

Aim and Objective:

By assessing functional outcomes using the Oswestry Disability Index (ODI), straight leg raise test (SLRT) and Numerical rating scale (NRS) in pre-injection and post-injection scores on days zero, thirty and ninety. The objective of this study is to ascertain whether SNRB intervention improves the outcome of PIVD with LR.

Methodology:

The prospective observational study was conducted among 35 consecutive patients of PIVD with LR who presented to the orthopaedics department of the R L Jalappa Hospital, Kolar, during the period between 1st September 2022 and 31st December 2023. As per the proforma, the patient's comprehensive medical history, clinical examination and radiological evaluation were documented.

Everyone was evaluated using the SLRT, ODI and NRS both before and after the procedure. A combination of 3ml drug [long-acting steroid (1ml) + local anaesthetic agent (2ml)] was instilled into each afflicted nerve root. All patients underwent an assessment on post-procedure day zero, followed by follow-up appointments at 30 and 90 days.

Results:

The mean age of enrolled patients was 39.63 ± 9.7 years. Among the enrolled patients, the most common side of radiating pain was the left side (57.1%) followed by the right side (42.9%). L4 - L5 was the most common level (45.7%) of PIVD, and the second most common level was L3-L4 (28.6%). The most common level at which SNRB injection was given in the present study was L4 (45.7%). All the patients tested SLRT positive before SNRB injection. After SNRB injection at day 0, all the patients tested SLRT negative, and it remained negative even at 30 days. At 90 days after SNRB injection only 4 patients were tested SLRT positive, and it was statistically significant by Fisher's exact test (P value 0.0001). The pain score decreased immediately after SNRB injection at day 0 of intervention (3.29). But this pain score increased at 30 days (4.14) but not more than the pre-procedure pain and later it decreased at 90 days after intervention (3.14). According to the paired t-test, this decline in the mean NRS score was regarded as significant. The disability assessment score decreased immediately after SNRB injection at day 0 of intervention

(7.83). However, this disability score remained the same at 30 days (7.86) and later it decreased at 90 days after intervention (6.86). A paired t-test revealed that this drop in the mean ODI score was deemed significant.

Inference:

SNRB injections have been shown to alleviate pain and disability in patients with LR in PIVD, the benefits of these injections have been observed to persist for up to three months post-administration, potentially improving their quality of life and functional status over an extended period.

Keywords: Prolapsed Intervertebral Disc, Straight Leg Raise Test, Selective Nerve Root Block, Numerical Rating Scale, Oswestry Disability Index, Lumbar Radiculopathy.

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ABBREVIATIONS

S. No	Abbreviation	Explanation
1	PIVD	Prolapsed Intervertebral Disc
2	NRS	Numerical Rating Scale
3	ODI	Oswestry Disability Index
4	SLRT	Straight Leg Raise test
5	SNRB	Selective Nerve Root Block
6	MRI	Magnetic Resonance Imaging
7	CT	Computed Tomography
8	USG	Ultrasonogram
9	LDH	Lumbar Disc Herniation
10	RMDQ	Roland Morris Disability Questionnaire
11	LFS	Lumbar foraminal stenosis
12	TFESI	Trans-foraminal epidural steroid injection
13	LR	Lumbar Radiculopathy
14	DH	Disc Herniation

INTRODUCTION

INTRODUCTION

As one of the most widespread problems in orthopaedics, pain in the lower back has dramatically increased in incidence and prevalence over the past 20 years.[1] A significant problem for healthcare providers is the management of bulging or herniated discs in the back, which can cause symptoms like sciatica or other back pain. LR is a condition defined by ache that starts in the back and radiates through one or more lumbar nerves, frequently extending into the leg or further. [2]

One of the most prevalent forms of impairment is PIVD, which results in radiculopathy and persistent back pain.[3] It affects both sexes equally, with an estimated frequency of 3-5% and a lifetime incidence ranging from 13-40%. [4,5] A painful electric jolt that travels along an inflamed nerve's pathway is known as radiculopathy. Mixter and Barr (1934) demonstrated a definite link between lumbar herniated discs and pain, which was previously unproven. [6] Chemical inflammation is one of the variables that contribute to the pathophysiology of pain in PIVD, alongside mechanical components. [7] Back and radicular pain may result from epidural inflammation caused by cytokines and other pro-inflammatory molecules released into the bloodstream by local immunological responses triggered by slid nucleus pulposus tissue into the epidural space. [6,8]

A number of sciatic stretch tests can be used to clinically detect LR. The SLRT is the gold standard; it involves lying the patient down on their back and having the doctor passively raise the afflicted leg with the knee completely extended. Suppose you can replicate radicular discomfort between 30 and 70 degrees of hip flexion. In that case, you have successfully performed a test that produces tensile strains at the roots of the sciatic nerve, and the lumbosacral nerve.[9] When SLRT comes positive, Passively dorsiflex the foot while lowering the leg to a level below your pain threshold. A positive Bragard's sign would be achieved if this manoeuvre produced pain comparable to the SLRT. [10]

Most individuals with radiculopathy due to PIVD recover on their own without medical intervention. [11] Acupuncture, analgesics, oral steroids and bed rest are some of the conservative methods for treating LR.[12] Discectomy procedures provide excellent short-term pain relief and are recommended for patients with cauda equina syndrome, developing neurological impairments, or severe radicular pain. Having said that, there are risks and problems associated with surgery. [13,14] Injecting anti-inflammatory drugs into the epidural space utilizing the caudal or transforaminal route helps alleviate pain caused by endo-neural oedema and leads to a rise in the microvascular penetration of the nerve roots. [15]

In order to diagnose and treat LR, a specific irritated nerve root might be targeted using a local injection technique called SNRB. [16–18] Administering a local anaesthetic drug along with a steroid group of drugs around the involved

nerve root with radiological assistance is the typical therapeutic technique for SNRB. Yet, injecting only the local anaesthetic is adequate for diagnostic purposes. The ache likely originates from an nerve root if a patient has immediate relief. Conversely, if there is no immediate relief, it suggests that the intended nerve block is the cause of the discomfort. [19] Several writers agree that SNRB is a good diagnostic tool. [16,17,20]

According to randomized clinical research, nerve blocks are usually more cost-effective than other surgical procedures.[21] In addition, SNRB can prevent surgery-related problems such as infection, hematoma, cerebrospinal fluid leakage due to dural rupture, and recurrence.[22]

In light of the above, we performed this intervention to appraise the functional outcome of SNRB containing 3 ml of injectable Triamcinolone (1ml) and 0.25% Bupivacaine(2ml) in patients treated at tertiary care hospitals for PIVD with LR. To fill these important gaps in our understanding, this research has examined the effectiveness of SNRB in reducing pain and improving functional results. We have also looked specifically at the usage of long-acting and particulate steroids in this evaluation. Our goal was to find out if these steroid compositions have any benefits regarding ache reduction, functional enhancement and how long the effects last.

AIMS & OBJECTIVES

AIM AND OBJECTIVES

AIM

To determine whether SNRB improves the functional outcome LR in PIVD. It was evaluated by the ODI, SLRT and NRS in pre-injection and post-injection scores on days zero, thirty and ninety.

OBJECTIVES

1. To estimate the pain by NRS on pre- and post-injection of SNRB on days 0, 30, and 90 among patients with LR in PIVD.

2. To determine whether SNRB improves the functional outcome of patients with LR in PIVD, as measured by the ODI, SLRT in pre-injection, and post-injection scores on days 0, 30, and 90.

ANATOMY & REVIEW OF LITERATURE

ANATOMY & REVIEW OF LITERATURE

Lumbar Spine

The lumbar spine, which extends from the first sacral vertebra (S1) to the last thoracic vertebra (T12), constitutes the lowermost portion of the spinal column. Five movable vertebrae (L1-L5) protect the spinal cord in this region by facilitating the uniform distribution of axial tension. [23]

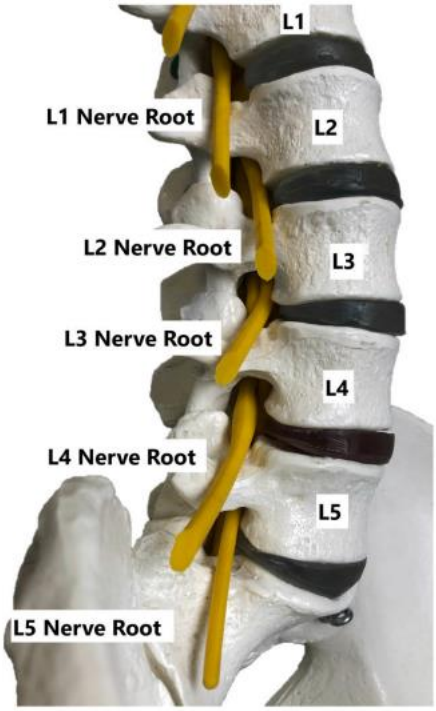


Figure 1: Lumbar spine and its spinal nerves[23]

The spinal cord culminates at the junction of the L1-L2 vertebrae in the conus medullaris, passing through the central region of the vertebral column. Coming from the Latin word for "horse's tail", the cauda equina is a group of spinal

nerve roots that, beginning at their termination at the spinal cord, go down throughout the left-over portion of the spinal canal.

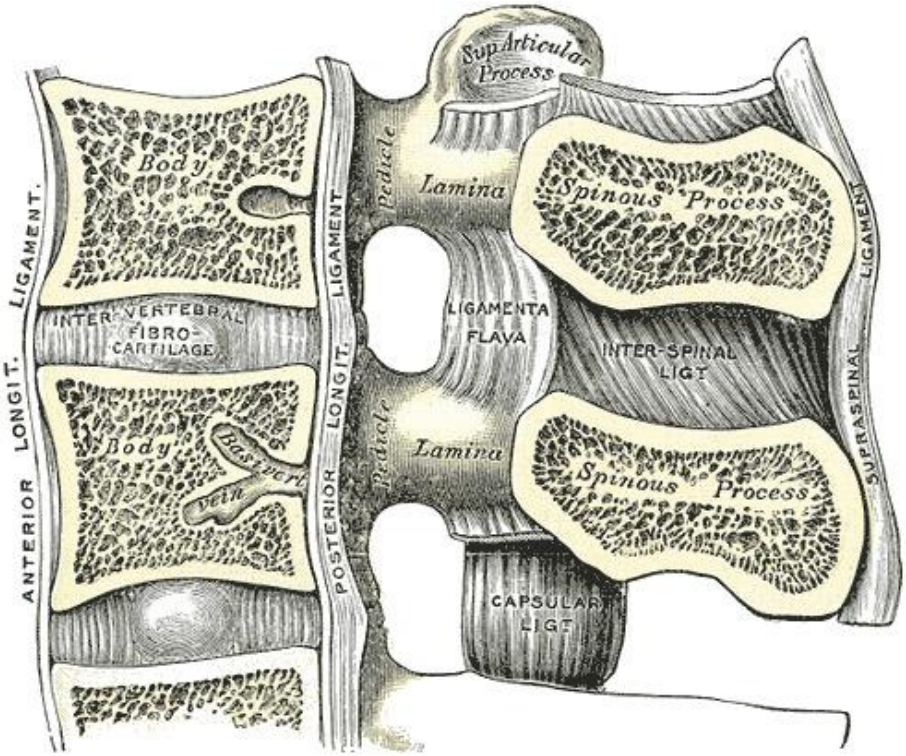


Figure 2: Anatomy of Vertebrae [23]

Muscles, cartilage, ligaments, and nerves constitute the lumbar spine. The structure and operation of the lumbar spine are significantly influenced by each of these constituent elements. [23]

Three essential tasks are performed by the lumbar spine. To begin with, the lumbar spine provides support for the higher body. In comparison to other sections, L1-L5 are considerably larger, enabling them to withstand the axial stresses transmitted from the head, neck, and trunk. A canal formed by the lumbar vertebrae delivers safeguard for the spinal cord and nerves. Messages

can be transmitted from the CNS to the inferior part of the body and vice versa via this configuration. A variety of truncal motions are possible with the lumbar spine, such as flexion, extension, rotation, and side bending.

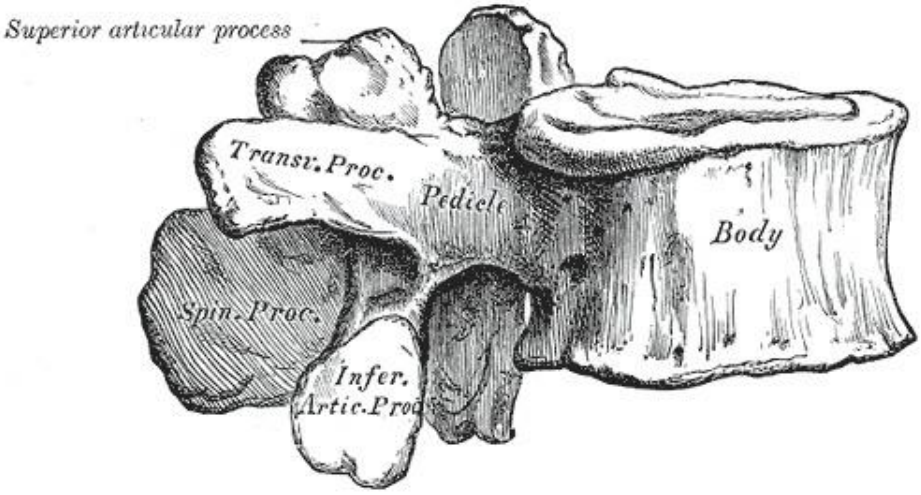


Figure 3: Side view of Lumbar Vertebra[23]

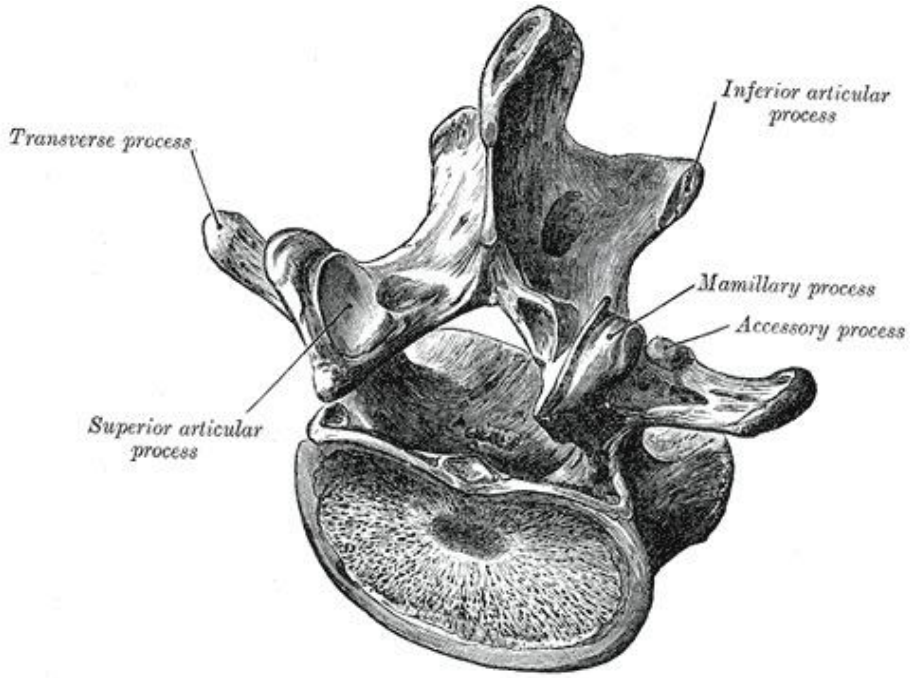


Figure 4: Overhead and backside view of Lumbar Vertebra[23]

Lumbar radiculopathy

On the list of the most frequently reported conditions examined by a spine surgeon is LR. An estimated three to five percent of the population is impacted, with both sexes being vulnerable. Age is the principal determinant, given that it results from a degenerative process occurring in the spinal column. Complaints commonly manifest during midlife, with males frequently experiencing symptoms in their forties and females in their fifties and sixties. [4,5] Certain demographic groups, including women pursuing physically demanding occupations like the military, pose a greater risk. The demographic composition of the general population is preponderantly male. [24]

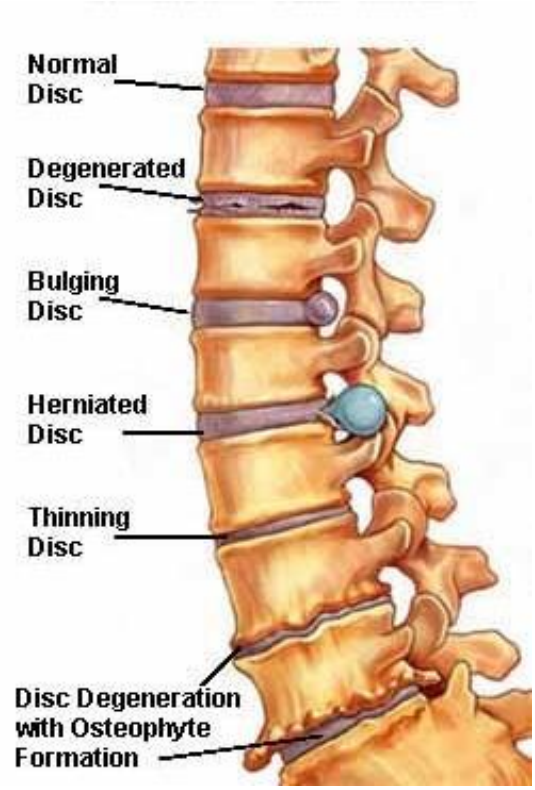


Figure 5: LR with disc bulge or prolapse.[24]

LR is primarily brought on by degenerative spondyloarthropathies as the underlying cause. [4] Patients often report back pain that is connected to their radiculopathy if they are experiencing it. Pain that extends down the legs is referred to as radiculopathy. Patients commonly describe the sensation as vibrant, searing, or intense pain. The most common underlying cause of LR is the irritation of a certain nerve. This inflammation, which is often the result of stress due to compression, can occur anywhere along the nerve.

It is possible for this compressive force to occur in the thecal sac when the nerve root exits the sac through the lateral recess, when the nerve root traverses the neural foramina, or regardless of when it exits the foramina in cases of spinal cord compression. Possible causes include spondylolisthesis, disc bulges or herniations, facet joints or ligament hypertrophy, neoplasms, or infections. To determine the cause and begin therapy, a comprehensive clinical examination is necessary.[25]

Sensory loss often manifests in a dermatomal fashion when nerve root compression pain is the classical aetiology of radiculopathy (Figure 1). There is a myotome pattern to how motor loss might happen (Table 1). Surgeons use imaging techniques like MRI and electrodiagnostic testing to pinpoint specific areas of the spine that are causing symptoms, based on the location of the pain and the results of the motor examination.

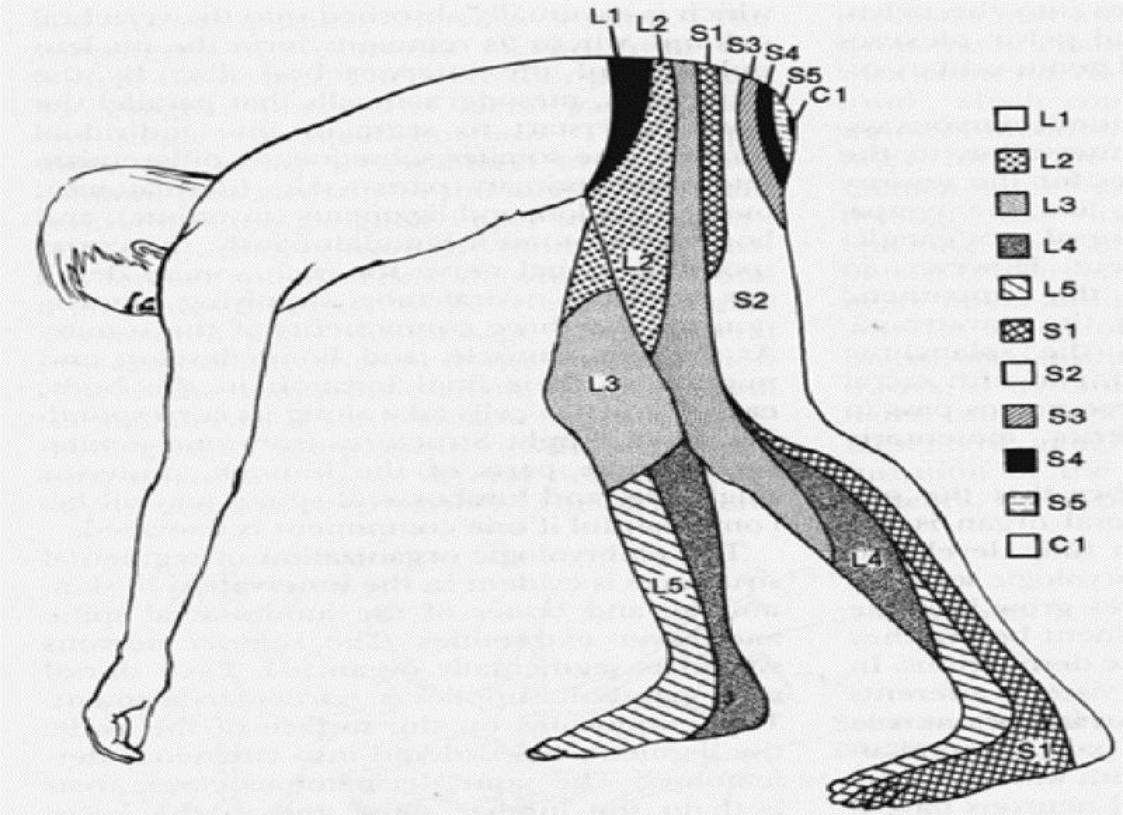


Figure 6: Anatomical atlas showing sensory dermatomes of the lumbo-sacral region. [25]

Spinal Nerve	Myotome
L2	Hip Flexion Iliopsoas
L3	Knee Extension
L4	Ankle Dorsiflexion Tibialis Anterior
L5	Ankle Eversion (peronous longus and brevis) Great Toe Extension Extensor Hallucis Longus
S1	Plantar Flexion Gastrocnemius, Soleus

Table 1: Anatomical distribution of lumbosacral myotomes[25]

Disc Herniation (DH)

The nucleus pulposus is forced out of the intervertebral space in a spinal herniated disc. Back discomfort can be caused by it. When people with herniated discs feel pain, they frequently recall a specific incident that set off their condition. The pain from a DH can be sharp, stinging or burning and it can even go down into the lower limbs, unlike the discomfort from a mechanical back. Additionally, changes in feeling or weakness may accompany more severe instances. Between each set of vertebrae in the spine lies a structure called a disc. As a shock absorber, it helps keep the spine in proper alignment. DH is an agonizing disorder that can sometimes lead to myelopathy. Myelopathy can be caused by an injury to a DH that has crushed a nerve or the spinal cord. According to current thinking, herniated discs cause pain by mechanically compressing nerves and by localizing an increase in inflammatory cytokines.[26]

Regrettably, there are not many conservative therapy options that are reliable. Most instances of painful DH recover within a few weeks. Many patients report no discomfort at all from their herniated discs. If a patient is asymptomatic, an MRI may nevertheless reveal a herniated disc. If a patient's symptoms of a stable DH continue for more than six weeks, radiological imaging may be warranted. Most DH patients recover without surgery, however, those who don't

respond to conservative treatment may need interventional techniques or perhaps surgery. [26]

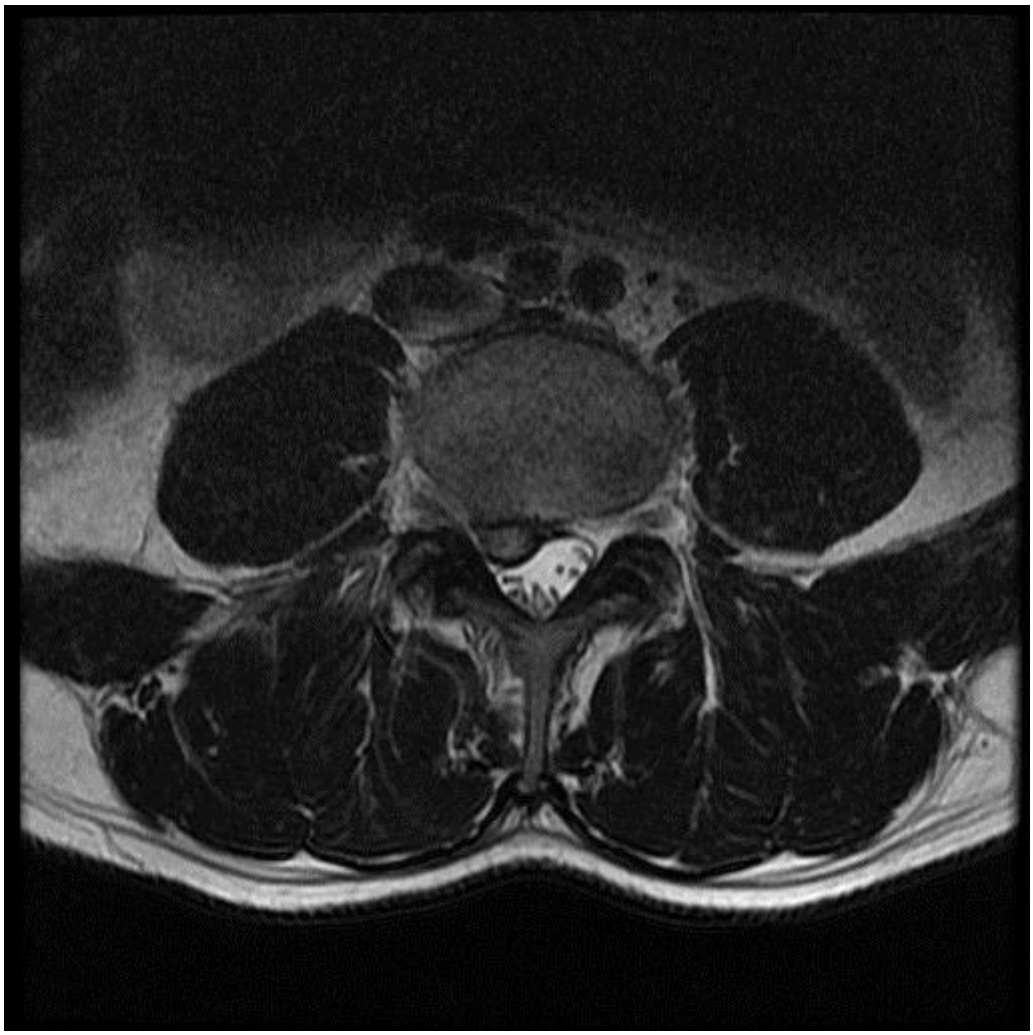


Figure 7: MRI of Lumbar spine showing DH[27]

Aetiology

DH is often caused by a degenerative process where the nucleus pulposus weakens and loses moisture as people age. A DH, which can cause symptoms over time, will develop because of this procedure. Trauma is second among the leading causes of DH. The cervical spine is the next most common site of DH

after the lumbar spine. Because of the biomechanical pressures acting on the spine's pliability, DH is more common in the cervical as well as lumbar regions. The occurrence of DH is rare in the thoracic spine. [28,29]

DH can happen in smoking, engaging in weight-bearing sports like weightlifting or hammer throwing, or doing certain jobs that require moving heavy objects repeatedly. There is some, but not clear, evidence that driving increases the risk of DH. [24,30,31]

Epidemiology

Herniated discs occur at a rate of 5 to 20 per 1000 individuals each year; they are most prevalent in those in their 30s and 40sand the male-to-female ratio is 2:1.[32] Around 1-3 percent of people are thought to have a DH in the lumbar spine that causes symptoms. People in the 30–50 age bracket have the highest incidence. Herniated discs most commonly develop between the spinal columns L4-5 or L5-S1 in people aged 25–55 years. [24] Less than 5% of those experiencing back discomfort have disc damage as the underlying cause. [33]

Intervertebral DHs

Most cases of LR, an inflammation of the nerve roots caused by pressure on the nucleus pulposus, occur as a result of intervertebral DH (Figure 8a, b). Both acute injuries and the gradual degeneration and desiccation of the intervertebral disc that comes with ageing can cause this. [1]

DHs are described using a variety of nomenclature systems and there are several extant approaches for classifying them. DHs may be classified into four main groups according to their anatomical location: central, paracentral, foraminal and far lateral. [34] The form of the dislodged material on the disc determines whether it is defined as protrusion, extrusion, or sequestration. [35]

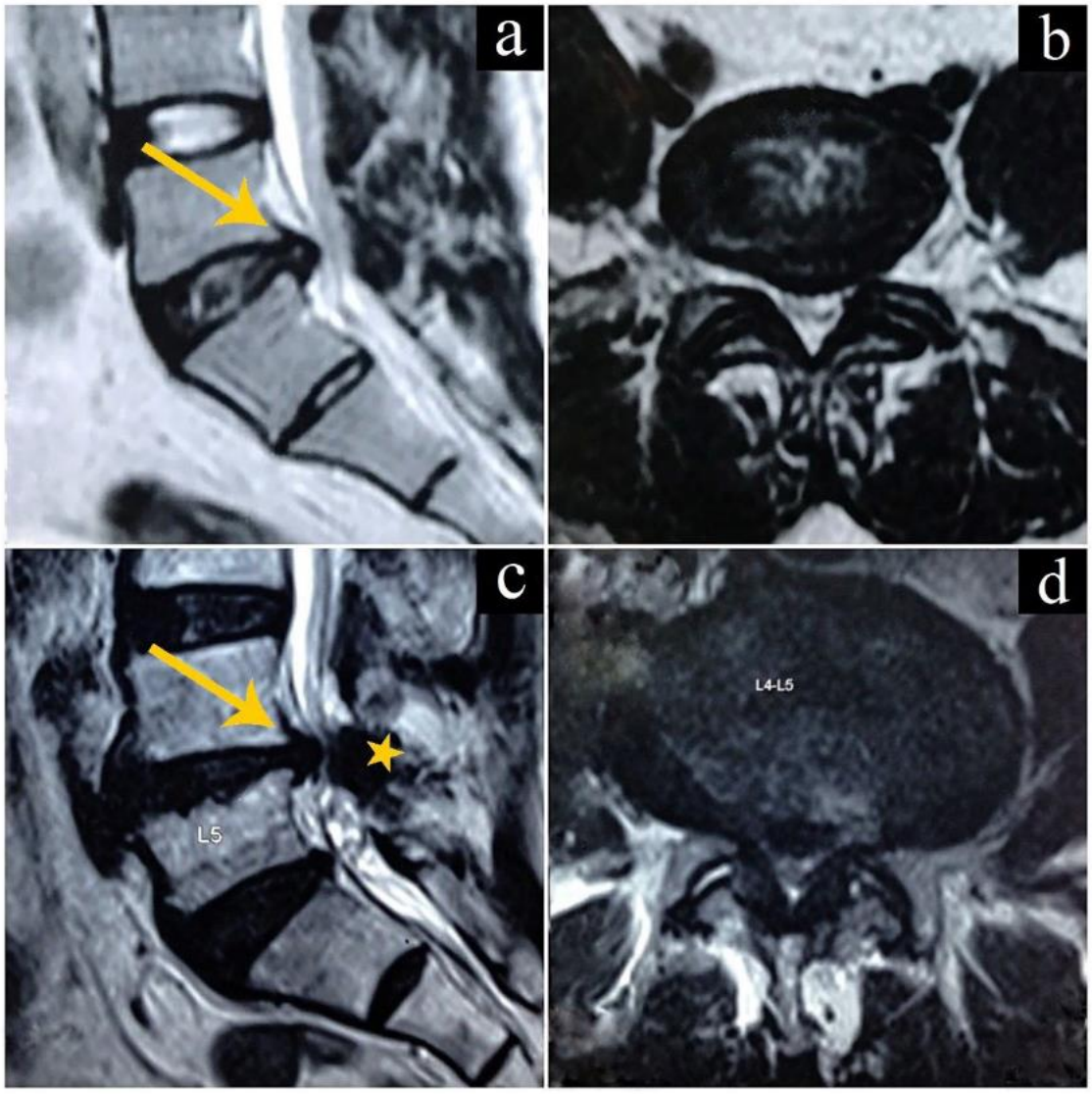


Figure 8: MRI images showing intervertebral DHs. [1]

The categorization method developed by Michigan State University (MSU) is more complex and relies on the herniation's morphology. [36] To establish an intra-facet line, a horizontal line is drawn around the lumbar canal. In accordance with Figures 10 and 11, this line extends between and across the medial margins of the articulations of the right as well as the left facet joints. An evaluation of the amount of the DH and its location is performed at the point where the extrusion is at its greatest. [36]

Many times, DHs are classified as being positioned in the middle, on the side, or on the side that is the farthest away from the disc. However, this is an erroneous description. A, B, or C are the names given to the lesion to provide further specificity. Three points are placed across the intra-facet line (figure) to produce four quarters that are similar to one another.

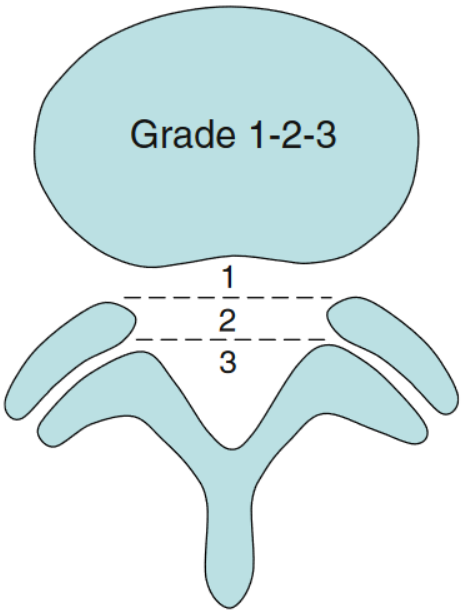


Figure 9: Grading the DH for size. [36]

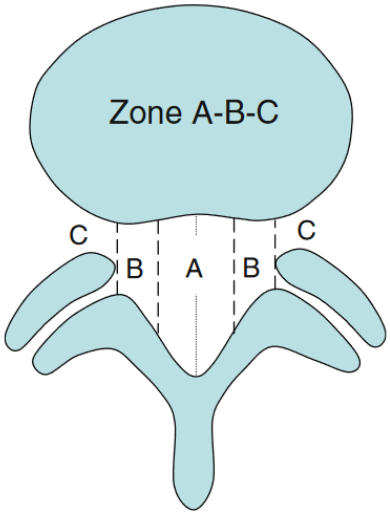


Figure 10: Zoning the disc for location. [36]

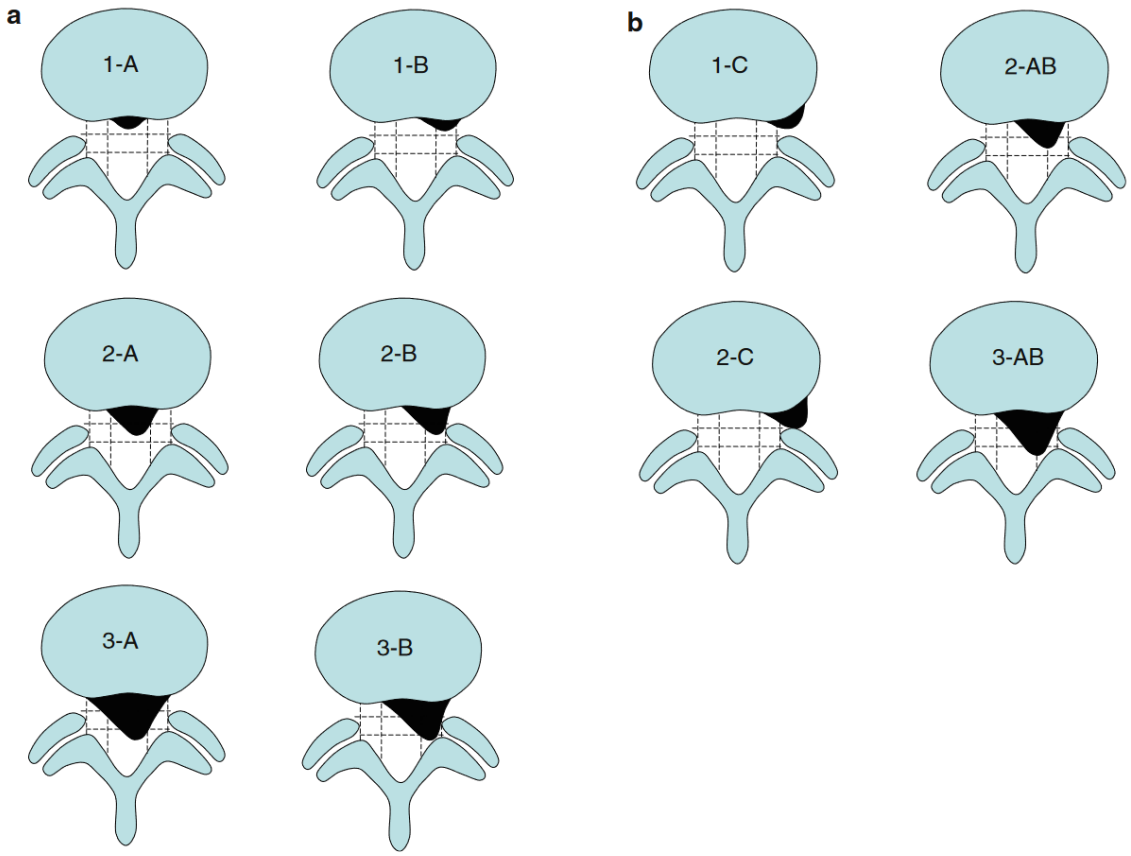


Figure 11: Combining size and location. [36]

At the same time, Pfirrmann's grading system uses a T2-axial cut MRI at the maximum DH level. Still, instead of classifying the degree of nerve root impairment instigated by DH into two groups, it uses four categories and it shows a strong association with surgical results. [37]

Although therapeutic SNRBs could be tried for any of the radiculopathy-causing DHs listed in these classification systems, they are typically reserved for less severe cases because patients with severe DHs only experience short-lived relief after the procedure. [38] There is a need for a systematic evidence-

based guideline, yet a dearth of research that evaluates and describes outcomes after SNRBs using these complex categorization systems.

Evaluation of DH

Herniated discs present themselves in a manner that is consistent across the spine. One of the things that the patient is likely to recall is the injury, which is typically caused by lifting or twisting. Additionally, a sensation that is either acute or searing might be employed to communicate the feeling of anguish. The pain may spread outward for a variety of reasons, depending on the location of the nerve root that is crushed. Throughout the course of the nerve root, there is a risk that the patient will suffer tingling, numbness, or loss of sensation depending on the severity of the condition. When the situation is more severe, the individual may be encouraged to demonstrate signs of weakness or an uneven stride. [26]

History[26]

One sign of a DH in the lumbar spine is a loss of sensation or weakness in a particular muscle group.

When reviewing the medical records of the individual, it is important to include the individual's primary complaints, the time when symptoms first appeared, as well as the area of the pain's starting point and its distribution. The medical

history should include a record of any past treatments that have been administered.

Physical Examination[26]

Finding the exact spot of compression requires a thorough neurological evaluation. The various stages correspond to sensory loss, weakness, pain and reflex loss.

- Inguinal discomfort and numbness are typical symptoms of the **L1 nerve**. Weakness in hip flexion is uncommon and the impulse to stretch is unaffected.
- Symptoms associated with the **L2-L3-L4 nerves** include diminished patellar reflex, weakness in knee extension and flexion, lack of sensation in the medial lower leg and anterior thigh and back discomfort that radiates into these areas.
- A condition affecting the **L5 nerve** can manifest in a variety of ways, including a loss of sensation in the buttock, lateral thigh, lateral calf and the area between the first and second toes on the bottom of the foot.

  Weakness in the areas of hip abduction, knee flexion, foot dorsiflexion, toe extension and flexion, inversion and eversion of the foot, and a diminished semitendinosus/semimembranosus reflex.

Straight Leg Raise Test (SLRT). [9]

In the case of LDH, for example, there isn't necessarily a correlation between the results of imaging tests, symptoms and the results of a bodily assessment. The SLRT test has set the bar high for diagnosing LDHs and has demonstrated a robust correlation with post-operative outcomes due to its exceptional sensitivity in identifying solely DHs causing root compression.

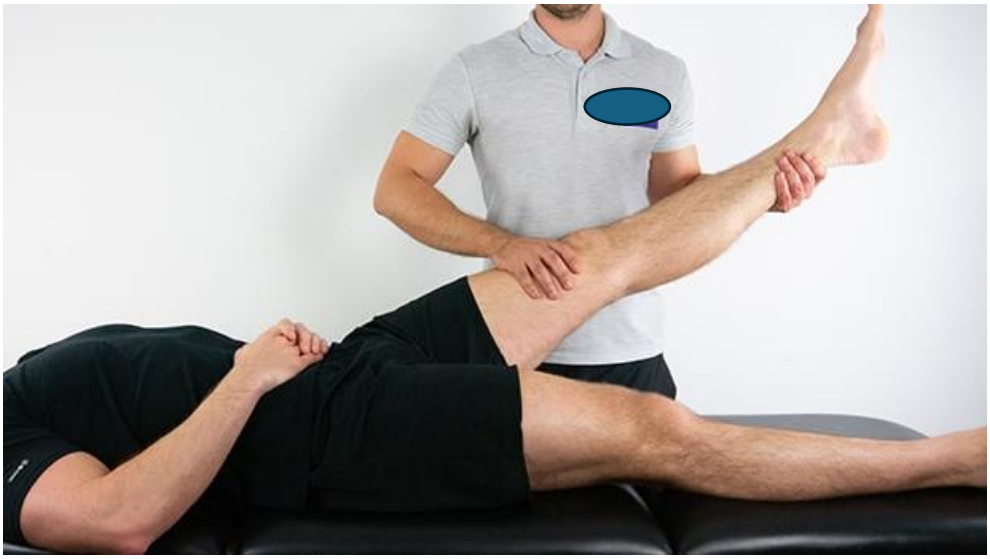


Figure 12: Straight leg raise test. [9]

When the SLRT comes back negative for a DH, Slump, may be utilized. Sitting through a sequence of motions meant to put the sciatic nerve roots under increasing strain, the Slump test is a variation of the SLRT/ Lasègue's tests. Throughout the examination, the patient reports any sensations of radicular discomfort to the physician. Consequently, if the SLRT comes out negative, the examiner should be warned about the possibility of nerve root compression

because the Slump test imparts traction to the roots by combining hip and spinal joint flexion with leg lifting. [9]

Crossed SLRT:[27]

Like the SLRT, the doctor lies the individual's face down and elevates the symptom-free leg to check for any abnormalities. When the manoeuvre brings back the patient's usual paraesthesia and pain, it's considered a positive test. The specificity of the test is more than 90%.

Imaging

X-rays: [26]

The majority of medical facilities and doctor's offices have these readily available. Any structural instability may be evaluated using this imaging approach. A computerized tomography (CT) or MRI scan is required for additional investigation in cases when X-rays reveal any abnormality.

CT SCAN: [26]

It is the gold standard for studying spinal bone structures. Calcified herniated discs can also be shown. Compared to X-rays, it is not as easily available in office environments. However, compared to MRI, it is more practical. It is possible to see herniated discs with CT myelography in individuals with implanted devices that are not comparable to MRI.

MRI [26]

It is the most sensitive and preferred method for visualizing herniated discs. If necessary, MRI results will assist providers in devising operative care, including surgeons.

Management

Conservative Treatments[26]

Herniated disc-related acute cervical and lumbar radiculopathies are predominantly treated non-surgically. Physical therapy and Non-steroidal anti-inflammatory drugs (NSAIDs) are the initial treatment options. Physical therapy is not advised for the duration of the initial symptomatic episode. DH typically resolves within a few weeks following the initiation of symptoms; therefore, physical therapy should not be initiated until symptoms have persisted for a minimum of three weeks. These methods are exceptional for the treatment of incapacitating pain.

Patients with neurological problems or who do not respond to conservative therapy should be consulted for surgery as soon as possible. [39] Oral corticosteroids and cyclobenzaprine, muscle relaxants, have a lack of data supporting their usage. [40] Opioid analgesics are necessary in situations where traditional pain relievers have failed to alleviate the discomfort. It is important to consult with patients about the potential risks, benefits and side effects of

their medication before prescribing opioids and to administer them for the shortest term that is safe.

As a second line of treatment, translaminar epidural injections as well as SNRB are used for individuals who have symptoms that have remained for anywhere from 4 to 6 weeks after normal medications have failed. Although there isn't a ton of data on how well epidural injections work in the long term, it's common practice to consider getting another shot. [41,42]

Surgical Treatments

The operational procedure is hoarded for extreme difficulties in pain management. DHs can develop in the cervical or lumbar regions and when they do, surgeons have two surgical options: laminectomy and discectomy. Additionally, anterior cervical decompression and fusion a viable options for the management of patients afflicted with cervical spine herniated discs. Disc replacement with an artificial one is an option to think about. Complete discectomy and fusion are other alternate lumbar spine surgical treatments that can be performed using an anterior or lateral approach. Moderate and in most cases, diminishing benefits are associated with surgical intervention.[43]

Prognosis

Because most patients with back pain get therapy and a formal diagnosis isn't always established, it's hard to tell how a DH develops over time. [30]

Most patients get a marked improvement in their symptoms after 6 weeks and only around 10% continue to experience severe enough pain to contemplate surgical intervention. According to sequential MRIs, the DH usually shrinks with time; within six months, two-thirds of patients experience full or partial resolution. [44]

Selective Nerve Root Block[45]

In both the cervical and lumbar regions, SNRB is utilized in the treatment of radicular pain caused by a specific nerve root pathology. [38] Since its description in 1971, selective nerve root blocks have grown in popularity to circumvent the risks associated with surgical procedures for LR. The use of SNRBs can be applied in both investigative and medicinal applications.[46] Injecting local anaesthetics at precise anatomical points enables SNRBs to forecast where a patient's discomfort is coming from. This treatment is based on injecting a steroid into the nerve root to decrease inflammation and, in turn, the level of pain. When imaging results don't match up with symptoms or when there are many levels of spinal illness, this comes in handy. Permanent symptomatic alleviation in cases of spinal stenosis and vertebral disc prolapse has also been demonstrated with the use of different injectables. [18]

The procedure's most crucial stage is needle placement. Multiple methods exist, each tailored to a certain level of competence; nevertheless, the "oblique Scottie dog" method has become standard practice owing to its remarkable

effectiveness. The procedure involves taking an oblique view X-ray image of the vertebrae by inserting the needle bearing out beneath the "Scottie dog's" neck.

Both methods target the needlepoint toward the so-called "safe zone" or "safe triangle"; the only real difference between them is the X-ray image, but otherwise the needle track is quite similar. In this area, the pedicle serves as the base, the lateral vertebral border as the side perpendicular to the base, and the exiting nerve root as the hypotenuse, making an inverted right-angled triangle.

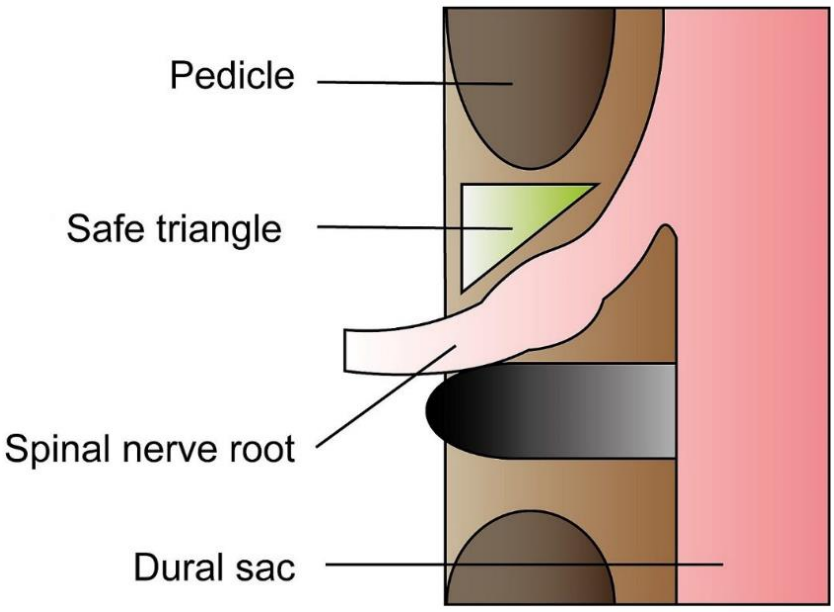


Figure 13: The safe triangle and its perimeter are shown graphically. [1]

Despite the widespread usage of SNRBs, there is still no level-one data to suggest whether injecting local anaesthetic by itself or using a mixture of steroid groups and local anaesthetic medication is more effective in easing symptoms. [45] Strangely, studies that document this rarely specify where the needle tip is

concerning the severity of the underlying condition. This seems like it should be a key metric for SNRB effectiveness.

So, it's important to be cautious when comparing and drawing conclusions from these studies if practitioners inject at different locations for different clinical scenarios. The possibility for unanticipated diversity in study designs therefore necessitates questioning the external validity of critical appraisals and meta-analyses. [47]

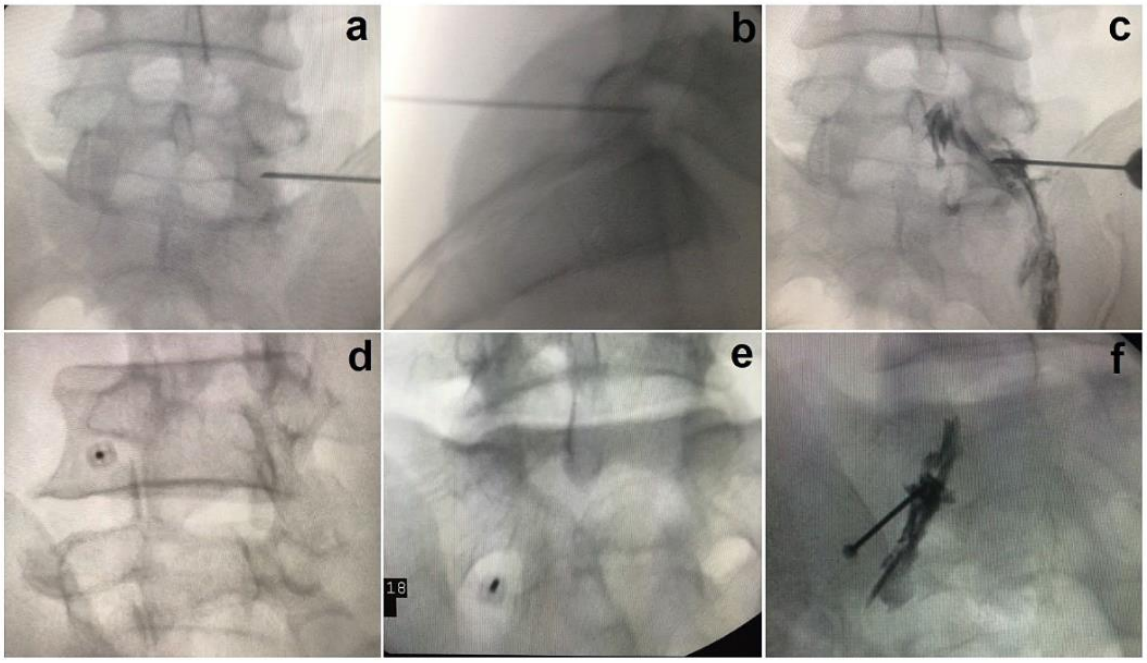


Figure 14: C-arm images during the SNRB procedure. [1]

Ultrasonogram (USG) Guided SNRB

The decrease in radiation exposure to the patient is one reason why USG-guided injection for lumbar levels has been on the raise recently. This is because the method simply requires confirmation X-ray pictures. [48] Because the foraminal

region is often obscured by bony features in ultrasound images, the procedure may be challenging for first-time users of the technology to visualize the finished needle tip. [49]

Complications of SNRB[50]

- Intravascular penetration,
- Bleeding,
- Local hematoma,
- Bruising,
- Vasovagal reaction,
- Nerve root injury/ irritation,
- Facet joint or disc entry,
- Facial flushing,
- Increased pain and numbness,
- Injection site pain,
- Flushing headache and weakness.

Relevant articles evaluating the functional outcome of SNRB for LR in PIVD.

1. In order to determine if steroid injection with SNRB is successful in controlling pain and disability induced by LDH, Sudhir et al. conducted a follow-up RCT in India. [51] Participants were followed by investigators at a tertiary care hospital from 2013 to 2014. The study included 80 individuals who had back pain, one-level LDHand LR; following six weeks of non-invasive therapy, none of them showed any improvement. They found that compared to SNRB, the caudal epidural block is a safe, straight forward way to alleviate pain and improve functional impairment. An experienced anesthesiologist is required to provide the technically more complex procedure of SNRB injection.

2. In 2015, Mehmood Khan et al. studied 120 patients in India who had LDH, back pain and LR. Following 6 weeks of conservative treatment, the patients still did not show any improvement. [52] Following 6-month follow-up after injecting SNRB, the VAS and ODI scores dropped significantly. They deduced that for lumber intervertebral DH, a simple and safe procedure is selective nerve root block, which improves functional impairment and provides better pain relief in the short, medium and long terms.

3. Forty patients suffering from persistent radicular pain due to disc prolapse of varying degrees impacting a single lumbar nerve root were the subjects

of a 2015 study by Arun Kumar et al. in India. [38] Before analysis, each participant was injected with a 40 mg steroid-based solution along with a local anaesthetic into the afflicted nerve root. Those rated as mild experienced 4.90 days of respite, while those rated as moderate got 2.5 months of alleviation. Outside of the short-lived alleviation following the procedure, patients suffering from significant disc prolapse reported little improvement. As few as 20% of patients reported continued improvement after 6 months.

4. In 2016, Kanna et al. performed research in an Indian tertiary referral spine care hospital. [22] In the trial, SNRB was administered to 91 patients who had LDH (LDH) confirmed by MRI, who presented with unilateral radiculopathy, whose symptoms had been present for less than three months and who had not responded adequately to three weeks of conservative treatment. With a success rate of 75.8%, 69 people were able to keep their pain alleviation for at least a year. Following the failure of NRB, twenty-two individuals were operated upon. Patients who had sensory problems and had higher mean scores on the ODI before as well as after injection were more likely to have a failed SNRB. In patients with acute LDH, they found that SNRB is a successful approach that consistently relieves symptoms for at least one year.

5. Fifty patients with LR who underwent SNRB at J.L.N. Hospital & Research Centre, Bhilai, were the subjects of prospective observational research by Vashishtha et al., which ran from August 2016 to March 2018. [53] Compared to the pain and activity levels measured before the operation, the mean VAS improved immediately after SNRB. At the one-week, four-week and three-month follow-up points, the ODI score dropped 37.7 percent, 54.8 percent and 66.0 percent, respectively.

6. Dhakal et al. (2019) performed prospective observational research in Nepal for a year on 35 patients treated with SNRB for LR. The research enrolled patients who had one level of disc prolapse, leg discomfort and a positive straight leg raise test. [54] SNRB considerably decreased VAS Score for till 1 year in patients with LR, according to their findings. But after about six months, the pain reduction stops becoming any better. The disability index score drops over the first six months, but then it stays quite stable for the next twelve months.

7. From January 2019 to June 2019, researchers Thakur et al. visited the Nepal Police Hospital to carry out their study. [3] MRI verified 29 cases of radicular discomfort. All individuals who were eligible for the study were given SNRB. The NRS and the Roland Morris Disability Questionnaire (RMDQ) were used in a prospective evaluation of the treatment outcome over the 6-month follow-up period. They came to the conclusion that for

patients suffering from LR due to a 1 level disc prolapse, SNRB provides an instantaneous alleviation of pain. Even in very active patients, like police officers, it lessens impairment.

8. Research was carried out in Korea by Sangbong et al. in 2019. The study comprised 233 individuals who had Lumbar foraminal stenosis (LFS). [55] Two, twelve-and twenty-four-weeks following injection, patients undergoing SNRBs had their symptoms evaluated for improvement. They found that after 2 weeks, SNRB decreased pain by 51% in LFS patients. Individuals with LFS grades 1T, 2, or 3 had better outcomes after 12 weeks on SNRBs than individuals with grade 1V.

9. To determine which patients would benefit most from lumbar decompression surgery and to evaluate the predictive validity of SNRBs, Beynon et al. performed a systematic evaluation in the UK in 2019. [19] They conclude that SNRB is a risk-free test with minimal potential for serious problems, but it is still debatable whether the extra diagnostic data it yields is worth the price.

10. In the year 2020, 76 individuals suffering from LBP or sciatica participated in a concurrent trial in Jordan, carried out by Kanaan et al. They looked at how well fluoroscopically guided SNRB worked for treating LR in the clinic. [56] They found that as many as 29% of individuals experienced pain alleviation lasting six months or more with

just one SNRB. Because of this, it is a viable option to postpone or even eliminate the necessity for surgery and it is an excellent adjunct to conservative therapy.

11. In 2020, Viswanathan et al. conducted a review in India based on evidence.[57] The evaluation included 539 publications that covered different aspects of lumbar transforaminal epidural steroid injection. They concluded that SNRB had a reported effectiveness rate of 76% to 88% overall. The time immediately following injection was when most of the positive effects were felt.

12. In 2021, 50 patients in India had undergone SNRBs as part of a prospective trial by Hamza Shaikh et al., who monitored them for three months. [58] After three months of following up with an injection of SNRB, the VAS and ODI scores dropped significantly. Because it alleviates leg and back pain and impairment in most patients immediately and for an extended period of time, they concluded that an SNRB should be administered early on during LR.

13. Sixty patients hospitalized in India with low back pain from neural foraminal stenosis or ruptured discs were the subjects of a study by Somashekara et al. by the year 2023. After 12 weeks, patients with PIVD and neural foraminal stenosis who had a combination of bupivacaine and

triamcinolone injections reported less pain and less impairment than those in the control group who had bupivacaine injections alone.[59]

14. Lumbar transforaminal epidural steroid injection (LTFESI) was studied by Dhandapani et al. to determine its effectiveness in alleviating pain and enhancing functional results for patients suffering from LR in India within the year 2023. [60] Results indicated that the NRS pain ratings decreased following the epidural steroid injection, going from 4.36 on the pre-injection score to 1.05 on the six-month post-injection score, with further decreases observed after 24 hours, one month, three months and six months after the injection. Another indicator that declined with time was the mean ODI score.

MATERIALS & METHODS

MATERIALS AND METHODS

STUDY DESIGN:

The study recruited patients who were diagnosed to have PIVD with LR. It is a prospective observational design.

STUDY AREA:

The research participants were individuals who were admitted to the orthopaedics department of RL Jalappa Hospital and research centre Tamaka, Kolar, due to PIVD accompanied by LR.

STUDY PERIOD AND DURATION:

From 1st September 2022 to 31st December 2023, a span of one year and four months.

STUDY POPULATION:

The study included all patients identified as PIVD with LR who were admitted under the Department of Orthopaedics at RL Jalappa Hospital during the study period.

SAMPLE SIZE CALCULATION

A prospective observational study was undertaken by Dhakal et al. to examine patients who had been diagnosed with LR over the course of one year. The clinical efficacy of SNRB in the treatment of LR caused by disc prolapse was

evaluated. The VAS score before intervention (7.8 ± 0.7) was significantly reduced to 2.74 ± 1.06 postinjection after 30 days. [54]

Under the assumption of a 1% alpha error (limit of 99% confidence) and an 80% research power,

The estimated minimum required sample size was twenty-four.

The sample size was derived from the following formula:

$$n \geq \frac{2\left(Z_{1-\alpha/2} + Z_{1-\beta}\right)^2}{\left(\delta_{Difference} / \sigma_{Difference}\right)^2} + \frac{Z_{1-\alpha/2}^2}{2}$$

The critical value for the 95% confidence interval is denoted as Z.

α is the type 1 error rate, β is the type 2 error rate

δ is the expected mean difference of the outcome between the two groups

σ is the expected deviation of the difference of the outcome between the two groups

The sample size was calculated using OpenEpi software version 3.01 (Open-Source Epidemiologic Statistics for Public Health).

In accordance with the inclusion and exclusion criteria, the ultimate sample size was increased to 35 patients.

INCLUSION CRITERIA:

- Patients who present with radicular discomfort and fall within the age range of 18 to 60 years.
- Symptoms persist for a duration exceeding one month and fail to be alleviated through conservative treatment.
- An indication of PIVD on the corresponding nerve root is detected through lumbosacral MRI.
- Patient who is willing to give written informed consent for the above-mentioned intervention.

EXCLUSION CRITERIA:

- The patient presents primarily with back pain rather than radiating pain.
- PIVD with spinal instability in a patient.
- History of previous spinal surgeries.
- Uncontrolled diabetes mellitus.
- A history of untoward reactions to local anaesthetics.
- Disorders of the skin surrounding the injection site.
- Patients with Cauda equina syndrome.

SAMPLING METHOD:

Individuals who were admitted to the orthopaedics department of RL Jalappa Hospital, an affiliated medical facility of the Sri Devaraj Urs Academy of Higher Education and Research, Tamaka in Kolar and received a diagnosis of PIVD with LR between September 2022 and December 2023.

DATA COLLECTION AND PROCEDURE

As per the proforma, the patient's comprehensive medical history, clinical examination and radiological evaluation were documented. Each individual was evaluated using the SLRT, ODI and NRS both before and after the procedure.

Drugs used:

- Injection Xylocaine (2%) was used for local anaesthesia of overlying skin.
- Injection Bupivacaine (0.25%) was used as a Long-acting local anaesthetic agent for nerve root block.
- Injection Triamcinolone (1mL/40 mg) was used as a Long-acting steroid for nerve root block.

Within the OT, after taking written informed consent, the patient was put in the prone position. Aseptic precautions were observed, parts painted and draped, and 3 millilitres of local anaesthetic were injected into the skin and subcutaneous tissue at the area of interest.

After inserting a 22-gauge spinal needle into the pars interarticularis through the safety triangle, the needle was positioned above and to the side of the departing nerve root. The location of the needle was verified under fluoroscopic C-ARM by capturing anteroposterior and lateral views.

One millilitre of steroid solution with two millilitres of local anaesthetic was injected into each afflicted nerve root once the injection site had been confirmed.

After the procedure, every patient was evaluated immediately post-procedure, again at the 30-days and 90-days. The functional outcome of each patient was evaluated using the ODI, NRS and SLRT. The results were updated in the Proforma.

STUDY TOOLS

1. NRS, as mentioned in Annexure

2. ODI, as mentioned in Annexure

3. SLRT, as mentioned in Annexure

ETHICAL CONSIDERATION

Regarding matters of ethics, the approval was given by the Institutional Ethics Committee. The procedure was conducted only after a comprehensive preoperative examination and the patient's informed, written consent had been

obtained. By strictly limiting data use to study-related activities, researchers ensured that participants' anonymity and privacy were protected throughout the research.

DATA ANALYSIS

- The collected information was subsequently imported into Microsoft Excel and analysed using IBM SPSS 23.0, a statistical software.

- Descriptive statistics for discrete variables were utilized to characterize the data through the implementation of frequency analysis and percentage analysis. The measures of mean, median, and standard deviation were utilized to characterize continuous variables.

- To characterize the data in inferential statistics, statistically significant differences between discrete variables in the two groups were examined using Fisher's exact test. The Paired t-test was used to determine if there was a statistically significant change between the pre-and post-intervention values of continuous variables.

- The statistical procedures all utilized a significance level of 0.05 for the probability value.

RESULTS

RESULTS

Table 2: Representation of enrolled patients based on age.

Age	
Mean	39.63
Std. Deviation	9.753
Range	37
Minimum	23
Maximum	60

The average age of the participants was 39.63 ± 9.7 years. The minimal and maximum ages of the participants in the investigation were, respectively, 23 and 60 years.

Figure 15: Box and Whisker plot showing representation of enrolled patients based on age.

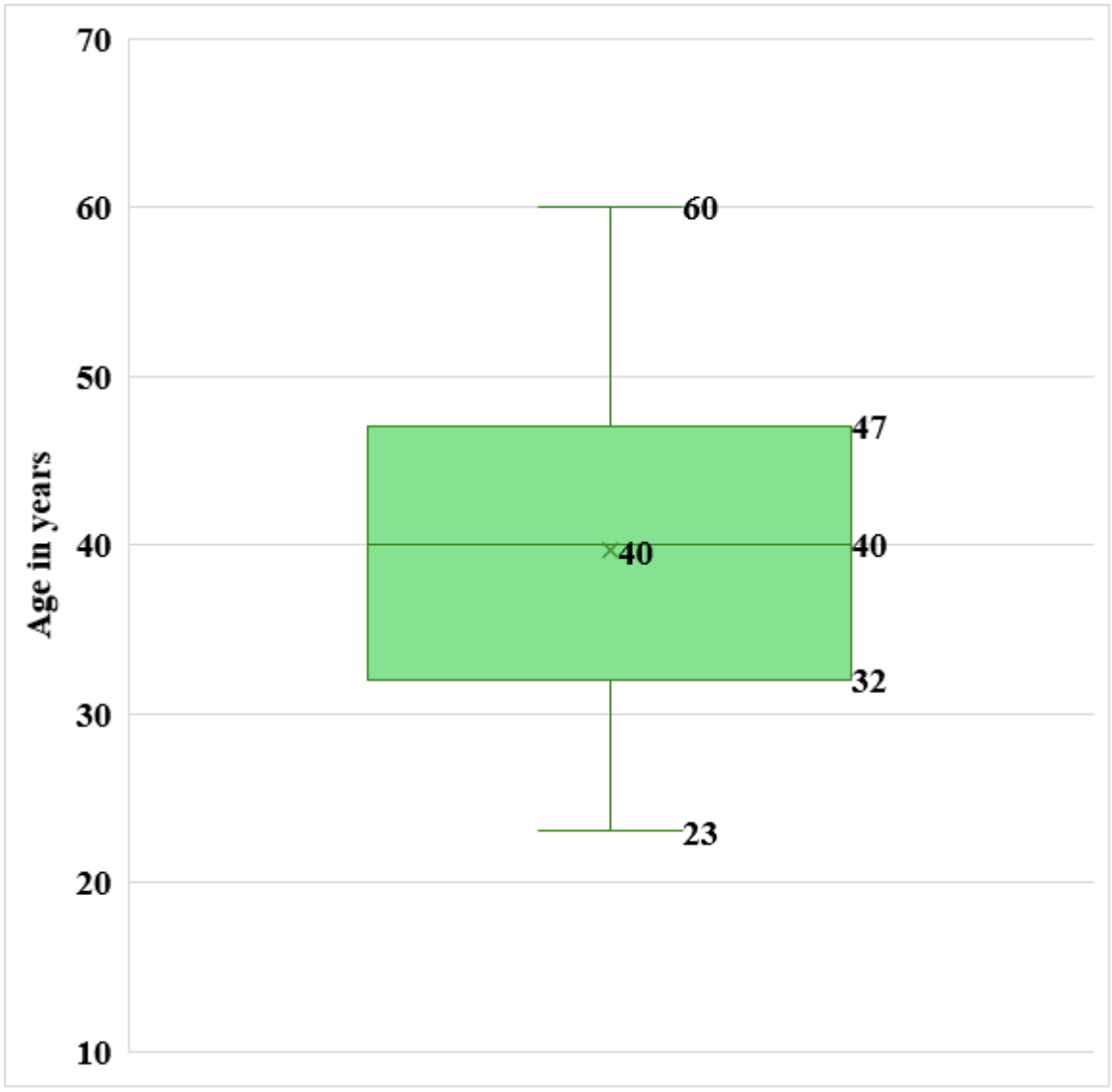


Table 3: Representation of enrolled patients based on duration of symptoms.

Duration of symptoms in months	
Mean	7.71
Std. Deviation	0.926
Range	3
Minimum	6
Maximum	9

In the current study, the average duration of symptoms for the participants was 7.71 ± 0.926 months. The sample cohort exhibited a minimum and maximum duration of symptoms of 6 and 9 months, respectively.

Figure 16: Box and Whisker plot showing representation of enrolled patients based on duration of symptoms.

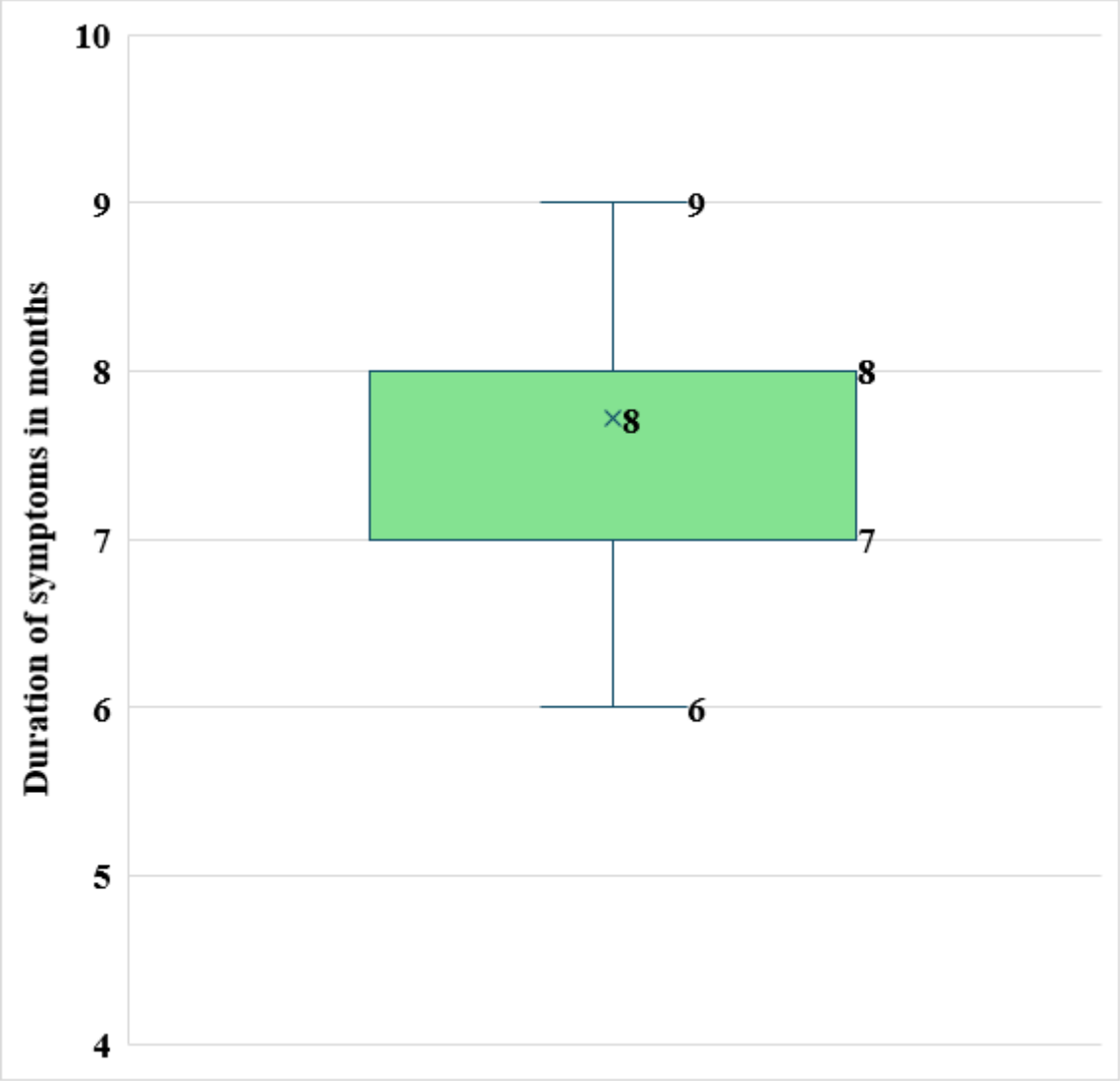


Table 4: Representation of enrolled patients based on gender.

Gender	Frequency	Per cent
Female	14	40
Male	21	60
Total	35	100

60% of the participants in the study were male, while the remaining 40% were female.

Figure 17: Representation of enrolled patients based on gender.

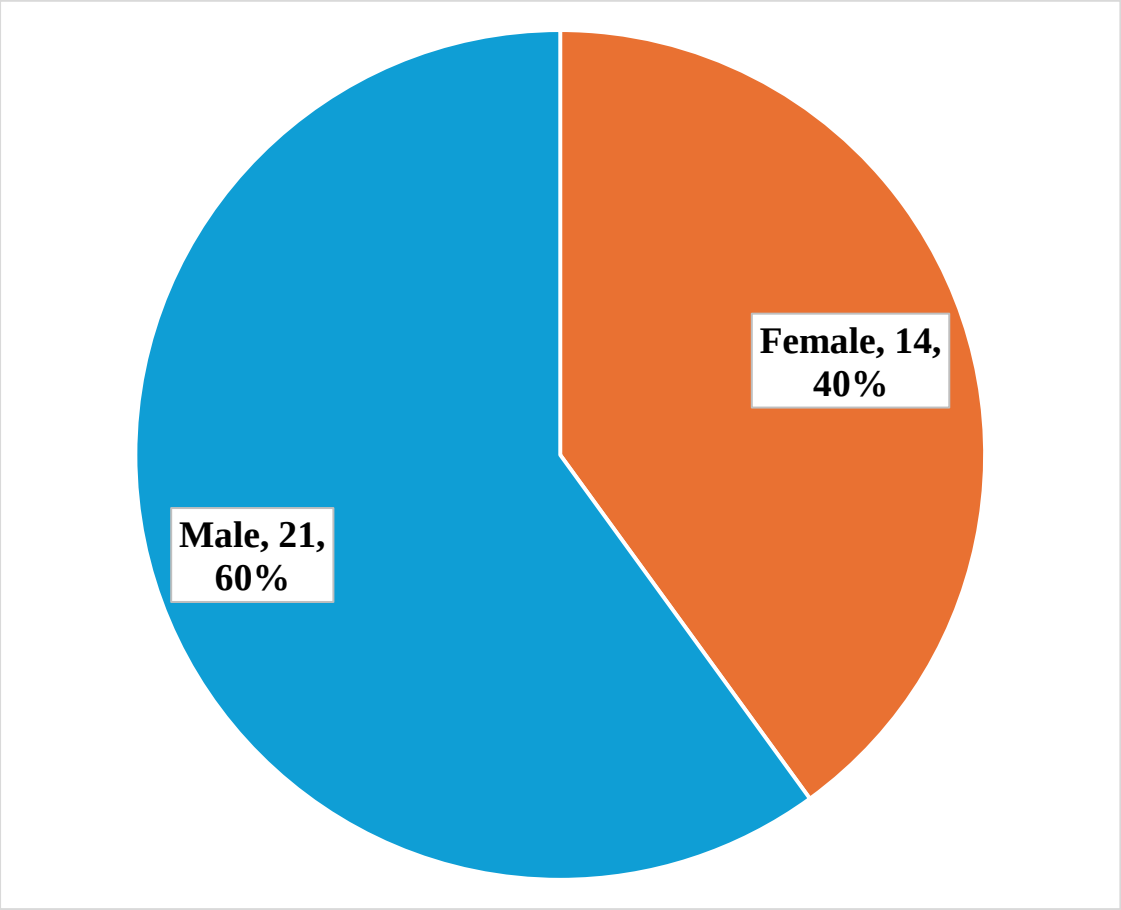


Table 5: Representation of enrolled patients based on occupation.

Occupation	Frequency	Percent
Clerk	6	17.1
Driver	8	22.9
Farmer	11	31.4
Homemaker	4	11.4
Teacher	6	17.1
Total	35	100

Occupations of the study participants included the following: 31.4% were farmers, 22.9% were drivers and 17.1% were clerks and teachers.

Figure 18: Representation of enrolled patients based on occupation.

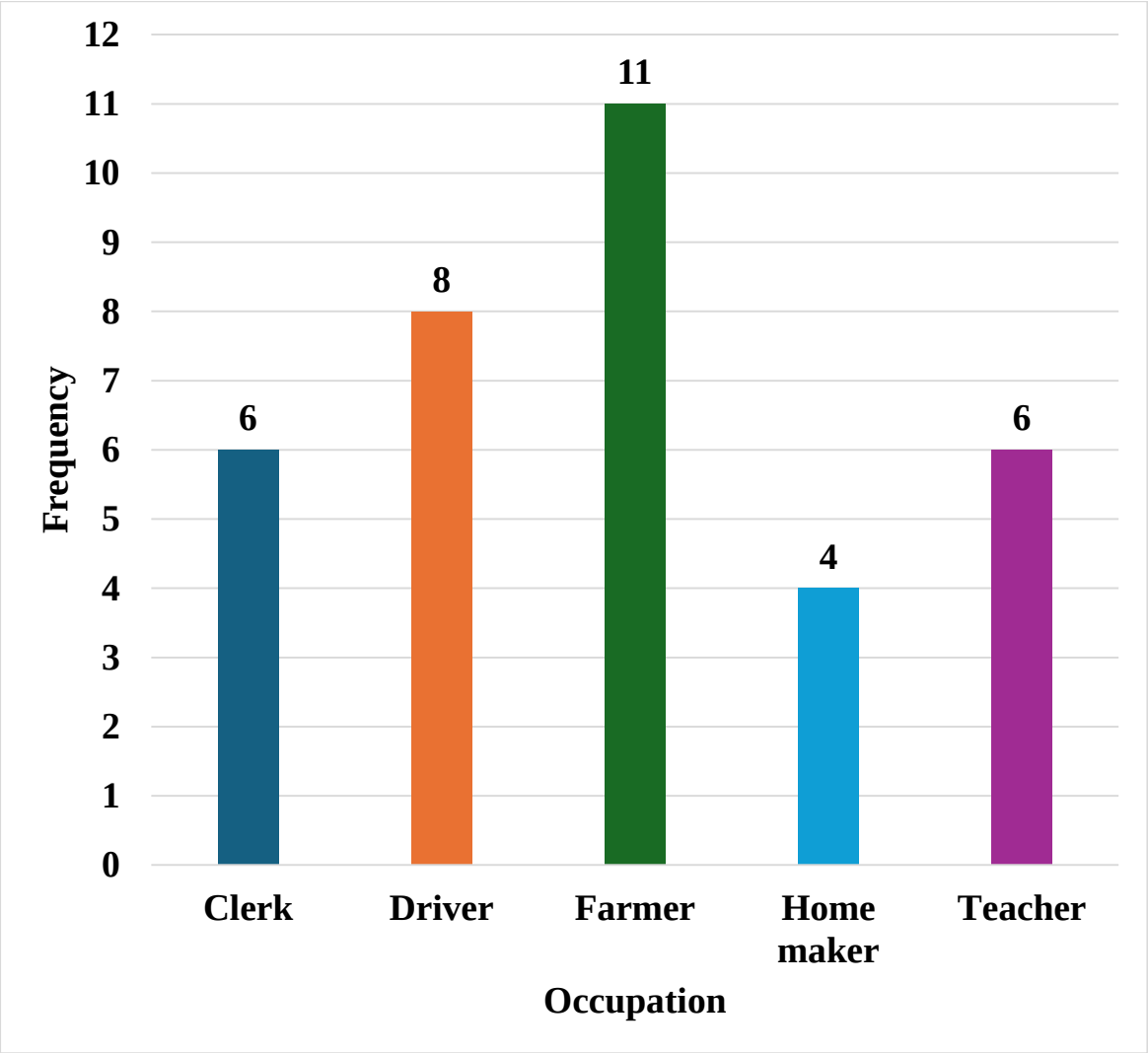


Table 6: Representation of enrolled patients based on level of prolapsed intervertebral disc.

Level of prolapsed intervertebral disc	Frequency	Percent
L3-L4	10	28.6
L4-L5	16	45.7
L5-S1	9	25.7
Total	35	100

In this study, prolapsed intervertebral discs occurred most frequently at levels L4 and L5 (45.7%), followed by L3-L4 (28.6%).

Figure 19: Representation of enrolled patients based on level of prolapsed intervertebral disc.

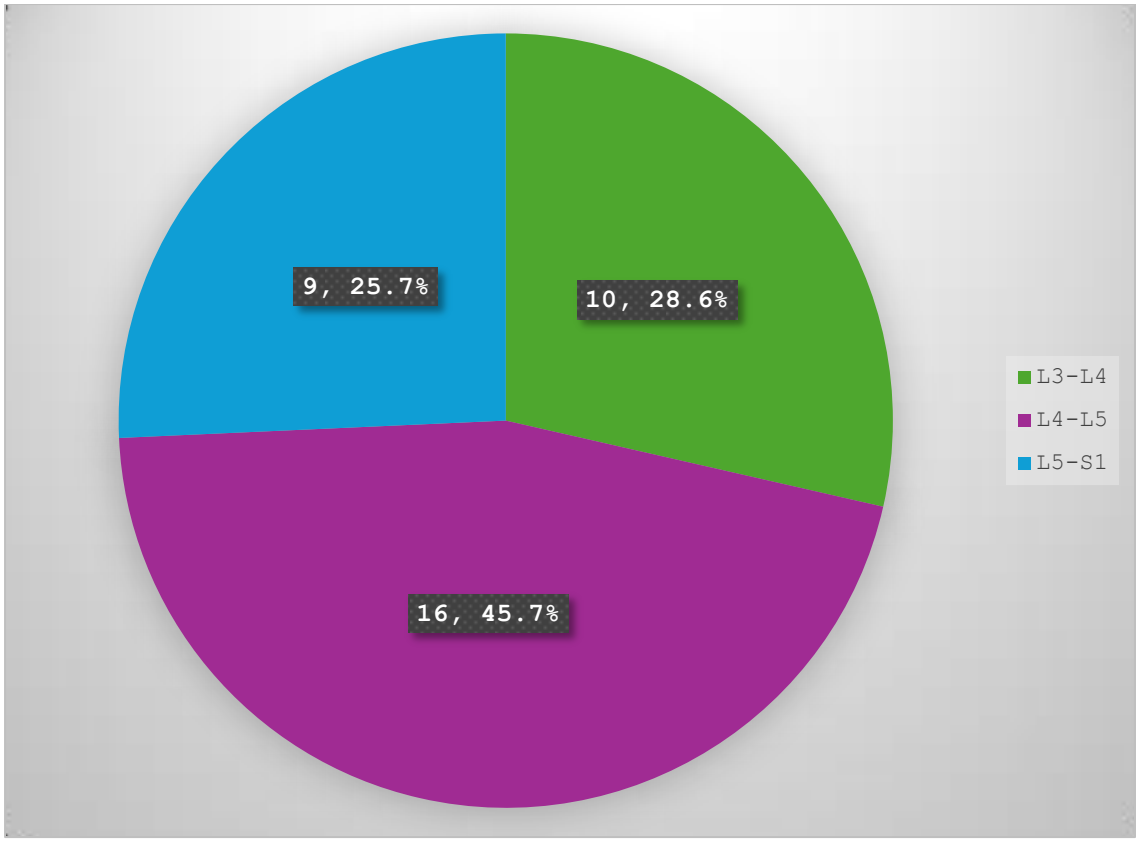


Table 7: Representation of enrolled patients based on the side of radiating pain.

Side of radiating pain	Frequency	Percent
Left	20	57.1
Right	15	42.9
Total	35	100

The predominant site of radiating pain in the enrolled patients was the left side (57.1%), with the right side (42.9%) following suit.

Figure 20: Representation of enrolled patients based on side of radiating pain.

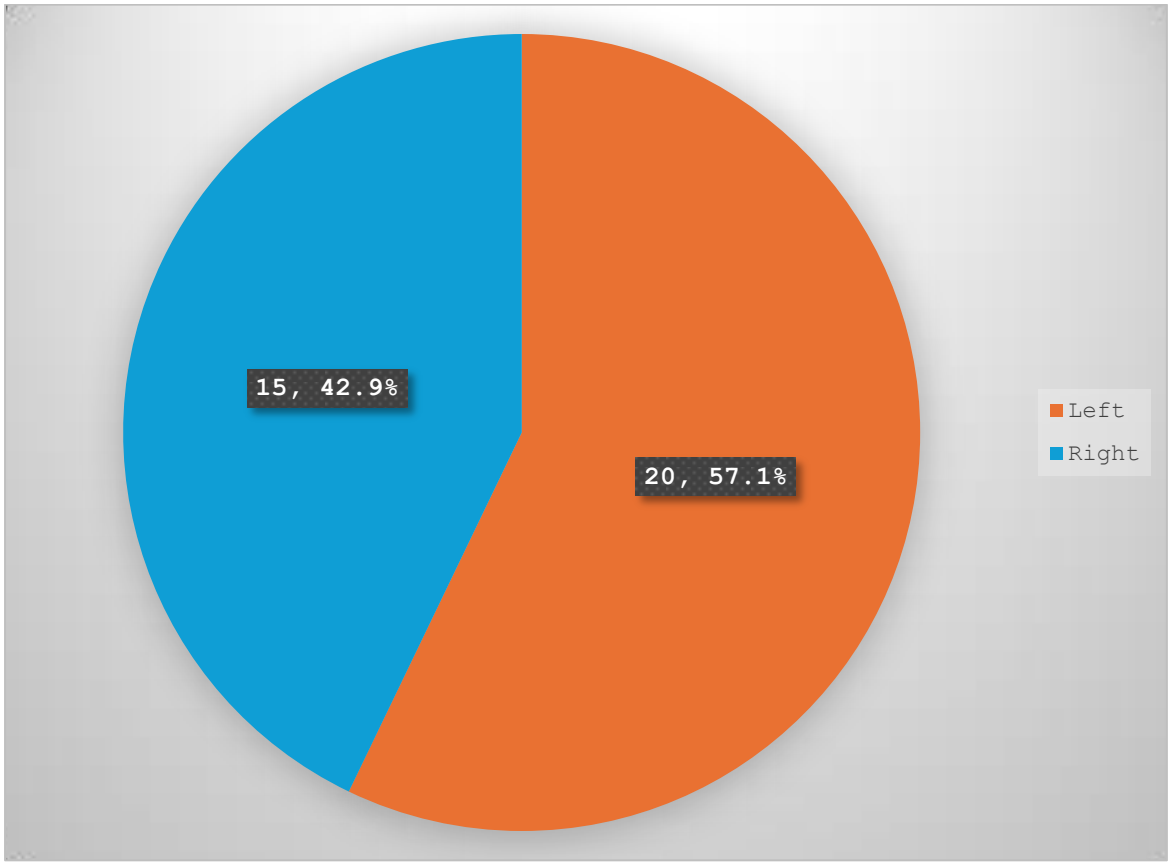


Table 8: Representation of enrolled patients based on level of SNRB.

Level of SNRB	Frequency	Percent
L3	2	5.7
L4	16	45.7
L5	12	34.3
S1	5	14.3
Total	35	100

In the current investigation, SNRB injection was performed most frequently at level L4 (35.7%), followed by level L5 (34.3%).

Figure 21: Representation of enrolled patients based on level of SNRB.

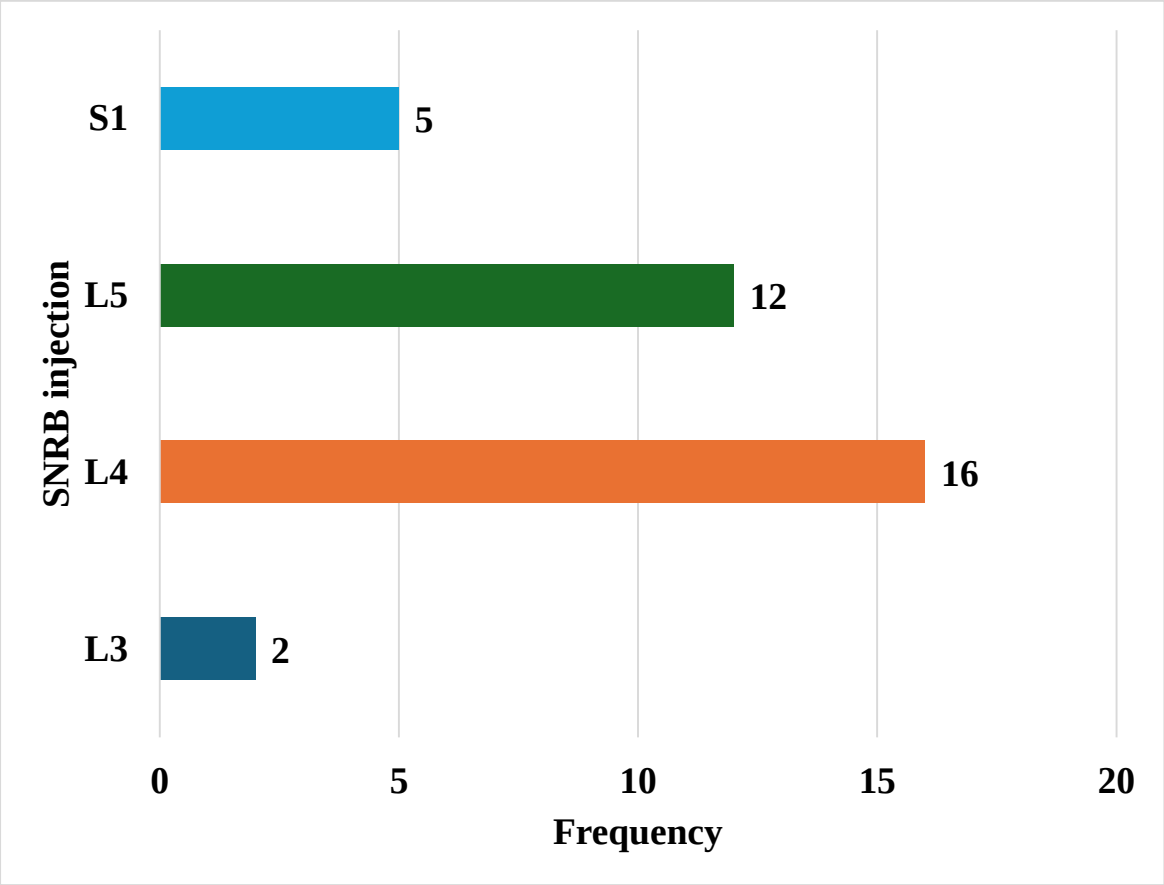


Table 9: Representation of enrolled patients based on LDH level.

LDH level	Frequency	Percent
L3-L4	10	28.6
L4-L5	16	45.7
L5-S1	9	25.7
Total	35	100

Based on the findings of this study, LDH was most frequently observed at levels L4–L5 (35.7%), followed by L3–L4 (28.6%).

Figure 22: Representation of enrolled patients based on LDH level.

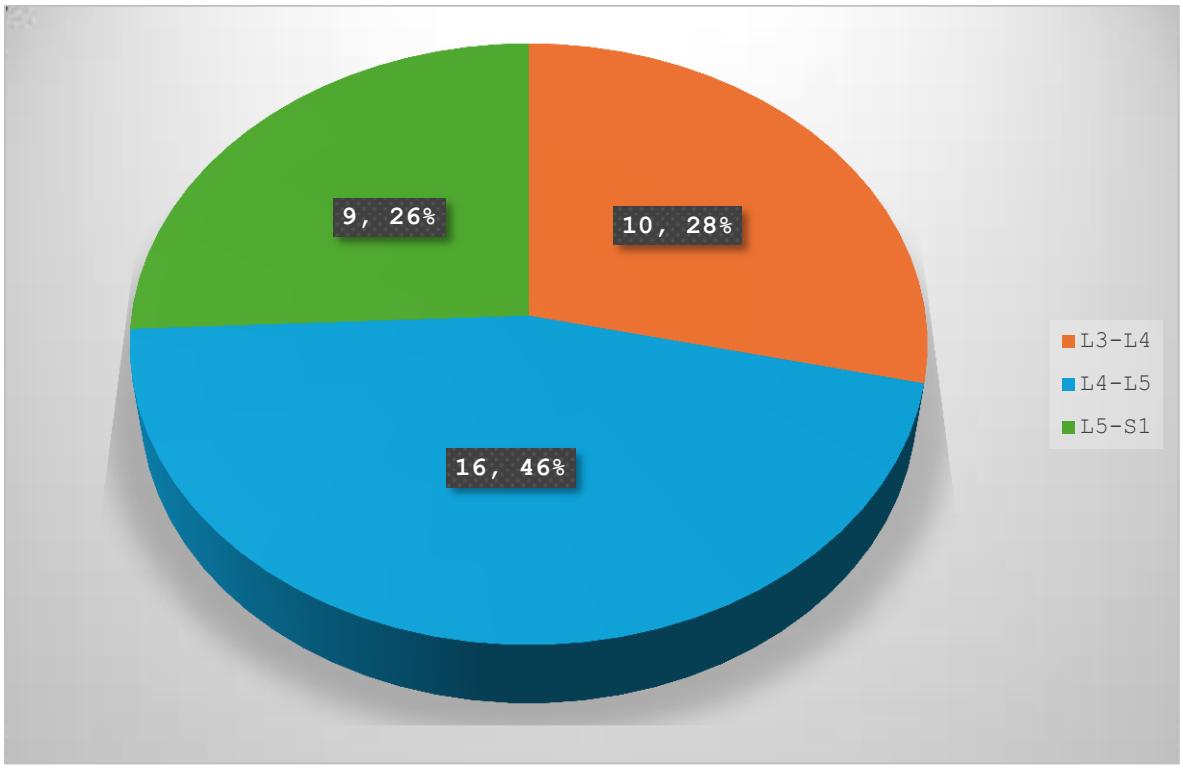


Table 10: Representation of enrolled patients based on the anatomical location of the herniation.

Anatomical location of the herniation	Frequency	Percent
Central	20	57.1
Paracentral	15	42.9
Total	35	100

In the current investigation, the central region exhibited the highest frequency of herniation anatomical sites (57.1%), followed by the paracentral (42.9%).

Figure 23: Representation of enrolled patients based on anatomical location of the herniation.

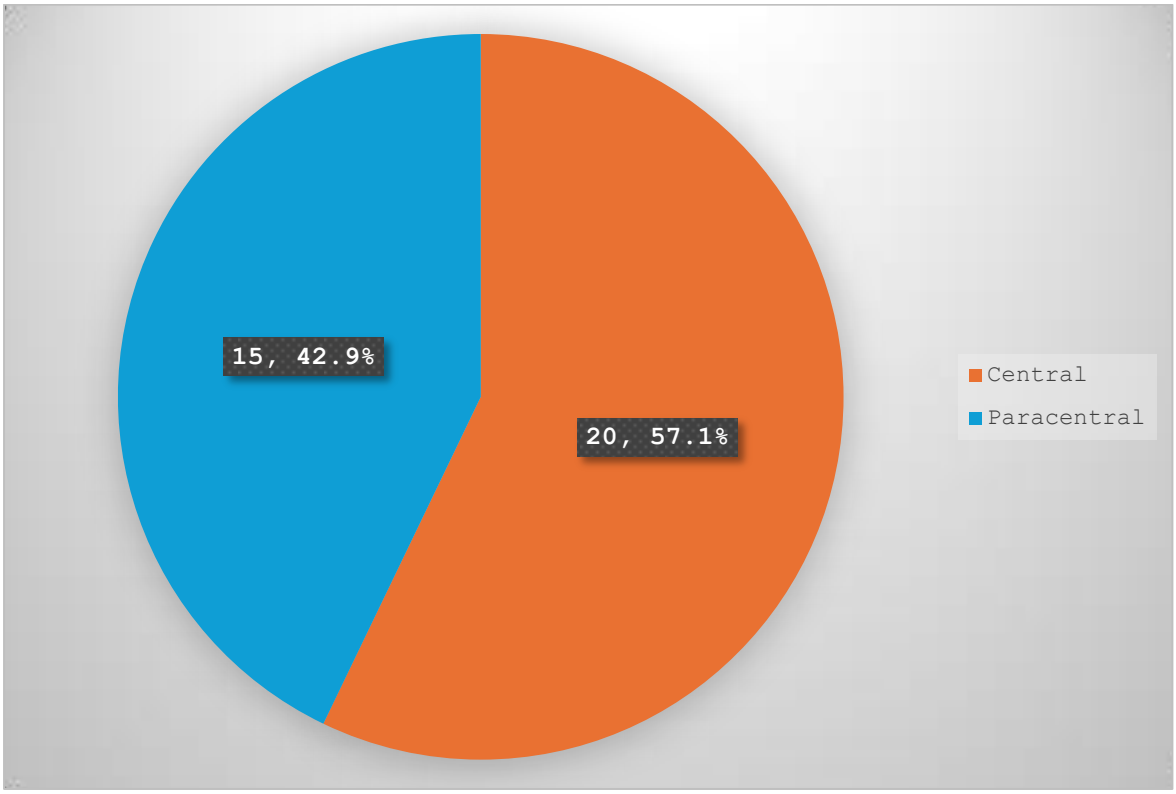


Table 11: Representation of enrolled patients based on morphology of the displaced disc material.

Morphology of the displaced disc material	Frequency	Percent
Bulge	20	57.1
Extrusion	4	11.4
Protrusion	11	31.4
Total	35	100

In the current investigation, bulge (57.1%) emerged as the prevalent morphology of the displaced disc material, with protrusion (31.4%) ranking as the second most frequent morphology.

Figure 24: Representation of enrolled patients based on morphology of the displaced disc material.

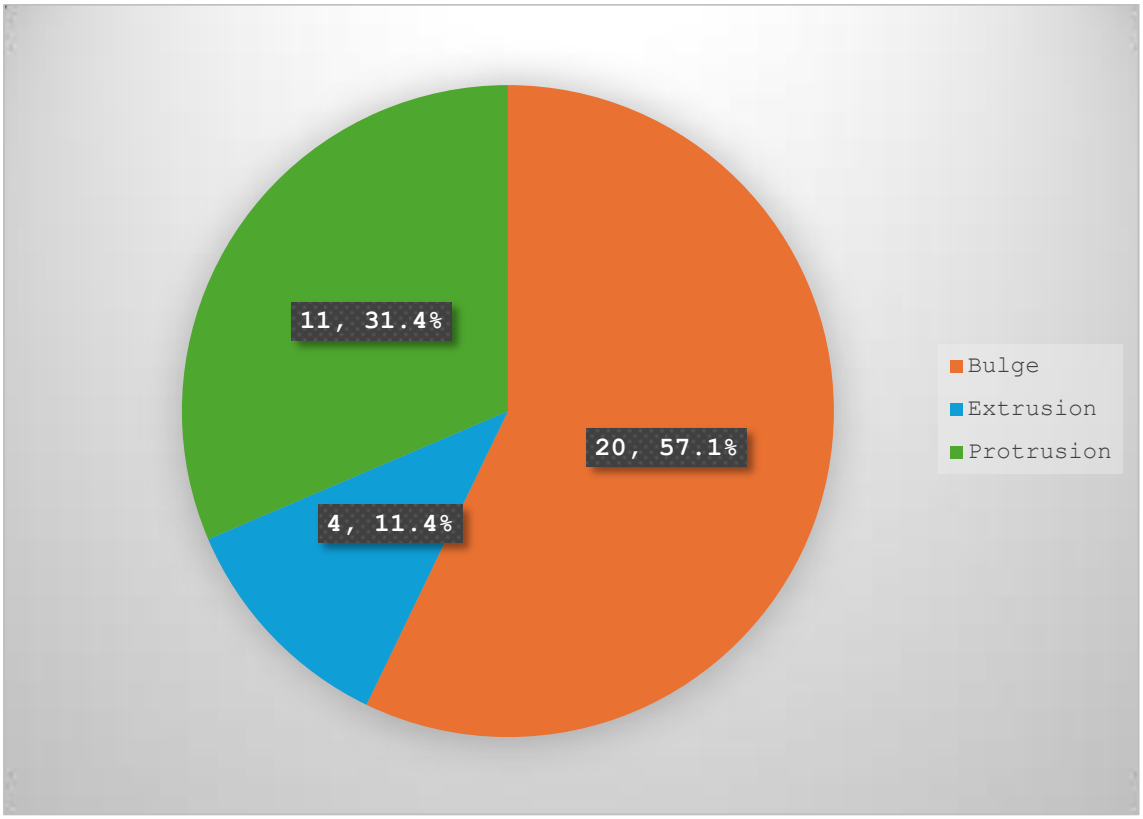


Table 12: NRS score estimated at different period before and after intervention.

NRS score	Mean	S. D	Minimum	Maximum
Preoperative at baseline	6.4	0.775	5	8
Post operative at Day 0	3.29	0.572	2	4
Post operative at 30 days	4.14	0.974	2	6
Post operative at 90 days	3.14	0.55	2	4

The mean NRS score recorded at different time intervals prior to and following the intervention is presented in the table above. The pain score decreased promptly following SNRB injection on the initial day of the intervention (3.29). However, this pain score increased at one month (4.14) and then declined at three months (3.14), following the intervention.

Figure 25: NRS score estimated at different period before and after intervention.

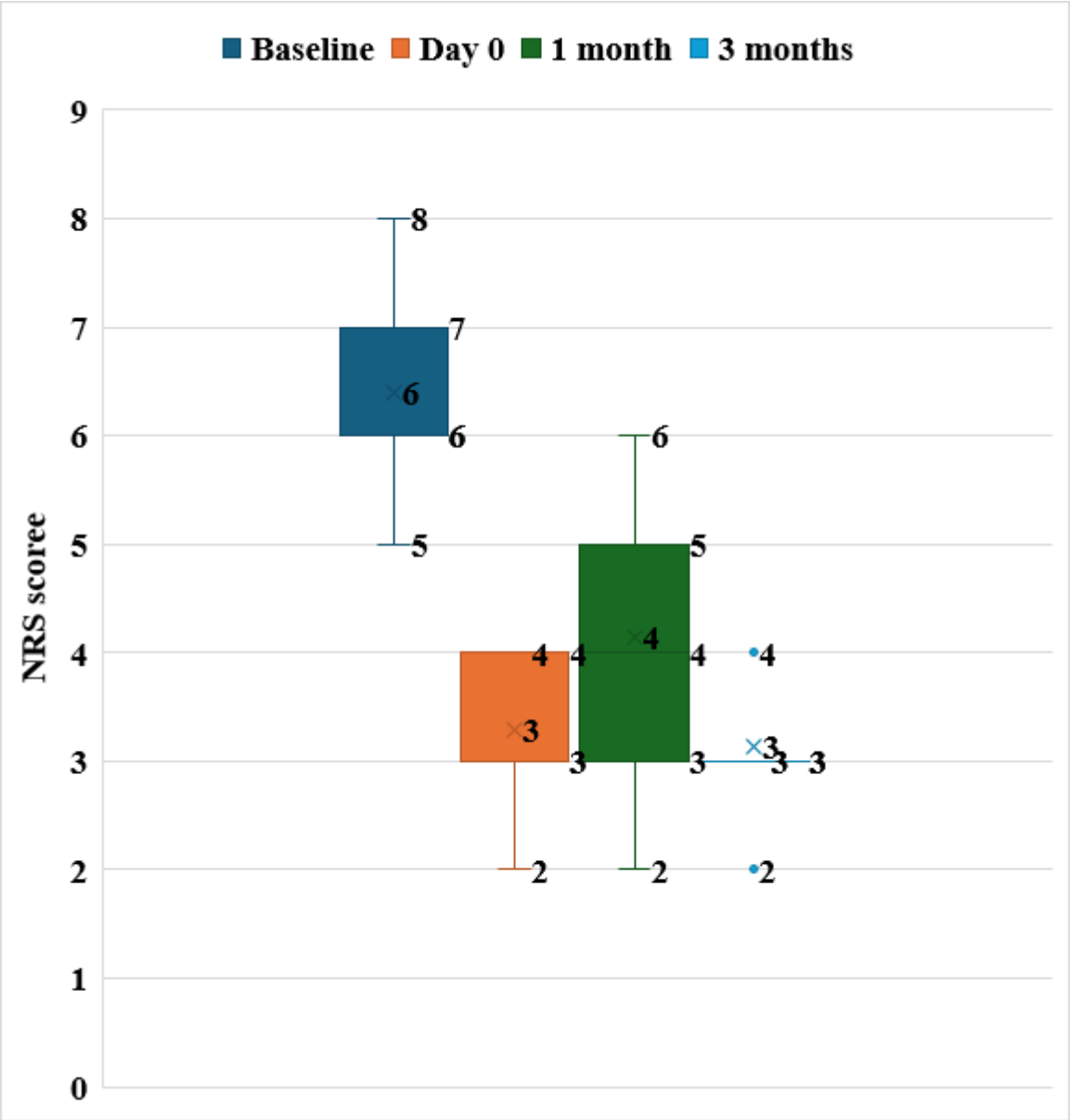


Table 13: ODI score estimated at different period before and after intervention.

ODI score	Mean	S. D	Minimum	Maximum
Preoperative at baseline	14.31	3.428	9	24
Post operative at Day 0	7.83	2.256	5	14
Post operative at 30 days	7.86	2.68	3	12
Post operative at 90 days	6.86	2.39	3	15

The mean ODI score recorded at different time intervals prior to and following the intervention is presented in the table above. On day zero of the intervention, the disability assessment score decreased promptly following SNRB injection (7.83). However, this disability score remained unchanged at one month (7.86) and subsequently declined at three months (6.86) after the intervention.

Figure 26: ODI score estimated at different period before and after intervention.

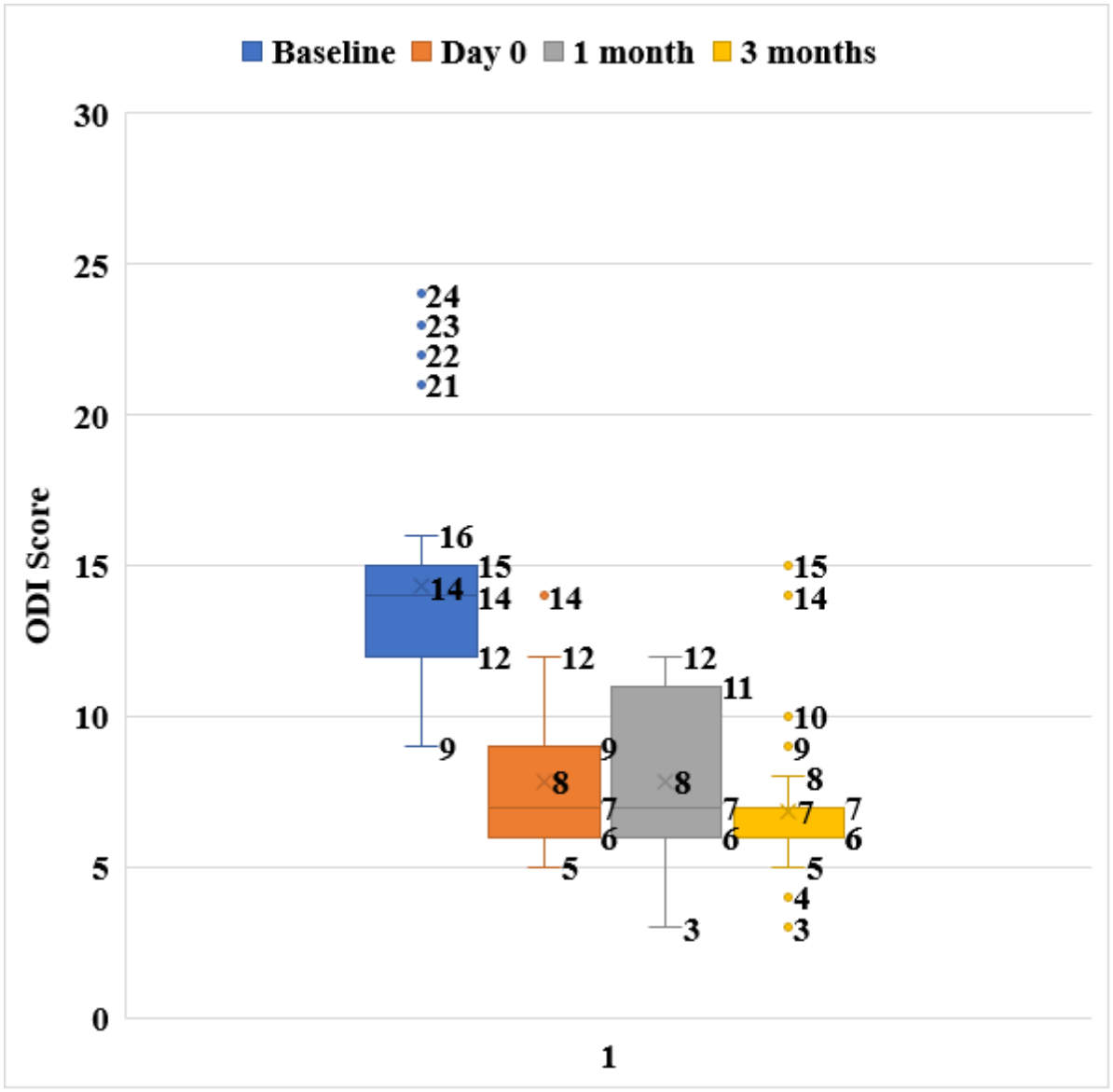


Table 14: Comparison of SLRT before and after intervention.

SLRT	Preoperative	Post operative Day 0	30 days	90 days	P value
Positive	35	0	0	4	0.0001
Negative	0	35	35	31	

Fisher's exact value – 54.84

All the patients were tested Straight Leg Raise test positive before SNRB injection. After SNRB injection at day 0, all the patients were tested SLRT negative, and it remained negative even after 30 days. Following 90 days after SNRB injection only 4 patients were tested SLRT positive, and it was statistically significant by Fishers' exact test (P value 0.0001).

Figure 27: Comparison of SLRT before and after intervention.

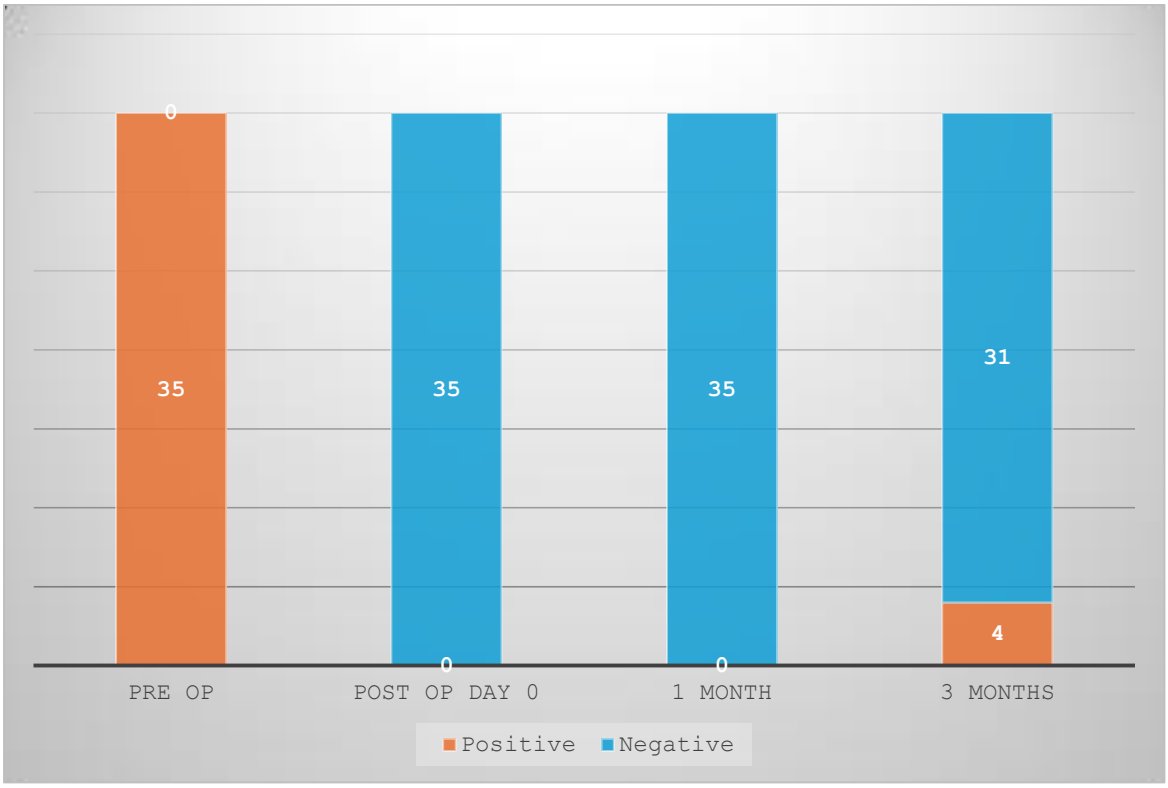


Table 15: Assessment of NRS score before and after SNRB injection by Paired t-test.

Pairs	Assessment of NRS score before and after SNRB injection	Mean	S. D	Mean difference	P value
Pair 1	Pre-operative at baseline	6.4	0.775	3.114	0.0001
	Post-operative on Day 0	3.29	0.572		
Pair 2	Pre-operative at baseline	6.4	0.775	2.257	0.0001
	Post-operative at 30 days	4.14	0.974		
Pair 3	Pre-operative at baseline	6.4	0.775	3.257	0.0001
	Post-operative at 90 days	3.14	0.55		
Pair 4	Post-operative on Day 0	3.29	0.572	-0.857	0.0001
	Post-operative at 30 days	4.14	0.974		
Pair 5	Post-operative on Day 0	3.29	0.572	0.143	0.201
	Post-operative at 90 days	3.14	0.55		

The mean NRS score decreased significantly (paired t-test) at each of the following three months and postoperative days compared to the preoperative mean score (0, 1and 90 days). The mean NRS score exhibited a statistically significant increase at one month against the postoperative day 0 score, followed by a statistically insignificant decrease at three months. In LR

associated with PIVD, SNRB injections continue to ameliorate pain three months after administration; however, pain levels marginally increase one month after the injection date.

Figure 28: Assessment of NRS score before and after SNRB injection by Paired t-test.

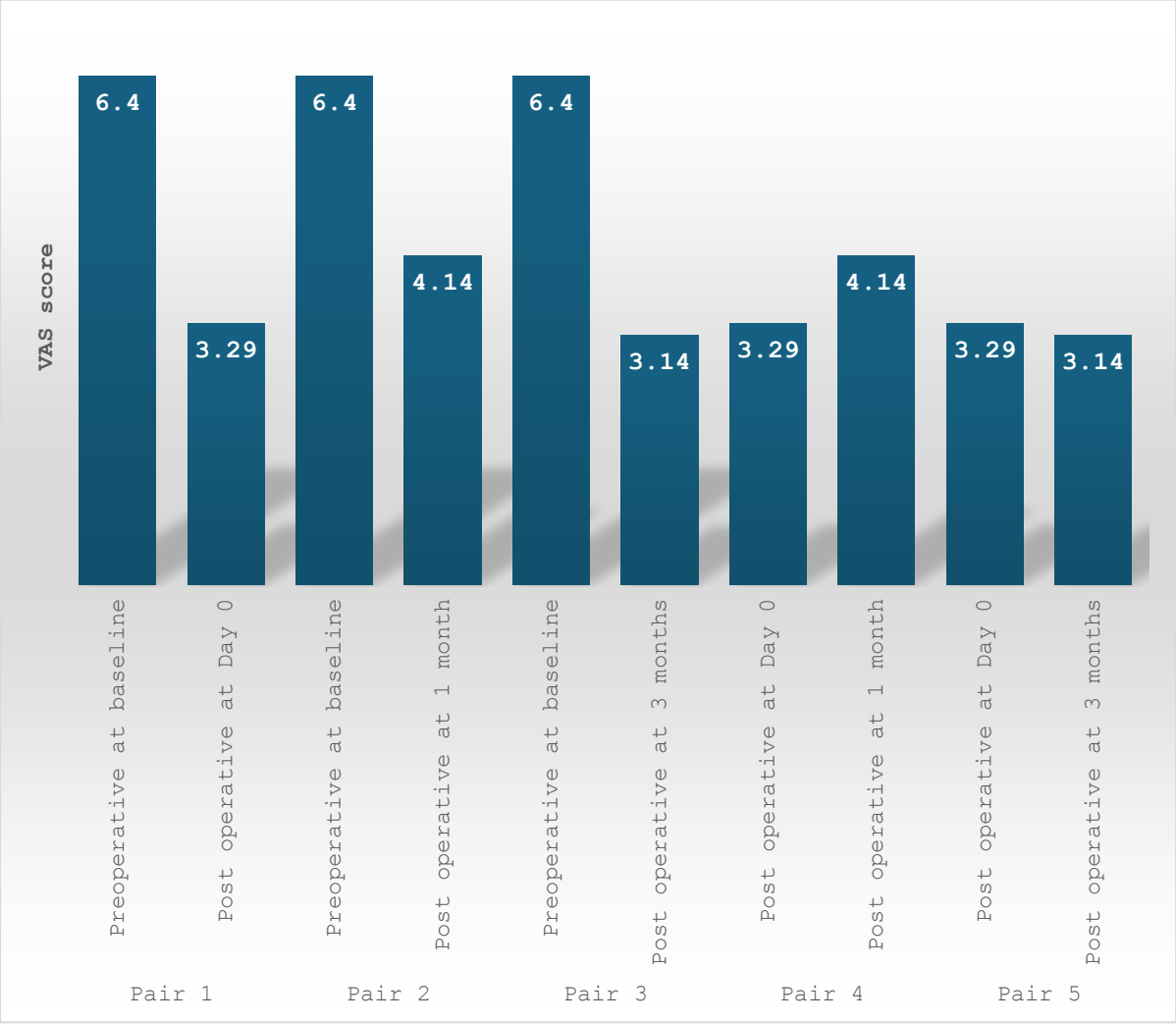


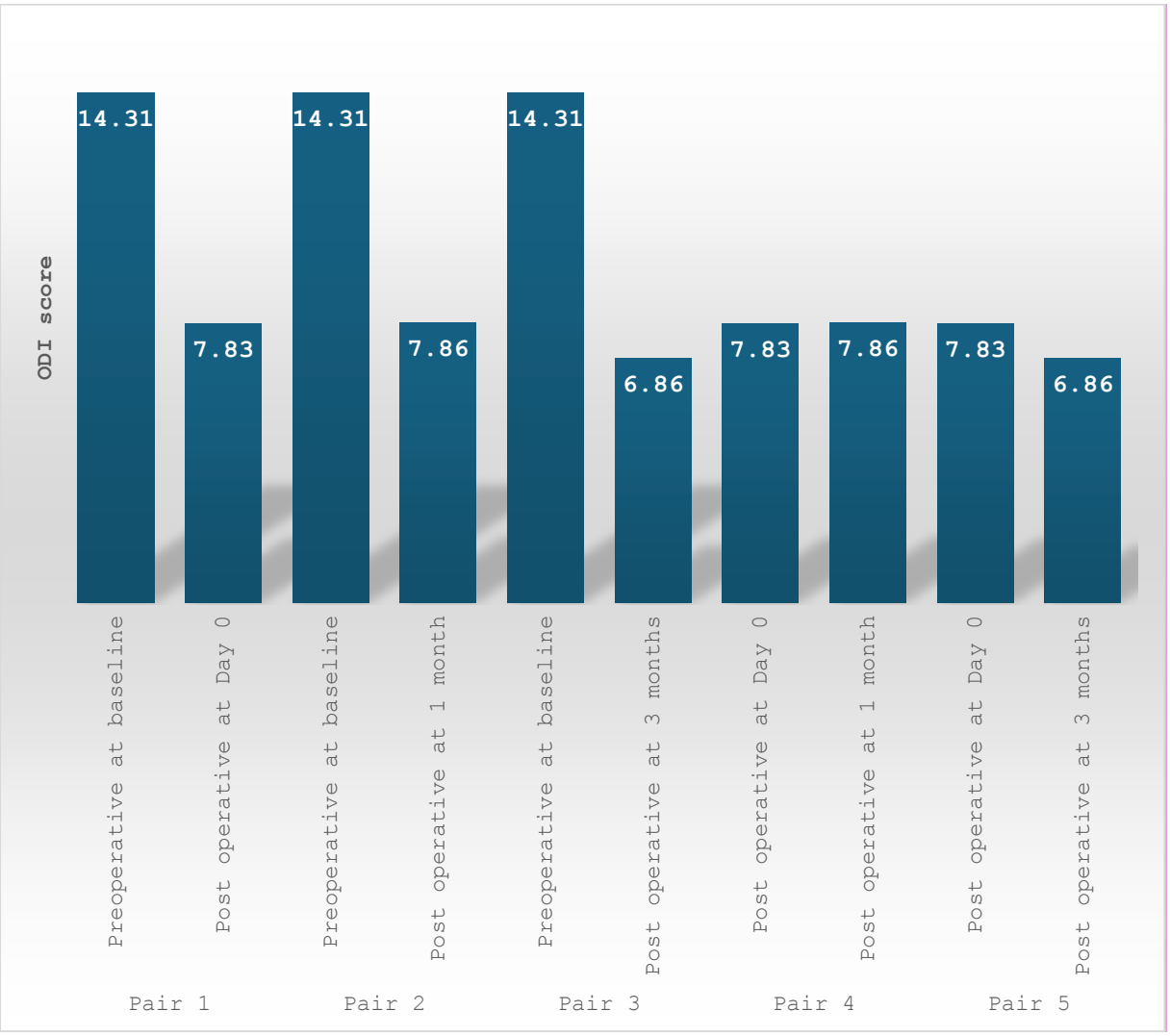
Table 16: Assessment of ODI score before and after SNRB injection by Paired T test.

Pairs	Assessment of ODI score before and after SNRB injection	Mean	S. D	Mean difference	P value
Pair 1	Pre-operative at baseline	14.31	3.428	6.486	0.0001
	Post-operative on Day 0	7.83	2.256		
Pair 2	Pre-operative at baseline	14.31	3.428	6.457	0.0001
	Post-operative at 30 days	7.86	2.68		
Pair 3	Pre-operative at baseline	14.31	3.428	7.457	0.0001
	Post-operative at 90 days	6.86	2.39		
Pair 4	Post-operative on Day 0	7.83	2.256	-0.029	0.922
	Post-operative at 30 days	7.86	2.68		
Pair 5	Post-operative on Day 0	7.83	2.256	0.971	0.0001
	Post-operative at 90 days	6.86	2.39		

The postoperative mean ODI score decreased significantly (paired t-test) at 0 days, 30 days, and 90 days in comparison to the preoperative mean ODI score. This decrease was statistically significant. When comparing the mean ODI score to the score on postoperative day zero, there is no statistically significant difference observed at one month. However, a significant decrease is observed

at three months. As a result, SNRB injections continue to reduce the degree of disability in patients with LR and PIVD even three months after administration; however, at one month, the degree of disability remains unchanged from the day of administration.

Figure 29: Assessment of ODI score before and after SNRB injection by Paired t-test.



DISCUSSION

DISCUSSION

LR, which is less prevalent than LBP alone and can vary from nine percent to twenty-five percent. Back pain radiating into the legs, foot, and toes is the hallmark of LR. [61] Although 23% to 48% of patients get a spontaneous resolution of their symptoms after a year, 30% may continue to experience severe symptoms, 20% may lose their jobs, and 5% to 15% may need surgery for their condition. LR is caused by a prolapsed disc. [52]

There are a variety of therapeutic approaches for LR due to the fact that the condition is caused by numerous pathophysiological causes. [62] One of the methods is injecting steroids into the SNRB. Many studies have shown that SNRB is effective, with results ranging from 76% to 88%.[22] When compared to alternative epidural techniques, most studies show that trans-foraminal drug administration yields better results. To provide an improved local concentration of the medicine, the trans-foraminal technique allows for drug administration to the epidural area anterior to the nerve root. [62–65] It has been shown that steroids can have a therapeutic impact because of their ability to stabilize nociceptive signals and reduce inflammation. [66–68] The above success rates make the use of corticosteroids to control inflammation and relieve radicular pain a reasonable alternative, as inflammation of root is now known to play a part in the pathophysiology of this pain.

A prospective observational study was undertaken on a cohort of 35 consecutive patients who presented to the orthopaedics department of RL Jalappa Hospital in Kolar diagnosed to have PIVD with LR. Each afflicted nerve root was injected with a mixture of 1 mL of steroid and 2 mL of local anaesthetic agent, in accordance with aseptic precautions. All patients were evaluated on post-procedure day zero, with subsequent assessments conducted at 30 and 90 days to obtain the SLRT, NRS, and ODI scores, respectively.

Comparison of basic characteristics of the study participants with similar studies

The mean age of the enrolled patients in this study was 39.63 ± 9.7 years. The minimum age and maximum age of the enrolled patients were 23 and 60 years respectively. The mean spell of symptoms of the enrolled patients in this study was 7.71 ± 0.926 months.

Among the enrolled patients, 60% were males and the remaining 40% were females. Among the enrolled patients, the most common side of radiating pain was the left side (57.1%) followed by the right side (42.9%).

In 2015, Mehmood Khan et al. examined 122 patients in India who had LDH, pain in their backs, and LR. The patients were seen to have failed to show improvement following six weeks of medical therapy. [52] Researchers found that participants' average age was 38.6. Out of the 127 patients that were considered,

65.83% were men and 34.31% were women. On average, participants in this research reported discomfort for 11.40 months.

By the year 2020, 76 individuals suffering from LBP or LR had participated in a concurrent trial in Jordan, carried out by Kanaan et al. They looked at how well fluoroscopically guided SNRB worked for treating LR in the clinic. [56] Of the total participants in the research, 25 (32.89%) were men and 51 (67.11%) were females.

Vashishtha et al. performed prospective observational research in 2019 on 50 patients in India who had LR and SNRB. [53] Ages ranging from 20 to 60 years old were recorded for the patients, with an average age of 39.68 ± 8.85 years. The gender ratio was 2.33:1, with men making up the majority. On average, 9.56 ± 5.85 months elapsed throughout the discomfort. Out of 50 patients, the majority (18/50, or 36%) reported radiation on both sides of the body. Discomfort in the right side was experienced by 15 patients (30%), whereas 17 patients (34%), reported discomfort in the left side.

Lumbar transforaminal epidural steroid injection (LTFESI) was studied by Dhandapani et al. to determine its effectiveness in alleviating pain and enhancing functional results for patients suffering from LR in India within the year 2023. [60] The average age of the study's participants was 43.22 ± 9.97 years. The enrolled patients consisted of 27 males (51.92 per cent) and 25 females (48.07 per cent).

Comparison of characteristics of PIVD with LR of the study participants with similar studies

In this study, 45.7% of participants had PIVD at level L4 - L5, with levels L3–L4 coming in second at 28.6%. The most common level at which SNRB injection was made in the present study was L4 (45.7%) and the second most common level was L5 (34.3%). The most common anatomical location of the herniation observed in the present study was the central location (57.1%) and the second most common location was the paracentral (42.9%).

In 2015, Mehmood Khan et al. studied 120 patients in India who had LDH and LR. Following 6 weeks of conservative treatment, the patients still did not show any improvement. [52] Of the patients surveyed, 56 (46.67%) had prolapsed discs at the L4-L5 level, whereas 39 (32.50%) had them at the L5-S1 level.

In Jordanian prospective research, Kanaan et al. followed 76 individuals who had LBP or LR from 2020 onwards. For LR, they looked at how well fluoroscopically guided SNRB worked in the clinic. [56] The study found that 32 individuals had LDH in the L4-L5 region.

Fifty Indian patients with LR in whom SNRBs were administered by 2019 were the subjects of prospective observational research by Vashishtha et al. [53] Three-quarters of patients had abnormalities in the L4-L5 intervertebral disc, twenty per cent in the L5-S1 disc and the largest percentage in the L4-L5-S1 disc.

For the purpose of increasing pain and functional outcomes in patients with LR in India by 2023, Dhandapani et al. assessed the efficiency of LTFESI. [60] The MRI results showed that 31 patients (59.6% of the total) had pathologies at the L4-5 level, 10 patients (19.2%) had abnormalities at the L5-S1 level, 11 patients (21.1%) had problems at the level beyond those two levels.

Effect of SNRB on SLRT test

All the patients were tested Straight Leg Raise test positive before SNRB injection. After SNRB injection at day 0, all the patients tested SLRT negative, and it remained negative succeeding 30 days. By the end of 90 days after SNRB injection only 4 patients tested SLRT positive, and it was statistically significant by Fisher's exact test (P value 0.0001).

In 2015, Mehmood Khan et al. studied 120 patients in India who had LDH, LBP and LR. After 6 weeks of conservative treatment, the patients still did not show any improvement. [52] Within three weeks of injection, six patients (5%) with (L4-5 along with L5-S1) did not demonstrate a good response in this trial. The average SLRT grew from 43.42±10.99 at the beginning to 67.78±6.23 following 6 months of follow-up.

Effect of SNRB on Pain (NRS) Score

The pain score decreased immediately after SNRB injection at day 0 of intervention (3.29). But this pain score increased at 30 days (4.14) and later it decreased at 90 days after intervention (3.14). In comparison to the preoperative mean NRS score, the mean NRS score was reduced at Postoperative day 0, 30 days and 90 days and this decrease in mean NRS score was statistically significant by paired t-test. Therefore, SNRB injection helps to alleviate the pain even 90 days after injection in LR in PIVD but there is a slight increase in pain at 30 days compared to the day of injection. Patients did not require surgery since the local anaesthetic agent provided immediate pain relief and continued to do so for three months.

Table 17: Assessment of the effect of SNRB on pain reduction in PIVD patients with similar articles.

Study	**NRS score**			
	Baseline	Day 0	30 days	90 days
Present study	6.4 ± 0.775	3.29 ± 0.572	4.14 ± 0.974	3.14 ± 0.55
Shaikh et al[58]	7.7 ± 1.35	2.3 ± 1.14	2.6 ± 1.6 (3 weeks)	2.0 ± 1.47
Khan et al [52]	8.01 ± 0.90	NA	2.80 ± 0.40 (6	3.50 ± 0.70

			weeks)	
Singh et al[51]	7.65 ± 0.5	NA	3.23 ± 0.5	3.40 ± 0.7
Vashishtha et al[53]	7.02 ± 1.31	4.7 ± 1.32	2.82 ± 1.17	2.32 ± 1.64
Dhandapani et al[60]	4.36	3.29	1.2	1.0

By 2021, 50 patients in India had undergone SNRBs as part of a prospective trial by Hamza Shaikh et al., who monitored them for three months.[58] In patients who opted out of the procedure, the average leg pain NRS score dropped from 7.7 (SD 1.35) before the injection to 2.3 (SD 1.14) after 30 minutes of the injection ($P < 0.005$). Without surgery, patients saw ongoing pain alleviation with each follow-up appointment. At 1 week, 3 weeks and 90 days after the injection, the leg pain NRS score was 2.8 (SD 1.21), 2.6 (SD 1.60)and 2.0 (SD 1.47), respectively. This was considerably lower than the mean NRS score before the injection ($P < 0.001$).

Mehmood Khan et al. examined 122 patients in 2015 from India who had LDH, LBP and LR and who had not shown improvement following six weeks of regular therapy. [52] During the 3-month follow-up, the initial NRS dropped from 8.01±0.9 to 3.50±0.7 in this research.

An RCT was conducted in India by Sudhir et al. to evaluate the efficacy of caudal epidural steroid injection in conjunction with SNRB for the management of pain and disability induced by LDH. [51] An initial VAS of 7.65 ± 0.5 was recorded in this study. However, after a follow-up period of three months, the VAS was lowered to 3.40 ± 0.7.

A prospective observational research was carried out by Vashishtha and colleagues on fifty patients in India who were suffering from LR and had got selective nerve root blocks by the year 2019. [53] The initial visual analogue scale score in this study was 7.02 ± 1.31. however, it was lowered to 2.32 ± 1.64 once the follow-up period of three months had passed.

Dhandapani and colleagues conducted an investigation into Lumbar transforaminal epidural steroid injection (LTFESI) to determine its efficacy in alleviating pain and enhancing functional outcomes in individuals diagnosed with LR in India by 2023. [60] After administering the epidural steroid injection, the patients' NRS pain ratings decreased over time. They went from 4.36 on the pre-injection score to 1.0 on the three-month post-injection score.

Effect of SNRB on Disability (ODI) Score

The disability assessment score decreased immediately after SNRB injection at day 0 of intervention (7.83). But this disability score remained the same at 30 days (7.86) and later it decreased at 90 days after intervention (6.86). In comparison to the preoperative mean ODI score, the mean ODI score was

reduced at Postoperative day 0, 30 days and 90 days and this decrease in mean ODI score was statistically significant by paired t-test. Therefore, SNRB injection helps to reduce the degree of disability even 90 days after injection in LR in PIVD but there is no difference in degree of disability at 30 days compared to the day of injection.

Table 18: Comparison of the effect of SNRB on disability score in PIVD patients with similar articles.

Study	ODI score			
	Baseline	Day 0	30 days	90 days
Present study	14.31 ± 3.428	7.83 ± 2.256	7.86 ± 2.68	6.86 ± 2.39
Shaikh et al[58]	59.4 ± 14.69	NA	38.6 ± 11.9 (3 weeks)	26.3 ± 9.43
Khan et al [52]	82.10 ± 3.80	NA	35.70 ± 7.10 (6 weeks)	38.60 ± 6.10
Singh et al[51]	78.20 ± 2.8	NA	36.90 ± 7.1	39.55 ± 5.1
Vashishtha et al[53]	49.88 ± 17.18	NA	22.52 ± 9.31	16.56 ± 10.3
Dhandapani et al[60]	56.61 ± 8.97	45.84 ± 9.11	30.69 ± 11.03	26.83 ± 8.76

By 2021, 50 patients in India had undergone SNRBs as part of a prospective trial by Hamza Shaikh et al., who monitored them for three months.[58] According to the ODI, the disability score related to leg and back pain improved after receiving an SNRB. At one week, three weeks and three months after injection, the ODI scores of 42 patients who opted out of surgery dropped dramatically from 59.4 (SD 14.69) before injection to 42.4 (SD 9.33), 38.6 (SD 11.99) and 26.3 (SD 9.43) ($P < 0.001$), respectively.

In 2015, Mehmood Khan et al. studied 120 patients in India who had LDH, LBP and LR. Subsequent to 6 weeks of conservative treatment, the patients still did not show any improvement. [52] In this study, the baseline score on the ODI was 82.10 ± 3.8. However, after three months, the score dropped to 38.6 ± 6.10, indicating a significant reduction.

An RCT was conducted in India by Sudhir et al. to evaluate the efficacy of caudal epidural steroid injection in conjunction with SNRB for the management of pain and disability induced by LDH. [51] The beginning Oswestry Disability Scale (ODI) score in this study was 78.20 ± 2.8. After 90 days, it had dropped to 39.55 ± 5.10.

Vashishtha et al. performed prospective observational research in 2019 on 50 patients in India who had LR and selective nerve root blocks. [53] The baseline Oswestry Disability index (ODI) score in this study was 49.88 ± 17.18. After 90 days of follow-up, the score decreased to 16.56 ± 10.3.

Dhandapani et al conducted a study in India by 2023 to assess the effectiveness of LTFESI in reducing pain and increasing functional results in patients with LR. [60] The average ODI score, measured before the injection and at 24 hours, one month and three months after the injection, exhibited a consistent decrease over time following the administration of the epidural steroid injection. The score decreased from 56.61 before the injection to 26.83 three months after the injection.

CONCLUSION

CONCLUSION

Our study findings indicate that the administration of SNRB injection effectively decreases the intensity of pain and level of impairment in individuals with LR caused by PIVD, even up to 90 days following the injection.

In cases of lumbar intervertebral DH, SNRB is an easy, cost-effective and safe way to alleviate pain both temporarily and over the long term and it also improves functional outcomes. This procedure is a quick and efficient intervention that may be done as an outpatient procedure, without the need for anaesthesia. The use of SNRB provides both diagnostic and therapeutic advantages in the management of patients. Therefore, we suggest using nerve root block as a first measure before resorting to surgical intervention for patients with LR caused by PIVD.

SUMMARY

LIMITATION

- The study encountered difficulties due to the limited sample size, especially when assessing results related to the MSU classification for disc prolapse.
- The limited duration of follow-up emphasizes the necessity of a protracted, prolonged follow-up time to comprehensively assess the enduring impact of the intervention.

It is essential to acknowledge the limitations of the study, including its limited sample size and brief duration of follow-up in the midterm. The presence of these restrictions may influence the applicability of the results and restrict the capacity to evaluate long-term consequences. Further investigation using larger patient populations and longer follow-up durations may yield a more thorough comprehension of the enduring impacts of SNRB with steroid injections.

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ANNEXURE

ANNEXURE

PATIENT INFORMATION SHEET

STUDY TITLE: "FUNCTIONAL OUTCOME OF SELECTIVE NERVE ROOT BLOCK FOR LUMBAR RADICULOPATHY IN INTERVERTEBRAL DISC PROLAPSE".

STUDY LOCATION: R.L. Jalappa Hospital and Research Centre attached to Sri Devaraj Urs Medical College, Tamaka, Kolar.

DETAILS: Please read the following information and discuss it with your family members. You can ask any question regarding the study.

- If you agree to participate in the study, we will collect information (as per proforma) from you or a person responsible for you or both.
- Relevant history will be taken. This information collected will be used only for dissertation and publication.
- Patients in this study will have to undergo routine blood investigations, Pre-op x-rays and MRI of LS spine, this procedure is invasive in nature involving 3ml of steroid mixed with local anaesthesia injection in the involved nerve root and the cost associated with the study will be taken care by investigating doctor.
- All information collected from you will be kept confidential and will not be disclosed to any outsider. There is no compulsion to agree to this

study. The care you will get will not change if you don't wish to participate. You are required to sign/ provide thumb impression only if you voluntarily agree to participate in this study.

CONFIDENTIALITY: Your medical information will be kept confidential by the study doctor and staff and will not be made publicly available. Your original records may be reviewed by your doctor or ethics review board. For further information/ clarification please contact,

DR. GOWTHAM G,

DEPARTMENT OF ORTHOPEDICS,

SDUMC, KOLAR.

CONTACT NO: 9043330338.

Date:

ಶ್ರೀ ದೇವರಾಜ್ ಅರಸ್ ಉನ್ನತ ಶಿಕ್ಷಣ ಮತ್ತು ಸಂಶೋಧನೆ ಅಕಾಡೆಮಿ, ತಮಕ, ಕೋಲಾರ – 563101.

ರೋಗಿಯ ಮಾಹಿತಿಯ ಪತ್ರ

ಅಧ್ಯಯನದ ಶೀರ್ಷಿಕೆ: "ಇಂಟರ್ವರ್ಟಿಬ್ರಲ್ ಡಿಸ್ಕ್ ಪ್ರೋಲ್ಯಾಪ್ಸ್‌ನಲ್ಲಿ ಸೊಂಟದ ರಾಡಿಕ್ಯುಲೋಪತಿಗಾಗಿ ಆಯ್ದ ನರ ಮೂಲ ಬ್ಲಾಕ್ನ ಕ್ರಿಯಾತ್ಮಕ ಫಲಿತಾಂಶ".

ಅಧ್ಯಯನದ ಸ್ಥಳ: ಆರ್.ಎಲ್.ಜಾಲಪ್ಪ ಆಸ್ಪತ್ರೆ ಮತ್ತು ಸಂಶೋಧನಾ ಕೇಂದ್ರವು ಶ್ರೀ ದೇವರಾಜ್ ಅರಸ್ ವೈದ್ಯಕೀಯ ಕಾಲೇಜು, ಟಮಕ, ಕೋಲಾರ.

ವಿವರಗಳು: ದಯವಿಟ್ಟು ಕೆಳಗಿನ ಮಾಹಿತಿಯನ್ನು ಓದಿ ಮತ್ತು ನಿಮ್ಮ ಕುಟುಂಬದ ಸದಸ್ಯರೊಂದಿಗೆ ಚರ್ಚಿಸಿ. ಅಧ್ಯಯನಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ ನೀವು ಯಾವುದೇ ಪ್ರಶ್ನೆಯನ್ನು ಕೇಳಬಹುದು.

- ನೀವು ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ಸಮ್ಮತಿಸಿದರೆ, ನಾವು ನಿಮ್ಮಿಂದ ಅಥವಾ ಇಬ್ಬರಿಗೂ ಜವಾಬ್ದಾರರಾಗಿರುವ ವ್ಯಕ್ತಿಯಿಂದ ಮಾಹಿತಿಯನ್ನು (ನಿಯಮಾನುಸರಣೆಯ ಪ್ರಕಾರ) ಸಂಗ್ರಹಿಸುತ್ತೇವೆ.
- ಸಂಬಂಧಿತ ಇತಿಹಾಸವನ್ನು ತೆಗೆದುಕೊಳ್ಳಲಾಗುವುದು. ಸಂಗ್ರಹಿಸಿದ ಈ ಮಾಹಿತಿಯನ್ನು ಪ್ರಬಂಧ ಮತ್ತು ಪ್ರಕಟಣೆಗೆ ಮಾತ್ರ ಬಳಸಲಾಗುತ್ತದೆ.
- ಈ ಅಧ್ಯಯನದಲ್ಲಿ ರೋಗಿಗಳು ವಾಡಿಕೆಯ ರಕ್ತ ಪರೀಕ್ಷೆಗಳಿಗೆ ಒಳಗಾಗಬೇಕಾಗುತ್ತದೆ, ಪೂರ್ವ-ಆಪ್ ಕ್ಷ-ಕಿರಣಗಳು ಮತ್ತು LS ಬೆನ್ನುಮೂಳೆಯ MRI, ಈ ಪ್ರಕ್ರಿಯೆಯು ಒಳಗೊಳ್ಳುವ ನರ ಮೂಲದಲ್ಲಿ ಸ್ಥಳೀಯ ಅರಿವಳಿಕೆ ಚುಚ್ಚುಮದ್ದಿನೊಂದಿಗೆ 3ಮಿ.ಲೀ. ಸ್ಟಿರಾಯ್ಡ್ ಅನ್ನು ಒಳಗೊಂಡಿರುವ ಆಕ್ರಮಣಕಾರಿ ಸ್ವಭಾವವಾಗಿದೆ.
- ನಿಮ್ಮಿಂದ ಸಂಗ್ರಹಿಸಿದ ಎಲ್ಲಾ ಮಾಹಿತಿಯನ್ನು ಗೌಪ್ಯವಾಗಿ ಇರಿಸಲಾಗುತ್ತದೆ ಮತ್ತು ಯಾವುದೇ ಹೊರಗಿನವರಿಗೆ ಬಹಿರಂಗಪಡಿಸಲಾಗುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನವನ್ನು ಒಪ್ಪಿಕೊಳ್ಳಲು ಯಾವುದೇ ಒತ್ತಾಯವಿಲ್ಲ. ನೀವು ಭಾಗವಹಿಸಲು ಬಯಸದಿದ್ದರೆ ನೀವು ಪಡೆಯುವ ಕಾಳಜಿಯು ಬದಲಾಗುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನೀವು ಸ್ವಯಂಪ್ರೇರಣೆಯಿಂದ ಸಮ್ಮತಿಸಿದರೆ ಮಾತ್ರ ನೀವು ಸಹಿ/ಹೆಬ್ಬೆರಳಿನ ಗುರುತನ್ನು ಒದಗಿಸಬೇಕಾಗುತ್ತದೆ.

ಗೌಪ್ಯತೆ: ನಿಮ್ಮ ವೈದ್ಯಕೀಯ ಮಾಹಿತಿಯನ್ನು ಅಧ್ಯಯನ ವೈದ್ಯರು ಮತ್ತು ಸಿಬ್ಬಂದಿ ಗೌಪ್ಯವಾಗಿಡುತ್ತಾರೆ ಮತ್ತು ಸಾರ್ವಜನಿಕವಾಗಿ ಲಭ್ಯವಾಗುವಂತೆ ಮಾಡಲಾಗುವುದಿಲ್ಲ. ನಿಮ್ಮ ಮೂಲ ದಾಖಲೆಗಳನ್ನು ನಿಮ್ಮ ವೈದ್ಯರು ಅಥವಾ ಎಥಿಕ್ಸ್ ರಿವ್ಯೂ ಬೋರ್ಡ್ ಪರಿಶೀಲಿಸಬಹುದು. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ / ಸ್ಪಷ್ಟೀಕರಣಕ್ಕಾಗಿ ದಯವಿಟ್ಟು ಸಂಪರ್ಕಿಸಿ.

ಡಾ. ಗೌತಮ್ ಜಿ.
ಆರ್ಥೋಪೆಡಿಕ್ಸ್ ವಿಭಾಗ,
SDUMC, ಕೋಲಾರ
ಸಂಪರ್ಕ ಸಂಖ್ಯೆ: 9043330338.

INFORMED CONSENT FORM

I Mr./Mrs. _____have been explained in my own understandable language, that I will be included in the study entitled, "FUNCTIONAL OUTCOME OF SELECTIVE NERVE ROOT BLOCK FOR LUMBAR RADICULOPATHY IN INTERVERTEBRAL DISC PROLAPSE" by Dr Gowtham G.

I have been explained that my clinical findings, investigations, and postoperative findings will be assessed and documented for study purposes.

I have been explained the nature, steps of the procedure, the intervention involved, and possible benefits and adversities due to the procedure, in my understandable language and I understood and agreed to the same.

I have been explained that my participation in this study is entirely voluntary and I can withdraw from the study any time and this will not affect my relation with my doctor or the treatment for my ailment.

I have been explained that I must answer the questionnaires related to the study.

I have understood that all my details found during the study are kept confidential and while publishing or sharing of the findings, my details will be masked.

I have been explained about the expenses related to the study.

I will not hold treating doctors, hospital management, or hospital staff for any untoward events.

I in my sound mind give full consent to be added in the part of this study.

Signature of the patient:

Name:

Signature of the witness:

Name:

Place:

Time:

ದಿನಾಂಕ:

ಮಾಹಿತಿ ನೀಡಿದ ಒಪ್ಪಿಗೆ ನಮೂನೆ

ನಾನು ಶ್ರೀ/ಶ್ರೀಮತಿ. _____ ನನ್ನ ಸ್ವಂತ ಅರ್ಥವಾಗುವ ಭಾಷೆಯಲ್ಲಿ ವಿವರಿಸಲಾಗುವುದು, ಡಾ. ಗೌತಮ್ ಜೆ ಅವರಿಂದ "ಇಂಟರ್ವರ್ಟಿಬ್ರಲ್ ಡಿಸ್ಕ್ ಪ್ರೋಲ್ಯಾಪ್ಸ್‌ನಲ್ಲಿ ಸೊಂಟದ ರಾಡಿಕ್ಯುಲೋಪತಿಗಾಗಿ ಆಯ್ದ ನರ ಮೂಲ ಬ್ಲಾಕ್ನ ಕ್ರಿಯಾತ್ಮಕ ಫಲಿತಾಂಶ" ಎಂಬ ಶೀರ್ಷಿಕೆಯ ಅಧ್ಯಯನದಲ್ಲಿ ನನ್ನನ್ನು ಸೇರಿಸಲಾಗುವುದು.

ನನ್ನ ಕ್ಲಿನಿಕಲ್ ಸಂಶೋಧನೆಗಳು, ತನಿಖೆಗಳು, ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ನಂತರದ ಸಂಶೋಧನೆಗಳನ್ನು ಮೌಲ್ಯಮಾಪನ ಮಾಡಲಾಗುತ್ತದೆ ಮತ್ತು ಅಧ್ಯಯನ ಉದ್ದೇಶಕ್ಕಾಗಿ ದಾಖಲಿಸಲಾಗುತ್ತದೆ ಎಂದು ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ.

ನನ್ನ ಸ್ವಂತ ಅರ್ಥವಾಗುವ ಭಾಷೆಯಲ್ಲಿ ನಾನು ಸ್ವಭಾವ, ಕಾರ್ಯವಿಧಾನದ ಹಂತಗಳು, ಒಳಗೊಳ್ಳುವ ಹಸ್ತಕ್ಷೇಪ, ಸಂಭವನೀಯ ಪ್ರಯೋಜನಗಳು ಮತ್ತು ಪ್ರತಿಕೂಲತೆಗಳ ಬಗ್ಗೆ ವಿವರಿಸಿದ್ದೇನೆ ಮತ್ತು ನಾನು ಅದನ್ನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ ಮತ್ತು ಒಪ್ಪಿಕೊಂಡಿದ್ದೇನೆ.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನನ್ನ ಭಾಗವಹಿಸುವಿಕೆಯು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ ಮತ್ತು ನಾನು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಅಧ್ಯಯನದಿಂದ ಹಿಂದೆ ಸರಿಯಬಹುದು ಮತ್ತು ಇದು ನನ್ನ ವೈದ್ಯರೊಂದಿಗಿನ ನನ್ನ ಸಂಬಂಧ ಅಥವಾ ನನ್ನ ಕಾಯಿಲೆಯ ಚಿಕಿತ್ಸೆಯ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ ಎಂದು ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ.

ನಾನು ಅಧ್ಯಯನಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ಪ್ರಶ್ನಾವಳಿಗಳಿಗೆ ಉತ್ತರಿಸಬೇಕು ಎಂದು ವಿವರಿಸಲಾಗಿದೆ.

ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ಪತ್ತೆಯಾದ ನನ್ನ ಎಲ್ಲಾ ವಿವರಗಳನ್ನು ಗೌಪ್ಯವಾಗಿ ಇರಿಸಲಾಗಿದೆ ಮತ್ತು ಸಂಶೋಧನೆಗಳನ್ನು ಪ್ರಕಟಿಸುವಾಗ ಅಥವಾ ಹಂಚಿಕೊಳ್ಳುವಾಗ, ನನ್ನ ವಿವರಗಳನ್ನು ಮರೆಮಾಚಲಾಗುತ್ತದೆ ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ.

ಅಧ್ಯಯನಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ವೆಚ್ಚಗಳ ಬಗ್ಗೆ ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ.

ಯಾವುದೇ ಅಹಿತಕರ ಘಟನೆಗಳಿಗೆ ವೈದ್ಯರು, ಆಸ್ಪತ್ರೆ ಆಡಳಿತ ಮಂಡಳಿ, ಆಸ್ಪತ್ರೆ ಸಿಬ್ಬಂದಿಗೆ ಚಿಕಿತ್ಸೆ ನೀಡುವುದಿಲ್ಲ.

ಈ ಅಧ್ಯಯನದ ಭಾಗದಲ್ಲಿ ಸೇರಿಸಲು ನನ್ನ ಉತ್ತಮ ಮನಸ್ಸಿನಲ್ಲಿ ನಾನು ಸಂಪೂರ್ಣ ಒಪ್ಪಿಗೆಯನ್ನು ನೀಡುತ್ತೇನೆ.

ರೋಗಿಯ ಸಹಿ:

ಹೆಸರು:

ಸಾಕ್ಷಿ ಸಹಿ:

ಹೆಸರು:

ಸ್ಥಳ:

ಸಮಯ:

PROFORMA

CASE No.:

UHID No.:

1. BASIC DATA,
   - Name:
   - Age/Sex:
   - Address:
   - Occupation:
   - Mobile No.:
   - Date of Admission:
   - Date of Procedure:
   - Date of Discharge:
   - History:
   - General physical examination:

Vitals: Temp- Pulse-

BP- RR-

- Systemic examination:

CVS- CNS-

PA- RS-

- Pre-existing systemic illness: Diabetes/ Hypertension/ Thyroid disorder/ TB/ Anaemia/ Epilepsy/others.
- Local examination of L-S spine:

Spinal tenderness :

	RIGHT	LEFT
SLRT	:	
Patrick test	:	
Power - L2(Hip flexors)	:	
L3(Knee extensors)	:	
L4(Ankle dorsi flexion)	:	
L5(Toe extension)	:	
S1(Ankle plantar flexion)	:	

Sensation: Intact / Impaired.

Distal pulsation: Palpable / Absent.

- Radiological Investigations:

X-Ray: LS SPINE,

- Antero-posterior view:
- Lateral – Flexion/ Extension view:

MRI- LS Spine:

2. DIAGNOSIS:

3. BLOOD INVESTIGATIONS:

- CBC: HB- , WBC- , PLT-
- BT:
- CT:
- RBS:
- HIV, HCV &HBsAg Status

4. TREATMENT:

- Procedure:

- Type of anaesthesia:

5. POST PROCEDURE

- Post-Op drugs:

- Complications:

6. TIME OF DISCHARGE:

Overall functional assessment according to NRS, SLRT and ODI score done just before the procedure, post-procedure day 0, post-procedure day 30 and post-procedure day 90.

Oswestry Disability Index

This questionnaire has been designed to give the doctor information as to how your pain or condition has affected your ability to manage everyday life. Please answer every section and circle in each section **only the ONE number** that applies to you. We realize that you may consider that two of the statements in any one section relate to you, but please just circle the number that most closely describes your problem.

Section 1: Pain Intensity

0. The pain comes and goes and is very mild.
1. The pain is mild and does not vary much.
2. The pain comes and goes and is moderate.
3. The pain is moderate and does not vary much.
4. The pain comes and goes and is very severe.
5. The pain is severe and does not vary much.

Section 2: Personal Care

0. I would not have to change my way of washing or dressing in order to avoid pain.
1. I do not normally change my way of washing or dressing even though it causes some pain.
2. Washing and dressing increases the pain, but I manage not to change my way of doing it.
3. Washing and dressing increases the pain and I find it necessary to change my way of doing it.
4. Because of the pain, I am unable to do some washing and dressing without help.
5. Because of the pain, I am unable to do any washing and dressing without help.

Section 3: Lifting

0. I can lift heavy weights without extra pain.
1. I can lift heavy weights, but it causes extra pain.
2. Pain prevents me from lifting heavy weights off the floor, but I manage if they are conveniently positioned (e.g., on a table).
3. Pain prevents me from lifting heavy weights off the floor.
4. Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.
5. I can only lift very light weights at the most.

Section 4: Walking

0. I have no pain on walking.
1. I have some pain on walking, but it does not increase with distance.
2. I cannot walk more than one mile without increasing pain.
3. I cannot walk more than 1/2 mile without increasing pain.
4. I cannot walk more than 1/4 mile without increasing pain.
5. I cannot walk at all without increasing pain.

Section 5: Sitting

0. I can sit in any chair as long as I like.
1. I can only sit in my favorite chair as long as I like.
2. Pain prevents me from sitting more than one hour.
3. Pain prevents me from sitting more than 1/2 hour
4. Pain prevents me from sitting more 10 minutes.
5. I avoid sitting because it increases pain right away.

0-10 Minimal disability

11-20 Moderate disability

21-30 Severe disability

31-40 Crippled (incapacitated)

40-50 Bed-bound

Section 6: Standing

0. I can stand as long as I want without pain.
1. I have some pain on standing, but it does not increase with time.
2. I cannot stand for longer than one hour without increasing pain.
3. I cannot stand for longer than 1/2 hour without increasing pain.
4. I cannot stand for longer than 10 minutes without increasing pain.
5. I avoid standing because it increases the pain right away.

Section 7: Sleeping

0. I get no pain in bed.
1. I get pain in bed, but it does not prevent me from sleeping well.
2. Because of pain, my normal night's sleep is reduced by less than 1/4.
3. Because of pain, my normal night's sleep is reduced by less than 1/2.
4. Because of pain, my normal night's sleep is reduced by less than 3/4.
5. Pain prevents me from sleeping at all.

Section 8: Social Life

0. My social life is normal and gives me no pain.
1. My social life is normal, but increases the degree of pain.
2. Pain has no significant effect on my social life apart from limiting my more energetic interests, e.g., dancing, etc.
3. Pain has restricted my social life and I do not go out very often.
4. Pain has restricted my social life to my home.
5. I have hardly any social life because of the pain.

Section 9: Traveling

0. I get no pain while travelling.
1. I get some pain while travelling, but none of my usual forms of travel makes it any worse.
2. I get extra pain while travelling, but it does not compel me to seek alternative forms of travel.
3. I get extra pain while travelling, which compels me to seek alternative forms of travel.
4. Pain restricts all forms of travel.
5. Pain prevents all forms of travel except that done lying down.

Section 10: Changing Degree of Pain

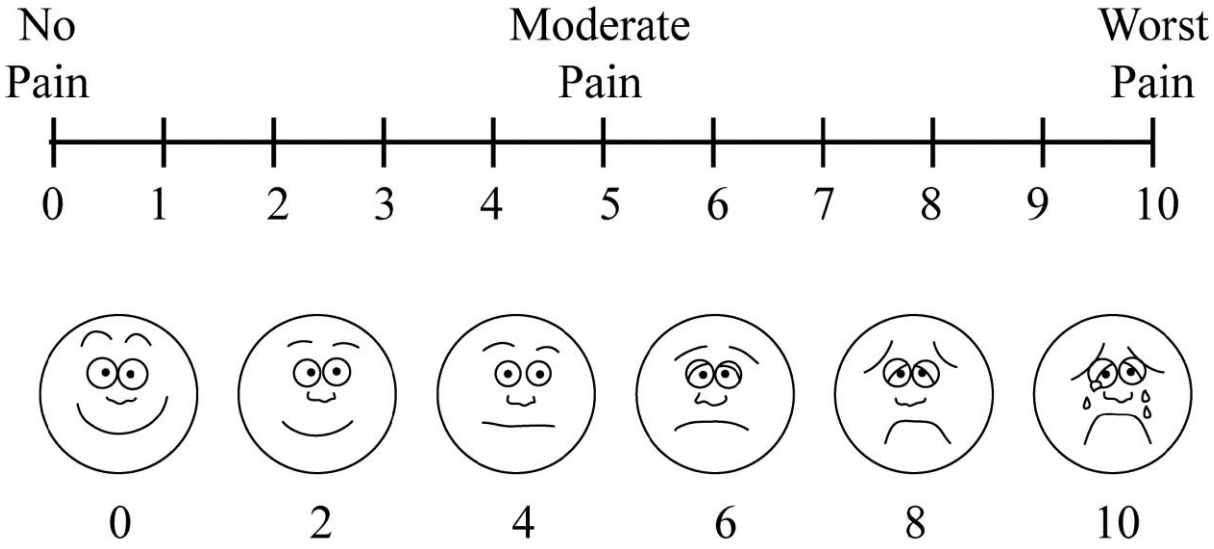
0. My pain is rapidly getting better.
1. My pain fluctuates, but is definitively getting better.
2. My pain seems to be getting better, but improvement is slow at present.
3. My pain is neither getting better nor worse.
4. My pain is gradually worsening.
5. My pain is rapidly worsening.

Patient's Signature:

_____

Date:_____

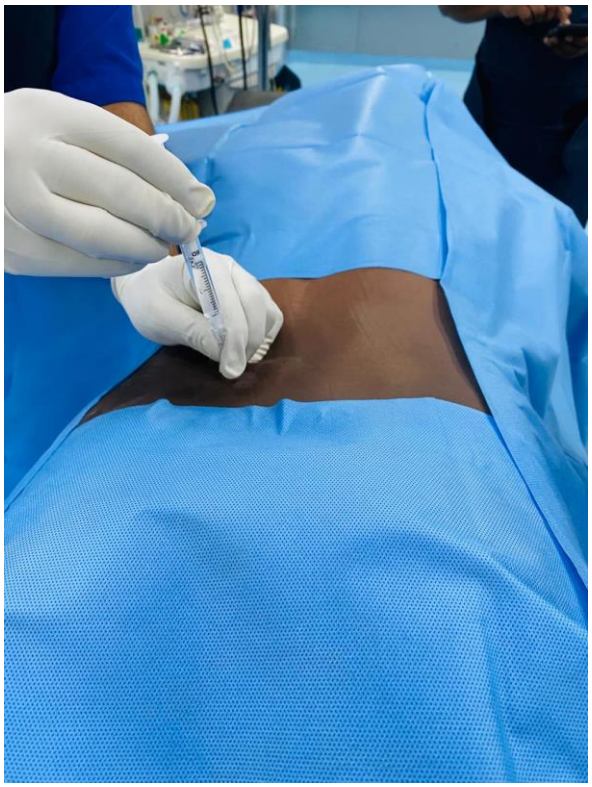
NUMERICAL RATING SCALE



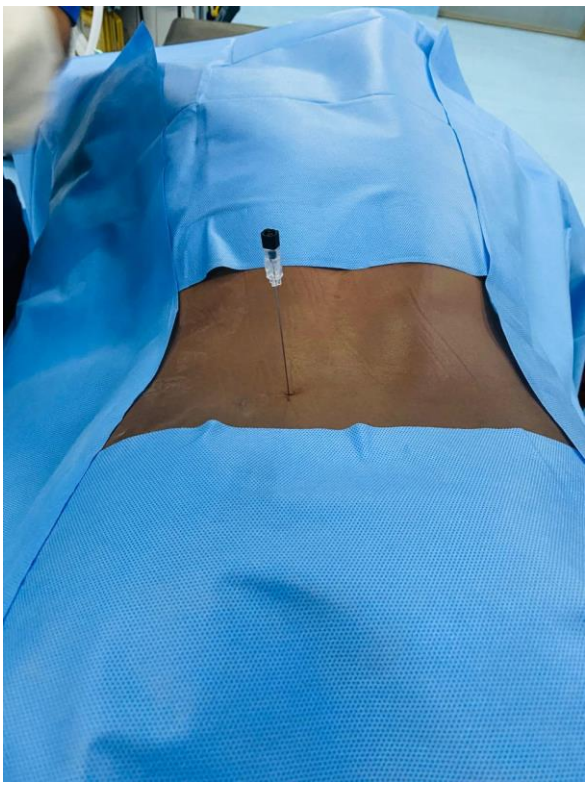
	PRE-PROCEDURE	POST-PROCEDURE DAY -0	POST-PROCEDURE DAY -30	POST-PROCEDURE DAY -90
SLRT				
NRS SCORE				
OSWESTRY DISABILITY INDEX				

PROCEDURE SET

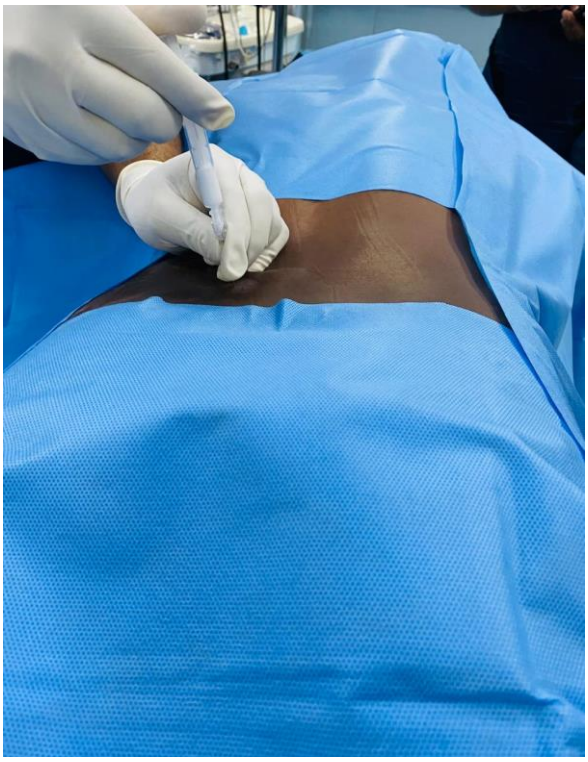
1 C-arm AP placement to identify area of interest



2 Picture depicts instillation of local anaesthesia to the area of interest

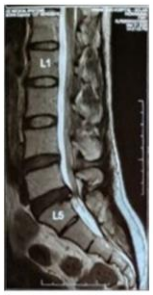


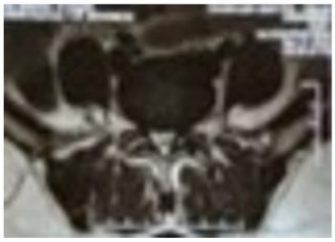
3 Picture depicts placement of the needle in the area of interest

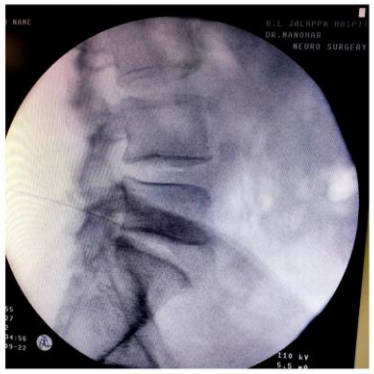


4 Picture depicts instillation of 3ml long-acting steroid with local anaesthesia to the area of interest

CASE 1

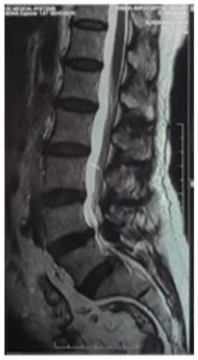


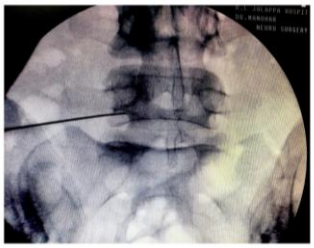




A. T2 weighted plane MRI sagittal section showing disc bulge at L4 L5 level.
B. T2 weighted plane MRI axial section showing disc bulge at L4 L5 level
C. C-arm image lateral view showing needle placement at L4 L5 level.

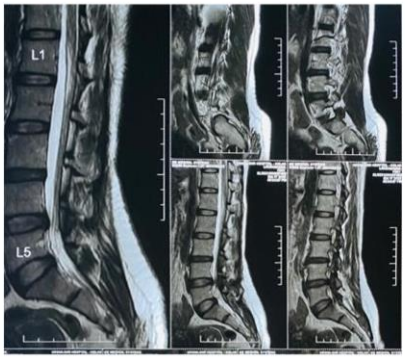
CASE 12

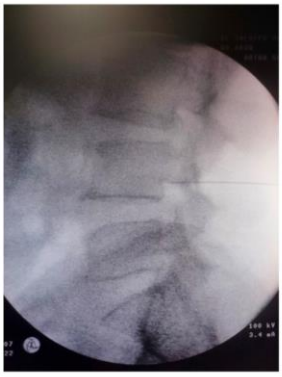




A. T2 weighted plane MRI sagittal section showing disc bulge at L5 S1 level.
B. T2 weighted plane MRI axial section showing disc bulge at L5 level.
C. C-arm image lateral view showing needle placement at L5 S1level.

CASE 32





A. T2 weighted plane MRI sagittal section showing disc bulge at L4 L5 level.
B. C-arm image lateral view showing needle placement at L4 L5 level.

MASTER CHART

S.No	Age	Gender	Occupation	Diagnosis	Duration of symptoms in months	Side of Radiating pain	Level of SNRB	Lumbar disc herniation	anatomical location of the herniation	morphology of the displaced disc material	VAS score				SLR test				ODI total score			
											Pre op	Post op day 0	At 1 month	At 3 months	Pre op	Post op day 0	At 1 month	At 3 months	Pre op	Post op day 0	At 1 month	At 3 months
1	42	MALE	CLERK	PIVD AT L4-L5	9	Left	L5	L4-L5	Central	Protrusion	6	3	4	3	Positive	Negative	Negative	Negative	14	8	9	8
2	50	MALE	DRIVER	PIVD AT L5-S1	8	Right	L5	L5-S1	Paracentral	Protrusion	7	4	5	4	Positive	Negative	Negative	Negative	15	6	9	6
3	57	FEMALE	FARMER	PIVD AT L3-L4	6	Left	L4	L3-L4	Central	Bulge	6	3	4	3	Positive	Negative	Negative	Negative	12	6	7	6
4	34	MALE	DRIVER	PIVD AT L3-L4	7	Left	L4	L3-L4	Central	Protrusion	6	3	4	3	Positive	Negative	Negative	Negative	12	8	5	6
5	36	MALE	FARMER	PIVD AT L4-L5	7	Right	L5	L4-L5	Central	Bulge	5	3	4	3	Positive	Negative	Negative	Negative	12	8	6	6
6	50	FEMALE	TEACHER	PIVD AT L5-S1	8	Left	L5	L5-S1	Paracentral	Protrusion	7	3	5	4	Positive	Negative	Negative	Negative	16	7	8	7
7	60	MALE	CLERK	PIVD AT L4-L5	7	Right	L4	L4-L5	Paracentral	Bulge	5	2	3	3	Positive	Negative	Negative	Negative	12	5	4	4
8	42	FEMALE	FARMER	PIVD AT L4-L5	7	Left	L5	L4-L5	Central	Bulge	6	4	3	3	Positive	Negative	Negative	Negative	11	6	7	6
9	23	MALE	FARMER	PIVD AT L3-L4	8	Right	L4	L3-L4	Central	Protrusion	7	4	4	4	Positive	Negative	Negative	Negative	14	6	7	6
10	38	FEMALE	HOME MAKER	PIVD AT L5-S1	9	Left	S1	L5-S1	Central	Bulge	6	4	5	4	Positive	Negative	Negative	Negative	12	7	6	7
11	45	MALE	FARMER	PIVD AT L4-L5	7	Left	L5	L4-L5	Central	Bulge	6	3	2	3	Positive	Negative	Negative	Negative	11	5	6	5
12	47	FEMALE	TEACHER	PIVD AT L4-L5	9	Right	L4	L4-L5	Paracentral	Bulge	5	3	6	3	Positive	Negative	Negative	Negative	15	7	8	7
13	55	MALE	FARMER	PIVD AT L4-L5	8	Left	L4	L4-L5	Paracentral	Protrusion	6	3	5	3	Positive	Negative	Negative	Negative	15	8	11	8
14	32	MALE	CLERK	PIVD AT L3-L4	6	Left	L4	L3-L4	Central	Extrusion	8	4	5	4	Positive	Negative	Negative	POSITIVE	22	12	12	14
15	23	FEMALE	TEACHER	PIVD AT L5-S1	6	Left	S1	L5-S1	Central	Bulge	7	3	5	3	Positive	Negative	Negative	Negative	12	7	8	7
16	42	FEMALE	CLERK	PIVD AT L4-L5	8	Right	L4	L4-L5	Paracentral	Bulge	6	3	2	3	Positive	Negative	Negative	Negative	11	7	3	5
17	47	FEMALE	TEACHER	PIVD AT L3-L4	8	Left	L4	L3-L4	Central	Protrusion	6	3	5	3	Positive	Negative	Negative	Negative	14	9	11	7
18	38	MALE	TEACHER	PIVD AT L5-S1	8	Right	L5	L5-S1	Paracentral	Bulge	6	4	3	3	Positive	Negative	Negative	Negative	15	9	7	6
19	29	MALE	CLERK	PIVD AT L3-L4	7	Right	L3	L3-L4	Paracentral	Bulge	7	3	4	3	Positive	Negative	Negative	Negative	14	8	11	7
20	51	FEMALE	HOME MAKER	PIVD AT L4-L5	9	Left	L5	L4-L5	Central	Bulge	6	3	4	3	Positive	Negative	Negative	Negative	14	7	6	6
21	44	MALE	DRIVER	PIVD AT L5-S1	9	Left	S1	L5-S1	Central	Protrusion	7	4	5	3	Positive	Negative	Negative	Negative	15	10	11	9
22	48	MALE	DRIVER	PIVD AT L3-L4	8	Right	L3	L3-L4	Paracentral	Bulge	6	4	4	3	Positive	Negative	Negative	Negative	14	7	6	7
23	49	FEMALE	FARMER	PIVD AT L4-L5	7	Left	L4	L4-L5	Paracentral	Extrusion	8	3	5	4	Positive	Negative	Negative	POSITIVE	23	14	12	15
24	24	MALE	DRIVER	PIVD AT L4-L5	6	Right	L5	L4-L5	Central	Bulge	6	3	4	3	Positive	Negative	Negative	Negative	12	6	5	5
25	28	MALE	DRIVER	PIVD AT L3-L4	7	Left	L4	L3-L4	Central	Bulge	7	3	5	4	Positive	Negative	Negative	Negative	16	7	6	6
26	30	FEMALE	TEACHER	PIVD AT L5-S1	8	Right	L5	L5-S1	Paracentral	Protrusion	7	3	4	3	Positive	Negative	Negative	Negative	14	9	11	8
27	32	MALE	FARMER	PIVD AT L4-L5	8	Left	L4	L4-L5	Paracentral	Extrusion	8	4	3	3	Positive	Negative	Negative	POSITIVE	24	11	12	10
28	37	FEMALE	HOME MAKER	PIVD AT L5-S1	9	Left	S1	L5-S1	Central	Bulge	6	2	3	2	Positive	Negative	Negative	Negative	12	6	5	5
29	35	MALE	DRIVER	PIVD AT L3-L4	7	Right	L4	L3-L4	Central	Protrusion	7	4	3	3	Positive	Negative	Negative	Negative	13	7	7	6
30	33	MALE	FARMER	PIVD AT L4-L5	8	Right	L5	L4-L5	Central	Bulge	6	3	3	2	Positive	Negative	Negative	Negative	11	5	3	3
31	27	FEMALE	CLERK	PIVD AT L4-L5	8	Left	L4	L4-L5	Paracentral	Bulge	7	3	5	3	Positive	Negative	Negative	Negative	15	7	7	6
32	33	MALE	FARMER	PIVD AT L4-L5	8	Left	L4	L4-L5	Paracentral	Bulge	6	4	5	3	Positive	Negative	Negative	Negative	9	6	7	6
33	44	MALE	FARMER	PIVD AT L4-L5	8	Right	L5	L4-L5	Central	Extrusion	7	3	4	4	Positive	Negative	Negative	POSITIVE	21	14	12	9
34	42	MALE	DRIVER	PIVD AT L5-S1	8	Right	S1	L5-S1	Central	Bulge	6	3	5	2	Positive	Negative	Negative	Negative	14	9	9	4
35	40	FEMALE	HOME MAKER	PIVD AT L3-L4	9	Left	L4	L3-L4	Paracentral	Protrusion	6	4	5	3	Positive	Negative	Negative	Negative	15	10	11	7