

Selective Nerve Root Block in Lumbar Radiculopathy Treatment

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Abstract

A specific irritated nerve root causing lumbar radiculopathy can be targeted with the Selective Nerve Root Block (SNRB) approach, which can be used for both diagnostic and therapeutic purposes. Under imaging guidance, a local anaesthetic agent and a steroid are typically combined to make SNRB therapeutic, whereas merely the local anaesthetic agent is given to make SNRB diagnostic. While relieving the nerve root of its compressing pathology is the optimum course of treatment, local steroid injections into the afflicted nerve root can also be tried in an effort to reduce inflammation and alleviate discomfort. There are variations in procedures based on the area and level of the spine that is targeted, even if the underlying idea for administering an SNRB is largely the same across the field. Additionally, the medicine combinations that doctors use vary depending on their preferences. The operation is regarded as safe and well tolerated by the majority of patients because the advantages of SNRBs have been demonstrated to significantly exceed the dangers.

Keywords: Lumbar region • Nerve block • Radiculopathy • Spine • Spondylosis

Introduction

Low back pain and lumbar radiculopathy

One of the most frequent complaints in medical settings is low back pain, which has alarmingly increased in incidence and prevalence over the past 20 years. In order to better understand the biology underlying this issue and move toward developing new therapeutic approaches, a number of studies have evaluated the risk factors causing back pain, including genome-wide association studies. When considering the causes of pain, deterioration involving the intervertebral discs or the bony components of the spine is a significant factor. Nerve root compression may also result from such degeneration. Here, a herniated disc, thickened ligamentum flavum, hypertrophied facet, or neural foraminal stenosis as a result of disc height loss could be the source of compression. Patients with these disorders frequently appear with lumbar radiculopathy, which causes shooting pain to travel along the damaged nerve's course down their legs. Along with tingling and numbness, there may also be motor weakness in more serious cases.

Diagnosing lumbar radiculopathy

Various sciatic stretch tests can be used to make a clinical diagnosis of lumbar radiculopathy. The Straight Leg Raising Test (SLRT), which is the most frequently utilized, involves having the patient lie on his or her back with the afflicted leg raised passively while the knee is completely extended. When radicular pain is replicated between 30° and 70° of hip flexion, a positive test result indicates that tensile strains have been generated at the lumbosacral and sciatic nerve roots. Additionally, if the SLRT results are good, the leg can be passively dorsiflexed and lowered to a point slightly below the pain threshold.

The Bragard's sign is considered affirmative if this manoeuvre induces discomfort that is comparable to the SLRT's. Another accurate diagnostic procedure is the slump test, which involves asking the patient to slouch forward while seated with their hands behind their backs, flexing their neck to place their chin on their chest, extending the knee on the affected side, and then dorsiflexing their ipsilateral ankle. The test is deemed positive when radicular pain is replicated at any stage of the process. This gradual sequence of manoeuvres generates increasing stress at the sciatic nerve roots. The Dejerine trinity, which entails executing a Valsalva manoeuvre, coughing, and sneezing, was demonstrated to have high diagnostic validity when paired with the slump test. The gold standard for pinpointing the precise disease impacting the nerve root is, in the end, Magnetic Resonance (MR) imaging. To distinguish various neurologic diseases from lumbar radiculopathy, electro diagnostic testing can be done utilizing sensory nerve action potentials and compound muscle action potentials. Such an evaluation is typically necessary for patients who have sensory or motor loss without any apparent relationship to MR imaging results.

Management strategies

Numerous publications offer proof that conservative care, analgesics, rest, and physical therapy completely relieve the symptoms of lumbar radiculopathy produced by a variety of diseases. Therefore, unless otherwise stated, first-line management is primarily conservative. Oral Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), oral corticosteroids, and non-pharmacological interventions like rest and traction therapy are typically tried first, with surgery being reserved for patients who exhibit red flag symptoms like neurological deficits or loss of bladder and bowel function. The question of when to forego conservative treatment in favor of additional therapies is, however, a constant conundrum. According to reports, invasive procedures may be considered if symptoms worsen or continue for longer than six weeks despite conservative care or if there is neurological impairment. While surgery to release the pressure on the nerve root is the best choice, local steroid injections into the epidural space of the afflicted level or the affected nerve root can also be tried to reduce inflammation and relieve pain. Patients must always be given a thorough explanation of the advantages and disadvantages of SNRB in contrast to alternative surgical choices, and a decision must be reached in agreement. Interlaminar, transforaminal, or caudal methods can all be used to target the epidural area during such injections. The needle is advanced between the laminae of two neighboring vertebrae in the interlaminar technique, which is a midline method, in order to reach the epidural space. The needle is placed far lateral to the midline on the affected side and moved toward the intervertebral foramen of the affected disc level in this transforaminal technique. This method, which is carried out with imaging guidance, is comparable to selecting the afflicted nerve root for a Selective Nerve Root Block (SNRB). The needle is advanced into the sacral canal through the sacrococcygeal ligament and into the epidural space using the caudal approach, which is through the sacral hiatus. In addition, a steroid injection can offer short-term pain relief in cases where a patient is unwilling to have surgery despite the fact that it is indicated. Despite the fact that SNRBs are more and more common, there is still debate about a variety of features of their administration, including the drugs utilized and the mode of administration. In this article, we aim to present a thorough overview of SNRB and the literature that surrounds it, including its indications, techniques, results, and side effects.

Selective nerve root block

A specific irritated nerve root producing lumbar radiculopathy can be addressed using the Selective Nerve Root Block (SNRB) technique for both diagnostic and therapeutic purposes. Under imaging guidance, a local anaesthetic and steroid are often injected around the damaged nerve root in order to treat SNRB, whereas only the local anaesthetic is given in order to diagnose SNRB. A crucial clue that the pain is coming from a different level or nerve root is the absence of pain relief, which also shows that the pain is not coming from the targeted nerve root. In addition, several spine surgeons, interventional radiologists, and pain physicians have incorporated this met-

-hod into their standard of care for therapeutic purposes due to its therapeutic efficacy whenever a steroid and local anaesthetic combo is administered.

Indications for therapeutic SNRB

When conservative care for unilateral lumbar radiculopathy, where only one nerve root is afflicted, has failed, therapeutic SNRB is indicated since it effectively reduces pain brought on by inflammation of a specific nerve root. However, as in the majority of spondylosis patients, it can also be employed for bilateral or ipsilateral multilevel pathology. It should be emphasized, however, that injecting steroids at many levels or in higher quantities may result in problems.

Intervertebral disc herniation

Intervertebral disc herniation, in which the nucleus pulposus is forced out of its natural position, is the most frequent condition producing nerve root inflammation leading to lumbar radiculopathy. This can occur suddenly as a result of an injury or more gradually as a result of the intervertebral disc's degeneration and desiccation as a result of ageing naturally. There are numerous different classification schemes and naming systems for disc herniation. The anatomical location of the herniation, which can be classified as central, paracentral, foraminal, or far lateral, can be used to categorize disc herniation in general. Depending on the form of the displaced disc material, it can alternatively be referred to as protrusion, extrusion, or sequestration. The classification system developed by Michigan State University (MSU) is a more complex method based on the herniation's morphology. The disc herniation size and location are evaluated here using a T2 axial cut MR image at the level of maximal disc herniation. However, Pfirrmann's grading divides the degree of nerve root impairment brought on by the herniated disc into four categories and uses a similar T2 axial cut MR picture at the level of maximal disc herniation, showing a strong connection with surgical findings. Although it is theoretically possible to try out therapeutic SNRBs for any type of disc herniation listed in these classification systems that cause radiculopathy, it is frequently not used for severe cases because those with severe disc herniation do not receive relief other than temporary post procedural pain relief. However, few studies evaluate and report the results of SNRBs using these complex classification schemes; as a result, there is a dearth of organized evidence-based guidelines.

Spondylosis

All of the components of the spine, including the bony elements of the vertebra, intervertebral discs, ligamentum flavum, and facet joints, are affected by age-related degenerative wear and tear known as spondylosis. Some of these disorders may cause foraminal constriction, which could impair the nerve roots and cause radiculopathy. First, intervertebral disc degeneration, the most typical kind of spondylosis, can result in considerable disc height loss and stiffness.

As a result, the neural foraminal height also declines, which may damage departing nerve roots and result in radiculopathy. It should be mentioned that such degenerative discs enhance the risk for intervertebral disc herniation by causing structural alterations. Second, the ligamentum flavum, which connects each spinal level's upper and lower lamina, keeps its tension both while moving and while at rest. When a result of cumulative mechanical stress, it becomes thicker and stiffer with age and buckles inside the spinal canal as the disc height lowers owing to degeneration. The nerve root can be compressed from the front by an intervertebral disc herniation, while the back by a ligamentum flavum hypertrophy, radiculopathy can result. In some cases of spondylosis, the ligamentum flavum can become swollen and buckled from the back and press on the nerve root, causing significant symptoms even when the herniated disc's compression is mild.

Similar to this, nerve root impairment can also result from the facet joints, which are paired synovial joints that play crucial roles in load transfer and stability maintenance during spinal motions. The facet joint, which is made up of the superior and inferior articular processes of two nearby vertebrae, surrounds the neural foramen posteriorly. Inflammation and hypertrophy of the facet joint capsule can happen whenever there is spondylosis brought on by ageing or improper bodily mechanics. Along with hypertrophy, osteophytes or spurs can also occur, which causes the facet joints to swell even more. Synovial cysts can also develop as a result of osteoarthritis of the joints. In all of these situations, it is possible for the larger and degenerative facet joint to compress the nerve root, resulting in radiculopathy. Whatever the aforementioned indication, if MR imaging shows a causal lesion compressing a nerve root in the foraminal-extraforaminal zone, which can be linked to radiculopathy, that specific nerve root can be targeted with an SNRB to provide pain relief. However, whether the SNRB will be effective as a therapeutic intervention will depend on how severe the lesion is. The only effect of the SNRB is to lessen the inflammation, but the mechanical compression that caused the inflammation will still exist, hence in most circumstances, the SNRB may not be the only effective treatment option.

Conclusion

In the clinical community, selective nerve root block is becoming more and more well-liked as both a helpful diagnostic tool and a therapeutic technique. It has the potential to effectively treat lumbar radiculopathy brought on by a range of diseases. The surgery itself can be approached in a variety of ways, depending on what the individual clinicians think is best. This may involve several techniques for seeing the spine, including where to place the needle and what drugs to combine. As with any technique, SNRB has its own unique set of potential drawbacks. Major issues are relatively uncommon, though, and the advantages far outweigh the disadvantages. With further developments, such as improved standardization and process optimization to assure maximum durations of effectiveness, SNRBs may become more well-liked in the future.