Effects of Nerve Flossing Technique on Sciatica due to Extruded Disc: A Case Report

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1. Introduction:

Sciatica is one of the most common painful, expensive and disabling conditions.1 Sciatica with back pain accounts for a disproportionate amount of the costs of medical care and disability compensation and is a major cause of pain, disability, and social cost affecting the quality of life in most patients.2 The lifetime incidence of LBP is 50-70% and the incidence of sciatica may be as high as 40%.3,4 The economic impact of lumbar spine disorders is high, ranking the fifth most expensive disease category for hospital care.5 Sciatica is a set of symptoms including radiating pain in the dermatome of a lumbar or sacral spinal nerve root due to compression and/or irritation of one of five spinal nerve roots or the sciatic nerve.6 Sciatica is caused by a herniated disc (posterolateral) involving nerve root compression in approximately 90% of the cases.7,8 As one age, the disc starts degenerating and undergoes a structural and biochemical change that alters its biomechanical properties. L3-4, L4-5 and L5-S1 are the most commonly affected segments. A degenerated disc can no longer attenuate shocks and distribute loads uniformly across the end plate as it is less elastic. It deforms easily at lower load levels which make it very prone to injury.9 Herniated or protruded disc can press against an adjacent nerve root and cause both compression and inflammation of the nerve as it contains an acidic chemical irritant (hyaluronic acid) leading to pain, numbness, tingling and muscle weakness.

Physiotherapy management of sciatica can comprise of electrotherapy (laser, mechanical traction, ultrasound...
IFT, TENS), manual therapy (neural mobilization, manipulations, massage, stretching), therapeutic exercises, corsets, advice and education. According to recent guidelines, an active approach in terms of resuming normal activities is considered optimum for low back pain with radiculopathy patients.\textsuperscript{10-16} Nerve flossing, a type of neural mobilization is an active non-invasive healing procedure or a conservative treatment method of disorders of neural tissue which is more beneficial, safer and cost effective and helps in quick relief which makes it highlighted. It is an entirely new system that actually moves the nerve through the tissues proximally and distally to the maximum extent possible by moving every joint and body part that the nerve crosses. The process is similar to stretching a cord at one end while the other is slack, and then switching the direction. When the sciatic nerve becomes trapped, it grates along the muscles and bones causing scar tissue to build up along the nerve fiber, nerve flossing technique puts tension on the tissue and actively lengthens it, which breaks the bonds of the scar tissue, releases the tension, and relaxes the nerve and improves mobility. Flossing entails operating the nerve by means of whatever range of motion the patient can handle, because the movements is completed without discomfort. Over time, the spot of painless movement can raise. The theory behind this technique is based on the idea that “essentially the entire nervous system is a continuous structure and it moves and slides in the body as we move and the movement is related to critical physiological processes such as blood flow to neurons”. As Sciatica is an expensive and time consuming problem an intervention giving immediate results in terms of decreasing pain, other sensory symptoms, functional disability and also delay the need for the surgery will be a cost effective option. But evidence for treatments which produce immediate effect in patients with sciatica is still conflicting.\textsuperscript{2,18-20} The literature suggests conservative treatment over the surgical option for patients with disc pathology. Nerve Flossing Technique is a safer, beneficial and cost effective conservative treatment option. However, there is no evidence about the nerve flossing technique and how this technique would influence the patients’ pain, sensory symptoms and functional outcome. This case study aims to establish the effect of the above.

\textbf{CASE PRESENTATION}

\textbf{Case History}

A forty-two year old male was referred to physiotherapy department by an Orthopaedician presented with complaints of dull aching pain at the lower back with radiating pain and tingling on the posterior side of the left lower leg. The patient is a laborer in a farm and his work includes a lot of forward bending to plant crops, frequent getting up and lifting heavy bags sometimes. Onset of low back with radiating pain and tingling was acute with prior episodes when he lifts heavy rice bags, persisting since seven weeks which increased in intensity and affected his daily activities. During the prior episodes, he was complaining of mild, gradual increase in low back pain which was aggravated by prolonged sitting, while planting crops and getting up from the chair. Since then, the low back pain had been constant and gradually progressing into his left buttock and leg. During the prior episodes the pain on VAS was rated 7/10 for which he took pain killers and bed rest only. Pain eased to 5/10 on the VAS post medication and bed rest. Now the patient complained of dull aching pain at lower back area (VAS-4/10) and intermittent tingling (VAS-8/10) on posterior side of left lower leg since then. The patient was otherwise generally healthy with no evidence of red or yellow flags to indicate serious spinal pathology or psychosocial issues.

On the initial examination, the patient reported primary problem to be the intermittent tingling P1 on the posterior side of the lower leg rated 8/10 on the VAS. P1 aggravated on prolonged sitting and forward bending to plant seeds. P1 eased after about 3-4 minutes with changing of position, i.e. walking around, or getting up after forward bending. The patient also experienced constant dull ache at his lower lumbar area P2, 4/10 on the VAS and was not so troublesome. It was forward, sitting for more than 30 minutes. P2 eased after about a minute with the patient.
changing position. A hot pack on his back also helped to relieve P2. The patient reported previous episodes of low back pain, but only now and again and never as severe as at the time of the assessment. Previous X-rays (taken in 2011) revealed disc space narrowing between L4/5 and L5/S1 and degenerative changes L1-S1 and MRI report confirmed extruded disc between L4/L5. The patient’s activities of daily living was affected since he experienced a lot of radiating pain and tingling with working in the field for long periods of time, and he had great discomfort sitting for a prolonged period.

**Physical Examination**

On observation, no swelling or erythema was noted in the lumbar region as well as in the left lower leg. He had a slouched sitting posture with the lumbar spine in end range flexion. On palpation, spasm was noted on lower lumbar area. On examination, straight leg raise test was used to test neural mobility. Left side straight leg raising reproduced low back and left lower leg pain at around 35°. The addition of passive dorsiflexion just short of 35 degrees increased the symptoms. Right SLR was not provocative and the range was 75°. The active range of motion (AROM) test of lumbar spine revealed pain during lumbar active flexion and also during combined lumbar left side flexion and flexion and left-sided rotation. Evidence based clearing tests confirmed no pathology in right hip joint and sacroiliac joints. Slump test on the right side brought on pain over left L5 dermatome region, which may denote likely left L5 nerve root involvement.

Present pain on VAS assessment was 8/10 in the P1 area and 4/10 in P2 area. Movement tests revealed P1 6/10 (sharp pain with tingling) and P2 4/10 during lumbar flexion, limited to ½ the range of movement. This range of motion was measured using modified Schober’s test. This active movement test and hip flexion range were used as the asterisk to determine the effect of the treatment modality.

A clinical neurological examination of the myotomes, reflexes and bladder and bowel were normal with tingling over L5 dermatome with no other sensory dysfunctions. With palpation of the soft tissue, trigger points in muscles erector spinae, quadratus lumborum and piriformis were tender to touch, but did not reproduce P1 or P2.

A grade three posterior-anterior (PA) vertebral pressure to L4 and L5 reproduced P1 to 8/10 (sharp pain). All other accessory movements of the lumbar spine were within normal limits. From the findings on the subjective and objective examination, it was confirmed that the patient’s pain was caused by L4/L5 disc pathology with nerve root irritation.

**Outcome measures**

Visual analogue scale was used to measure the intensity of pain before and after the intervention which is a 10 cm horizontal line anchored at each end, with the left end anchor (i.e.0cm) representing minimum score (minimum pain) and right end aggravated by bending anchor (i.e.10cm) representing maximum score (maximum pain). The highest reported inter-tester reliability of VAS is 0.84.21 Passive Straight Leg Raise Test (Hip flexion range) was done with the patient completely relaxed. It was done passively and each leg was tested individually with the normal leg being tested first. The test is positive if pain, tingling and numbness extend from the back down into the leg in the sciatic nerve distribution between 30° to 70°. The hip flexion range was measured with the help of goniometer as the leg was raised passively until the participant complaints of pain, tingling and numbness. The highest reported inter-tester reliability was 0.88.22 Active lumbar flexion range was measured using Modified Schober’s method. The highest reported inter-tester reliability of Modified Schober’s method is 0.89.23 The Modified Oswestry Disability Questionnaire (MODQ) was used as an outcome measure for a patient’s functional disability due to low back pain. The highest reported reliability was 0.90.24

**Intervention**

The patient received physiotherapy treatment for six consecutive days. The patient received five sets of Nerve Flossing Technique (NFT) per day and fifteen repetitions per set. Before and after 5 sets of NFT pain (using the VAS), passive straight leg raise (hip flexion range), the active range of lumbar flexion and the
Table 1: Shows the values of all the outcome measures on pre, post day 1, post day 3 and post day 6 of treatment.
functional disability were measured. Nerve flossing technique was started with the patient seated the knee backwards under the chair and lowered the head at the same time and held the position for 5 seconds (Figure 1). Now the patient straightened out the leg in which he experienced sciatic pain and at the same time extended the neck. The patient lifted the leg out and up in front until he began to experience pain and did not push beyond that point. As the nerve became less sensitive, he increased the stretching effect by flexing the toes of his foot upward toward the shin and held the position for 5 seconds (Figure 2). Speed and amplitude were adjusted such that no pain was produced. The effect of this technique was then measured in the exact same way as before the technique was applied. After these outcomes were measured, other physiotherapy treatment modalities were also used, which included: Mechanical lumbar traction in Ninety/Ninety Position i.e. in supine with hip and knee joints supported in 90 degrees flexion for 10 – 20 min each session/3 times per week with hold: Relax Time – 60/20 and Transcutaneous Electrical Nerve Stimulation (TENS) in prone lying with the placement of electrodes along the area of symptoms for 12 minutes for 6 days.

The reason for this was to determine the response to the nerve flossing technique and not the other modalities. The patient was assessed before and on day 1, day 3 and day 6 after NFT and functional disability was assessed pre and on day 6 after NFT the therapist educated the patient on the findings of the clinical examination and derived diagnosis and proposed the overall plan of care. He was advised to avoid aggravating activities such as sustained positions – even in the work place try to not sit or work in one position for longer than 15 minutes. Nerve flossing technique was done five times with 15 repetitions per session with 2hr gap in between. After the reassessment, TENS and mechanical lumbar traction were given. After 6 days of treatment the patient reported an overall improvement. There was a reduction of radiating pain and tingling in the posterior side of the left lower leg and patient only experienced a “tired” feeling in the back after a busy day at the field. No radiating pain was felt on forward bending while on farm and sitting for prolonged periods of time. A two week follow up was done telephonically and no pain was experienced. The patient had no problem performing the normal activities of daily living- he was fully functional at work and also carried on with leisure activities without any pain.

Discussion
The purpose of this case study was to determine the effectiveness of a nerve flossing technique in the physiotherapy management of a patient presenting with sciatica due to extruded disc. During the objective assessment it was evident that the primary diagnosis was a lumbar disc lesion (L4/L5) with associated radiculopathy and it was confirmed with MRI report. Passive straight leg raise test (hip flexion range) and active forward lumbar flexion were the main objective signs and were used as a test to monitor progress. The nerve flossing technique was used as the main treatment technique. It is interesting to note that the patient responded well on day one after five sets of nerve flossing technique. The relief from pain and sensory symptoms might be due to due to large amplitude movements which attempt to take the nerve throughout the available range of motion potentially affecting the nerve both mechanically and physiologically sufficient enough to disperse the edema, thus alleviating the hypoxia and reducing the associated symptoms. NFT also causes proximal sliding of lumbar nerve roots with neck and knee flexion and causes distal sliding of lumbar nerve roots with neck and knee extension and also improve the actual excursion of the sciatic nerve. With a dynamic variation in the pressure intraneural edema may be evacuated, adhesions decreased and may help to oxygenate the nerve thereby reducing symptoms and allowing the nerve to move freely with minimal increase in tension. NFT reduces pressure caused by intraneural and extra neural fibrosis which in turn will increase blood circulation and axonal transport which are necessary for structural and functional integrity of a neuron. It could also be because movement may help control pain at a central nervous system level. In addition, it is
hypothesized that the movement of nerve within pain-free variations can help.

Outcomes
Following the examination tension and friction therefore decreasing its mechanosensitivity. Similar results were found in a favor of Neural Mobilizations in a study done by McCracking and Devasahayam Augustine Joshua on LBP with radiculopathy and discogenic pain with radiculopathy respectively. This could possibly be the reason for the positive response using nerve flossing technique.

It is important to note that the patient maintained a high level of compliance throughout the treatment process regarding the advice and education he received about his problem. It is interesting to note that the rate of recovery was fast which could be due to the fact that the nerve flossing technique was performed five times a day. This could also have contributed to the patients' positive response to therapy.

A limitation to the study was the fact that the evaluation of the VAS, passive straight leg raise (hip flexion range), active forward flexion and MODQ score was done before treatment and directly after the Nerve flossing technique was applied. The further effects of TENS and lumbar traction that were given thereafter could thus not be determined.

Seeing that there is very little literature available on the use of Nerve flossing technique for patients presenting with low back pain with sciatica due to extruded disc, it is definitely a topic for further research. It would also be interesting to do a study with a bigger sample size.

Conclusion
In this case study it was found that a Nerve Flossing Technique can become an adjunctive treatment strategy in reducing the patient’s pain and sensory symptoms and regain functional ability in a shorter period of time. Future studies in this aspect are necessary to gain more insight about this conservative treatment approach.

CONFLICTS OF INTEREST
None identified and/or declared.

References:
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