CASE REPORT

Effect of Sciatic Nerve Mobilization with Combination Therapy on Myofascial Trigger Points in a Young Obese Female with Piriformis Syndrome - A Case Report

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ABSTRACT

Background: Piriformis syndrome (PS), which contributes to 0.3% to 6% of low back pain and sciatica cases, affects approximately 2.4 million individuals annually out of the 40 million yearly instances of these conditions. This syndrome is primarily observed in middle-aged adults, with a notable prevalence among young obese females. It is characterized by unilateral gluteal pain extending down the leg, muscle weakness, and numbness. Given the variable efficacy of current treatments, this study aims to investigate the potential benefits of combination therapy—specifically, ultrasound (US) and interferential therapy (IFT)—as well as sciatic nerve mobilization in managing PS in young obese adult females.

Case Summary: A 35-year-old obese female presented with chief complaints of pain in walking, lower back, and right buttock for the past 15 days. The pain worsened with all activities of daily living. Clinical examination revealed marked tenderness and weakness in the right piriformis muscle, accompanied by restricted hip abduction and internal rotation. Functional limitations included difficulty with prolonged sitting, walking, and stair climbing. Diagnostic tests confirmed PS with positive piriformis, Freiberg, and PACE sign. The patient was given a combination of therapy and sciatic nerve mobilization as physiotherapeutic treatment.

Outcome Measures: The outcomes were reported on the Numerical Pain rating scale, Manual muscle testing, WHO-5 quality index, and Barthel Index.

Conclusion: This study highlights the effectiveness of combination therapy and sciatic nerve mobilization in managing PS.

Keywords: Sciatic nerve mobilization, Combination therapy, Pain, Trigger point, Interferential Therapy, Ultrasound Therapy.

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INTRODUCTION

Sciatica, or buttock pain, results from piriformis syndrome when the piriformis muscle triggers sciatic nerve inflammation [1,2]. Researchers estimate that piriformis syndrome is responsible for between 0.3% and 6% of all cases of low back pain and sciatica. These conditions affect approximately 40 million new victims per year, which means that there are approximately 2400,000 new victims of piriformis syndrome per year. Most commonly, piriformis syndrome affects middle-aged individuals, and the condition is notably more prevalent in women than in men, with a ratio of 1:6 [3,4]. These figures illustrate the considerable epidemiological burden of low back pain [5-7]. The geographical distribution can be above or below the piriformis muscle or pass through it by forming a loop with the nerve roots of L4 to S3. When the piriformis muscle becomes tight or short, it has the potential to immediately push on the sciatic nerve and interfere with standard signal transmission. The piriformis plays the role of a lateral rotator and is coordinated with the flexor and abductor muscles, as stated above [8-9]. This condition is more commonly observed in females than in males [7]. Although piriformis tightness is relatively rare and can significantly impact individuals' physical and social functioning, it is often overlooked [10]. This neglect is partly due to individuals' difficulty in self-diagnosing the underlying cause, which can progressively worsen the condition over time. The condition is notably challenging to manage, particularly in individuals with obesity, who may experience exacerbated symptoms due to increased mechanical stress and reduced mobility [2,11]. The resulting pain and discomfort can significantly impact an individual's quality of life, affecting both physical activity and social interactions [2,8,12]. Various nonsurgical treatments are employed to treat PS. Among these physiotherapeutic interventions, ultrasound has moderate-quality evidence. Exercise therapy, electrotherapy, and manual therapy have also been effective. Neural mobilization, also known as nerve mobilization, is a method used to address nerves that are irritated, inflamed, or stuck to surrounding tissues [7]. This technique is helpful in neurological management, as it assists in relieving nerve pain and assisting in restoring nerve traffic patterns [13]. Soft tissue mobilization is a therapy whose aim is to identify and provide solutions for joint, nerve, and muscle complications. This method involves the appraisal of the soft tissue system and the application of unique techniques for diagnosing and treating soft tissues [12, 14].

When different treatment approaches are integrated into therapy, the intervention results are usually better than the outcomes yielded from individual treatment strategies [15]. When two particular treatments are coordinated, each method's benefits are maintained, enhancing the treatment impact constructively [16]. Importantly, these combinations allow for the application of low-intensity treatments and obtain equal or even better outcomes than high-intensity treatments are used. Furthermore, this integrative approach may also provide more substantial advantages regarding endpoints, thus enhancing total performance and patient satisfaction. This introduction describes how integrating treatment approaches may maximize treatment efficacy and discusses the possibility of improving therapeutic outcomes [17].

Patient information

A 35-year-old obese female presented with right buttock and posterior thigh pain, persisting for 15 days. She was referred to the physiotherapy department by the General Physician of Galgotias University with no notable past medical or surgical history.

Diagnostics:

On examination, the patient exhibited symptom reproduction through palpation and stretching of the piriformis muscle. Analysis during a single-limb step-down maneuver revealed excessive hip adduction and internal rotation, which elicited the patient's symptoms. The strength assessment indicated weakness in the right hip abductor and external rotator muscles. Deep digital palpation of the gluteal and retro trochanteric regions revealed tenderness, pain, tightness, and leg numbness. To assess pain levels, the Numeric Pain Rating scale was utilized [1]. Quality of life was evaluated via the WHO-5 Quality Index [18]the WHO-5 has been translated into more than 30 languages and has been used in research studies all over the world. We now provide a systematic review of the literature on the WHO-5. Methods: We conducted a systematic search for literature on the WHO-5 in PubMed and PsycINFO in accordance with the PRISMA guidelines. In our review of the identified articles, we focused particularly on the following aspects: (1, and functional activities of daily living (ADL) were measured via the Barthel Index. Informed consent was obtained from the patient, and the CARE guidelines were followed for this case study [19].

Table 1: Hip ROM

AROM	Left hip joint (Degree)		Right hip joint (Degree)	
	Before	After	Before	After
Flexion	110	110	40	110
Extension	30	30	10	30
Abduction	35	35	30	30
Internal Rotation	35	35	20	35
External Rotation	38	38	15	30

Table 3: Intervention Program

Weeks	Treatment Intervention	Description
1st week& 2nd week	Combination Therapy (US + IFT)	**Positioning**: The patient was placed in a comfortable position, ideally in the prone position.
		Locate the Right Piriformis Muscle: The piriformis muscle is palpated 1 to 2 cm below the middle third of a line drawn between the posterior superior iliac spine and the upper boundary of the greater trochanter.
		Ultrasound (US):
		- **Mode:** Continuous mode
		- **Frequency:** 1 MHz
		- **Duty Factor:** 100%
		- **Intensity:** 1 W/cm²
		- **Technique:** US head moving in small circular patterns over the right piriformis muscle.
		Interferential Therapy (IFT):
		- **Sweep Frequency:** 40 Hz.
		- **AMF/Beat Frequency:** 90-130 Hz.
		- **Power:** 3.2 watts.
		- **Electrode Position:** One electrode in the Bipolar Form was placed on the S1piriformis region.
		- **Duration:** 5 minutes.
		- **Procedure:** After completing the US, IFT is applied. The output intensity gradually increases until the patient experiences a 'normal' tingling sensation.
	Sciatic Nerve Mobilization (SNM)	Positioning:
		- High sitting position
		Repetitions: 4
		Hold Time: 10 seconds.
		Relaxation Phase: 10 seconds.

Timeline

She received the treatment for 14 days, including combination therapy (ultrasound + interferential) and sciatic nerve mobilization (SNF) four times weekly for 2 weeks.

Assessment:

The participants were assessed at baseline (day 1) and subsequently at post-intervention (4th, 7th, and 10th treatment sessions) with a Numeric Pain Rating Scale (NPRS), hip joint goniometry, and lower extremity functional scale. Pain intensity was measured with a Numeric Pain Rating Scale (NPRS) ranging from "0" no pain to "10" worst pain in the last 24 hours [1]. Hip abductors and external rotators were assessed for strength via manual muscle testing (MMT) [20]literature review, description, synthesis and critique of the reliability and validity of MMT in the evaluation of the musculoskeletal and nervous systems. Methods: Online resources were searched including Pubmed and INAHL (each from inception to June 2006. The score was three at baseline, which was greater than that of the contralateral lower limb. Special tests included the Freiberg sign, the Beatty test, the Pace sign, and the FAIR test, and the results were positive [12, 2]we aim to provide the pathophysiology and diagnostic criteria of the piriformis syndrome (PS.

Interventions:

The patient was provided detailed information about the intervention, and informed consent was obtained before the treatment. The main aim was to improve the patient's ability to perform functional ADLs and educate her regarding back and leg pain and central sensitization by focusing on adherence to the exercise program and removing negative thoughts about well-being. We performed combination therapy (US+IFT) and sciatic nerve mobilization. The combination therapy treatment parameters are listed in Tables 3, Picture 1, and 2.

Picture 1: Combination therapy

Picture 2: Sciatic Nerve Mobilization

Procedure Overview:

After the initial assessment, the patient was comfortably placed in the prone position on a couch. The first is ultrasound treatment, which focuses on the most painful area. The intensity was adjusted following interferential therapy to achieve the desired tingling effect. This combination approach leverages the benefits of both modalities, starting with US to address localized pain and followed by IFT for deeper stimulation and relief. The patient received 10 sessions for two weeks, five sessions weekly. Sciatic nerve mobilization was also performed while the patients were seated 4 times with a 10-sec hold and a 10-sec relaxation for a duration of 10 days.

Follow-up and Outcomes

A total of 10 sessions were given, and a follow-up appointment was scheduled after 2 weeks on 15th Day. The outcomes revealed improvements in the pain score, disability score, WHO-5 quality index, and Barthel ADL

assessment. Overall, significant improvement was observed in Table 2.

Table 2: Outcome Measures

	At Baseline	After 2 weeks
NPRS	9	1
MMT	3	4^{+}
WHO 5 Quality Index	45	75
Barthel Index	55/100	85/100

On the 15th Day, significant improvements were observed in pain intensity, muscle strength, and ROM Table 1. The patient reported almost complete relief from pain and improved overall function. The functional assessment scores demonstrated enhanced performance in daily activities (Table 2).

DISCUSSION

This case report focuses on a 35-year-old obese female with PS and highlights the positive effects of combining ultrasound (US) and interferential therapy (IFT) with sciatic nerve mobilization (SNM).

Mechanisms and Pathophysiology of Piriformis Syndrome

Again, in this case, obesity seems to have triggered the problem with the patient. Obesity also puts relatively mechanical stress on the piriformis and may enhance sciatic nerve compression [21]. The patient's pain symptoms during prolonged sitting, walking, and stair climbing align with previous descriptions of PS. The treatment approach in this case involved a combination of two physiotherapeutic modalities—US and IFT—along with SNM. Combination therapy in physical rehabilitation is known for its synergistic effects [22]. The US applies sound waves to produce heat in tissues, increasing blood circulation, relieving pain, and promoting tissue repair. Of most importance is the relief of myofascial trigger points due to the ability to induce muscle relaxation and reduce muscle spasm [23]mainly by physiotherapists. The objective of this review was to evaluate the effectiveness of ultrasound therapy in the treatment of musculoskeletal disorders. Methods: Published reports of randomized clinical trials investigating the effects of ultrasound therapy on pain, disability or range of motion were identified by a systematic search of MEDLINE, EMBASE and the Cochrane databases, supplemented with citation tracking. The quality of methods of all selected publications was assessed systematically by two independent and 'blinded' reviewers, using ten validity criteria. Data from the original publications were used to calculate the differences between groups for success rate, pain, disability and range of motion. Statistical pooling was performed if studies were homogeneous with respect to study populations, interventions, outcome measures and timing of follow-up. Results: 38 Studies were included in the review, evaluating the effects of ultrasound therapy for lateral epicondylitis (n=6. In this study, continuous-mode US was used to introduce the US to the patient's piriformis muscle, which probably facilitated improved blood flow to the target area and enhanced the rate of tissue repair therein.

IFT is an electrotherapeutic modality that employs two currents to interfere with the area being treated. It has a significant analgesic and anti-inflammatory profile in MSK conditions including PS [24]. The patient's experience of the tingling sensation while undergoing IFT also suggested the penetration of deeper structures, where IFT modulated the neuron muscular pathways and desensitized the sciatic nerve. Sciatic nerve mobilization involves passive and active mobilization at the point where too much roughening of the tissues surrounding the sciatic nerve may be present. This technique is most commonly applied in treating neural pain syndromes such as PS since it can help resolve the entrapment and boost the functions of the nerve [25].

Outcome Measures:

The merger of three kinds of treatment, namely the US, IFT, and SNM, enhanced the patient's pain, muscle strength, and life quality index. The Numeric Pain Rating Scale (NPRS) depicted a much lower NPRS value from baseline, that is, 9/10; at the two weeks' study endpoint, it was 1/10. The enhanced MMT results confirmed the patient's existing hip abductor and external rotator muscle strength. Further, the functional status of the Barthel Index of ADLs revealed a marked change from 55 /100 to 85 /100. Self-administered inventories included the WHO-5 Quality Index to indicate an improvement in the patient's psychological health. These outcomes imply that not only did combination therapy with sciatic nerve mobilization relieve the patient's somatic pain, but it also improved her overall well-being.

Adherence to intervention:

The patient was given a diary to adhere to self-stretching and home exercises prescribed, and a diary was given to note the adherence to complete all the sessions for better outcomes and prognosis.

Reporting of adverse effects:

The patient was also instructed to write in a diary and report any adverse effects noted during and after treatment in the next session.

Conclusion

The case report successfully illustrates the efficacy of a multimodal approach involving US, IFT, and SNM in treating PS in a young, obese female. The treatment resulted in significant pain relief and improved muscle strength, range of motion, and quality of life. This integrative therapy approach has significant potential for managing complex musculoskeletal conditions like PS, especially in high-risk populations such as obese females.

CONCLUSION

This study effectively demonstrated the significant benefits of combining sciatic nerve mobilization with interferential

therapy (IFT) and ultrasound (US) in treating piriformis syndrome. The combination therapy substantially reduced pain intensity, as evidenced by a decrease in Numeric Pain Rating Scale (NPRS) scores from 9 to 1. Additionally, improving the hip abduction range of motion (ROM) by 20 degrees underscores the positive impact on functional mobility. These results are consistent with the literature supporting the efficacy of therapeutic ultrasound and electrotherapy in managing musculoskeletal disorders, including piriformis syndrome. Notably, the findings of this study highlight that the integrated use of these modalities, along with sciatic nerve mobilization, provides a more effective treatment approach than traditional methods. This combination therapy not only alleviates pain more effectively but also enhances functional outcomes, resulting in more significant improvements in both pain reduction and trigger point management. Overall, this study underscores the value of combining therapeutic approaches in clinical practice, offering a promising strategy for optimizing treatment outcomes in patients with piriformis syndrome.

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