

Combined Effect of Static Openers and Sciatic Nerve Mobilisation on Pain, Range of Motion and Lower Extremity Functions in an Individual with Piriformis Syndrome: A Case Report

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ABSTRACT

Piriformis Syndrome (PS) is defined as an impingement of the sciatic nerve by the piriformis muscle, resulting in buttock pain, sciatica-like symptoms, or both. Various physiotherapeutic interventions are used for its management, such as sciatic nerve mobilisation, strengthening of the hip abductors, extensors, and external rotators, and electrotherapy modalities including Transcutaneous Electrical Nerve Stimulation (TENS) and Interferential Therapy (IFT), however, none have been proven to provide long-term effects. Static openers are novel techniques that facilitate canal opening and create space for compressed nerves. A 24-year-old female presented to the Outpatient Department (OPD) with complaints of pain in gluteal region radiating till right posterior side of knee from past six days. On assessment, special tests such as Straight Leg Raise (SLR) test, Beatty, and Flexion, Adduction, Internal Rotation (FAIR) test of right-side were positive with restriction in Hip Internal and External Range Of Motion (ROM) making a diagnosis of PS. Sciatic nerve mobilisation was performed for three sets of 30-40 repetitions (2 minutes/set) with a one-minute rest between sets, while static openers were given for 30 seconds to one minute, four days/week. Baseline and postintervention, improvements were observed on pain by Visual Analogue Scale (VAS) (8 to 5), Pain pressure threshold of piriformis muscle reduced (2.20 to 2.10), Hip IR (32° to 36°), ER (43° to 48°), and Lower Extremity Functional Scale (LEFS) (25 to 35). This case report concludes that combining static openers with sciatic nerve mobilisation might serve as an effective intervention in managing PS.

Keywords: Buttocks, Females, Low back pain, Muscles, Sciatica

CASE REPORT

A 24-year-old female visited neuro-physiotherapy OPD of tertiary care hospital with complaint of pain in gluteal region radiating till right posterior side of knee from past six days. The patient was a student with complaint of gluteal region back pain due to prolonged standing, fast walking movements that leads to her persistence of symptoms. Her medical history was notable for no significant past issues, and she was taking pain killers from last two days. She had no relevant traumatic events, surgical history or any family history and led a non alcoholic, non smoking lifestyle. The condition gets aggravated when the patient used to do prolonged standing, household work and walking for longer duration without any breaks. The pain is relieved with rest and in sitting position and also when the patient takes some medications (NSAIDS) for pain.

Before confirming the diagnosis of PS, several differential diagnoses were considered like lumbar radiculopathy which was ruled out as symptoms were localised to the gluteal region, lumbar stenosis as the patient did not demonstrate features of bilateral lower limb symptoms aggravated on walking, or relief of pain with lumbar flexion and Sacroiliac (SI) joint dysfunction which was also not matching as tests like FABER test (Flexion, ABduction, External Rotation), compression, and distraction tests were found to be negative.

The patient was unable to perform chores that were earlier simple but now make her pain worse because she was unable to carry out her regular daily activities like morning workout, household activities like washing clothes, prolonged standing in kitchen etc.

Patient was having a mesomorphic body built having BMI 23.4 kg/m². Grade 2 tenderness was present over gluteal region over piriformis muscle [1]. Hip Range of Motion (ROM) Internal Rotation

(IR) and External Rotation (ER) [2] were assessed. Patient was diagnosed to be having PS as per the special diagnostic test like SLR sensitivity test, Beatty manoeuvre and FAIR test [3] for right-side were reported to be positive, pain pressure threshold for piriformis muscle was estimated using Pressure algometer [4] and Lower Extremity Functional Scale (LEFS) score was calculated to assess lower extremity functions [5].

After taking written informed consent from the patient, treatment was started. The patient was given sciatic nerve mobilisation, static openers and conventional treatment for consecutively four days within one week and follow-up after 15 days was taken and there were no recurrent symptoms present.

The treatment protocol for PS utilising sciatic nerve mobilisation involves the therapist holding the painful lower extremity and raising the leg straight with ankle dorsiflexion. Upon reaching the maximum range of pain, adjust the hip flexion by reducing it by 10° at a pain free range. With the hip held in a stable position, perform neural mobilisation (sliders) of sciatic nerve through simultaneous movements: flexion of the knee with dorsiflexion of the ankle [Table/Fig-1], followed by extension of the knee with plantar flexion of the ankle [Table/Fig-1]. Frequency (4 sessions within 1 week), Repetitions: 30-40 repetitions/set, Intensity (Performed within pain-free range), Time: 2 minutes per set). [6]: Conventional treatment included TENS in which patients in both groups were positioned in prone lying. Electrodes were placed in buttock region to calf region in radiating pattern through the course of sciatic nerve. Parameters: frequency (2- 250 Hz) and wider pulse of (200-250micro sec) with intensity (0-80 mill amperes) was used for about 15-20 minutes [7].



[Table/Fig-1]: Sciatic nerve mobilisation (Slider technique).

In addition to this static openers were given with patient's both knees flexed in side lying position, the painful leg up placed on the table with the hip at 90° flexion, bolster placed between the anterior superior iliac spine (ASIS) and greater trochanter of hip and the back muscles relaxed, held for 30 seconds to one minute [Table/Fig-2], after the day when the patient was having some relief from pain, progression of static openers were added in which one leg is positioned over the side of the couch with the painful leg flexed at 90° and the sole of the foot on the couch [Table/Fig-2] if symptoms increase, return the foot to the couch. Finally, both legs are positioned over the side of the couch [Table/Fig-2] as described above, with both feet placed on the side of the couch [8].

During and after the treatment patient did not experienced any discomfort or any adverse effects and was coming regularly



[Table/Fig-2]: Progression of static openers.

to OPD for treatment. After one week of intervention, patient's condition was reassessed and showed significant improvements. The pain pressure threshold was also improved [Table/Fig-3]. The hip ROM was also measured, and improved significantly. Additionally, the LEFS and VAS score improved significantly, indicating improvements in lower extremity functions [Table/Fig-3].

Variables	Pretreatment	Post-treatment
1. Hip Range Of Motion (ROM)		
Hip Internal Rotation (IR)	32°	36°
Hip External Rotation (ER)	43°	48°
2. Pain pressure threshold		
Piriformis muscle (reduced)	2.10	2.20
3. VAS Score		
	8	5
4. LEFS Score		
	25	35

[Table/Fig-3]: Outcome measures.
*LEFS: Lower extremity functional score

DISCUSSION

The PS is a neuromuscular condition caused by compression or irritation of the sciatic nerve [8]. Piriformis muscle compresses or irritates the sciatic nerve, producing buttock pain with radiation along the posterior thigh that often mimics lumbosacral radiculopathy [9]. Most of patients present with deep pain in the buttocks, which can be worsened by prolonged sitting, walking and or changing positions, and is associated with tingling and or numbness along the course of the sciatic nerve [10,11].

Management of PS often involves a multidimensional physiotherapy approach, as reported in the literature including stretching exercises, strengthening programs, electrotherapy modalities, manual therapy techniques, and neural mobilisation strategies [12-15].

The present case report evaluated the combined effect of sciatic nerve mobilisation and static opener techniques on pain, hip ROM, and lower extremity functional performance in a patient with PS. Following the intervention program, the patient demonstrated improvement in pain intensity, hip ROM, and functional ability, which supports the role of physiotherapy interventions in managing symptoms associated with PS.

Previous studies have investigated different physiotherapy approaches for the treatment of PS [Table/Fig-4] [11-15]. Tonley JC et al., reported that strengthening of hip abductors and external rotators along with movement retraining helped correct biomechanical dysfunction and significantly improved pain and functional mobility in individuals with PS [11]. Similarly, Awan WA et al., demonstrated that a combination of electrotherapy modalities and manual therapy techniques such as myofascial release and trigger point therapy resulted in reduced pain and improved soft-tissue flexibility [12].

Neural mobilisation techniques have also been widely used in the management of PS. Similarly, Jaiswal A et al., observed that the combination of dry needling and neurodynamic mobilisation significantly reduced pain and improved functional disability in patients with PS [13]. These findings suggest that interventions targeting neural mechanosensitivity and muscle tightness may play a significant role in reducing symptoms associated with PS. Ellis R et al., demonstrated that neural mobilisation techniques produce measurable sliding of the sciatic nerve, and diagnostic ultrasound can reliably quantify these movements, supporting the biomechanical basis of neurodynamic interventions [14]. Bhardwaj N et al., reported that muscle energy technique combined with stretching significantly reduced pain, while myofascial release with strengthening exercises showed greater improvement in ROM and functional performance in patients with PS [15]. However, Jaiswal A et al., and Ellis R et al., proved that the neurodynamic mobilisation slider techniques have

Author and year	Country	Population	Intervention	Outcome measures	Key findings
Tonley JC et al., 2010 [11]	USA	Individual diagnosed with Piriformis Syndrome (PS)	Hip muscle strengthening and movement retraining	Pain intensity, hip biomechanics, functional mobility	Targeted strengthening of hip abductors and external rotators improved pain and functional mobility in PS.
Awan WA et al., 2018 [12]	Pakistan	Patients with PS	Electrotherapy combined with manual therapy	Pain intensity, muscle tenderness, functional ability	Combined physiotherapy approach resulted in reduction of pain and improved soft-tissue flexibility.
Jaiswal A et al., 2024 [13]	India	Patients with PS	Dry needling combined with neurodynamic mobilisation	Pain intensity, functional disability	Combined intervention significantly reduced pain and improved functional outcomes in PS.
Ellis R et al., 2008 [14]	New Zealand	27 healthy participants	Neural mobilisation slider technique with ultrasound measurement of nerve movement	Ultrasound measurement of sciatic and tibial nerve displacement	Neural mobilisation produced measurable sciatic nerve movement and ultrasound showed moderate to good reliability.
Bhardwaj N et al., 2021 [15]	India	30 patients with PS	MET with stretching + TENS vs Myofascial release with strengthening + TENS	VAS, LEFS, WHOQOL-BREF	Both treatments improved pain and function; MET reduced pain more, while MFR improved ROM and function.
Present case report, 2026	India	24-year-old female with PS	Sciatic nerve mobilisation combined with static opener techniques	VAS, Hip ROM, Pain pressure threshold, LEFS	Combined intervention resulted in reduction in pain (VAS 8-5), improvement in hip internal and ER, and improved lower extremity functional score (LEFS 25-35).

[Table/Fig-4]: A comparison of previously published studies and the present case report [11-15].

MET:Muscle energy technique; MFR:Myofascial release;TENS: Transcutaneous electrical nerve stimulation;VAS:Visual analog scale; LEFS:Lower extremity functional scale;WHOQOL: World Health Organization quality of life; BREF: Brief version;ROM:Range of motion

shown improvements in pain symptoms when given for 10 days and for one session, respectively [13,14]. This present combined approach of static openers and neurodynamic mobilisation reduces the duration of the improvement in symptoms when intervention given for four days within one week.

In the present case report, sciatic nerve mobilisation was combined with static opener techniques described in neurodynamic concepts by Shacklock M [8]. Static openers are sustained positioning techniques designed to reduce compressive forces around neural structures and facilitate improved neural interface mobility. These techniques may help reduce pressure on the sciatic nerve by promoting relaxation of surrounding musculature and improving tissue extensibility. Neural mobilisation, on the other hand, aims to restore normal sliding and movement of neural structures, thereby reducing neural mechanosensitivity and pain.

Despite the positive outcomes observed in this case, certain differential diagnoses such as lumbar radiculopathy and sacroiliac joint dysfunction should always be considered while evaluating patients presenting with buttock and leg pain. Careful clinical examination and appropriate special tests were done for differentiating PS from other causes of sciatica-like symptoms.

The combined application of these two techniques may provide an adjunct therapeutic effect by addressing both muscular tightness and neural mobility restrictions [8]. Improvement in hip ROM observed in the present case may be attributed to reduced piriformis muscle tension and enhanced neural mobility, which together may decrease compression of the sciatic nerve. The improvement in functional outcome measured using the LEFS further indicates that the intervention contributed to better performance in daily activities. However very low improvement in the pressure pain threshold values were due to which as no intervention performed for the soft-tissues and also digital algometry may not detect the deterioration of pressure pain threshold [1].

CONCLUSION(S)

A combination of sciatic nerve mobilisation and static openers might be effective in treating PS. This synergistic approach comprehensively addresses PS pathophysiology by targeting three key domains: neural (mechanosensitivity via sliders), muscular (piriformis lengthening via openers), and articular (hip ROM restoration).

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PLAGIARISM CHECKING METHODS: [\[Jain H et al.\]](#)

- Plagiarism X-checker: Mar 04, 2026
- Manual Googling: Apr 10, 2026
- iThenticate Software: Apr 12, 2026 (3%)

ETYMOLOGY: Author Origin**EMENDATIONS:** 6**AUTHOR DECLARATION:**

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Feb 17, 2026**Date of Peer Review: **Mar 11, 2026**Date of Acceptance: **Apr 14, 2026**Date of Publishing: **Jun 01, 2026**