Case Study

The Effect of Muscle Energy Technique in A Patient with Piriformis Syndrome: A Case Report

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How to cite this article: Haripriya. S, Padmanabhan Suresh Babu Roshan, Apeksha Khadka, The Effect Of Muscle Energy Technique In A Patient With Piriformis Syndrome: A Case Report. Indian Journal of Physiotherapy & Occupational Therapy / Vol. 19 No. 1, January-March 2025

Abstract

Background: The piriformis muscle, an integral component of the deep gluteal region, exhibits a distinctive anatomical arrangement, coursing from the anterior sacrum to the greater trochanter of the femur. Piriformis Syndrome is a neuromuscular disorder characterized by the irritation of the sciatic nerve due to anatomical variations or dynamic factors involving piriformis muscle which commonly affects between the age group of 30 and 60, although can occur in younger individuals. It is more common in women than in men.

Objective: The aim of this case study was to evaluate the effect of Muscle Energy Technique in a patient with Piriformis syndrome.

Method: A 25-year-old female diagnosed with Piriformis syndrome underwent physiotherapy intervention for six weeks involving MET along with conventional physiotherapy(stretching, strengthening, moist heat pack) focusing on pain, range of motion (ROM) of Hip joint, and function of lower limb. The outcomes were measured using Numerical Pain Rating Scale (NPRS), Hip Joint Goniometry and Lower Extremity Functional Scale (LEFS).

Results: The scores improved significantly for all three outcome measures indicating a reduction in pain, improvement in Hip joint range of motion and function of the lower extremity .

Conclusion: Piriformis syndrome is a debilitating condition that can significantly influence one's quality of life. This case report suggests that Muscle Energy Technique is beneficial in reducing pain, improving Hip ROM and enhancing function of lower extremity in patients suffering from this condition.

Keyword: Piriformis syndrome, Pain, Range of motion, function, Muscle Energy Technique.

Introduction

The piriformis muscle, an integral component of the deep gluteal region, exhibits a distinctive anatomical arrangement, coursing from the anterior sacrum to the greater trochanter of the femur.[1] This muscle function is to lift and rotate the Hip joint away from the body's midline, helping to shift the body weight from one foot to the other and maintain balance, during weight bearing activities, such as those involving eccentric loads, excessive Hip adduction and internal rotation can occur. When the gluteus maximus

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Submission: July 16, 2024 **Revision:** Sept 16, 2024 **Published date:** 12/12/2024

and gluteus medius are weak, the high eccentric loads transfers to the piriformis muscle, which can lead to the sciatic nerve compression or irritation.[2]

Piriformis syndrome (PS) is a neuromuscular condition characterized by symptoms that include Hip or buttock pain.[3] This pain and instability results from muscle spasm, inflammation or shortening causing sciatic nerve compression.[4] Symptoms are similar to sciatica and are often misdiagnosed as more common conditions like facet arthopathy, sacroiliitis, lumbar disc disease and radiculopathy.[5,6] The prevalence of piriformis syndrome among patients with low back pain or posterior thigh pain varies between 0.3%-6%.[7] Women are affected six times more than men and tend to present at a younger age whereas men usually present at an older age.[8] The purpose of this study was to study the effects of Muscle Energy Technique in a patient with piriformis syndrome. Muscle Energy Techniques (MET) is a manual therapy that uses the muscle's own energy through isometric contraction to relax the muscle via autogenic or reciprocal inhibition. Autogenic inhibition involves submaximal muscle contraction followed by stretching of the same muscle, while reciprocal inhibition involves submaximal contraction followed by stretching of the antagonist muscle. In this manner, it is possible that MET could improve Hip ROM and enhance the function of the lower extremity.

Case Description

A 25-year-old actress reported a deep pain in her back and buttock, sometimes radiating down to the back of her thigh, and discomfort during prolonged sitting, climbing stairs and after lifting heavy weights. The pain persisted in spite of 10 days bed rest and analgesics as prescribed by an orthopedician. MRI of spine revealed L5-S1 disc bulge, and patient was referred to physiotherapy.

The objectives of physiotherapy were to reduce pain, restore her Hip joint range of motion, improve and maintain the strength and enhance the activities of daily life. The treatment program involved pain management, targeted muscle contractions to improve flexibility, along with stretching, strengthening exercises. The sessions were conducted once per day, six days a week, for six weeks.

Clinical Findings

The patient presented with localized pain in the buttock sometimes radiating down the back of the thigh, resembling sciatica and exaggerated lumbar lordosis. On examination, tenderness was noted over the piriformis muscle and there was a restricted Hip range of motion notably in external rotation and abduction. Sensation was intact throughout the affected area. The special tests for piriformis syndrome namely Freiberg, Pace and FAIR test were seen to be positive. These test is used to assess piriformis syndrome to find out irritation on the sciatic nerve by the piriformis muscle. Freigberg test can be performed by making a patient lie down supine with the legs straight. The examiner passively internally rotates the hip. PACE and FAIR tests can be performed by making a patient sit on the edge of a couch or a chair with hips and knees flexed to 90 degrees, feet keeping flat on the floor. then the examiner places their hands on the lateral aspects of the patient's knees. Patient is then instructed to abduct and externally rotate their hips against the examiner's resistance. the test is considered to be positive if the patient experiences pain or discomfort in the buttock. Physiotherapy outcomes used to assess pain, Hip range of motion and function of lower limb were Numerical Pain Rating Scale (NPRS), Goniometry and Lower Extremity Functional Scale (LEFS) respectively. Pre-treatment, the patient scored 7/10 on NPRS, 55/80 on LEFS and a reduced Hip abduction and external rotation range of motion was noted.

Intervention

Table1: Rehabilitation protocol for Piriformis Syndrome

Weeks	Exercises
Week 1	1.Introduction to MET focusing on the piriformis muscle. 2.Gentle Post isometric relaxation (PIR)- starts with light contractions holding for 5-6 seconds, followed by stretching. 3.Reciprocal inhibition (RI)- isometric contraction of antagonist muscle hold for 5-6 seconds.
Week 2 Building foundation	1.Gentle contraction and light strengthening exercises 2.PIR- hold for 7- 10 seconds contractions, 3.RI- hold for 5-10 seconds, 4.Stretching for piriformis, Hip flexors, hamstring muscles. 5.Strengthening exercise for Hip and Gluteal muscles (Bridges, clamshell, side lying Hip abduction 10 repetition on each side)
Week 3 Increasing intensity	1.PIR: hold for 7-10 seconds contractions with 3-4 repetition per session. 2.RI: hold for 7-10 seconds contractions with 3-4 repetition per session.

Week 4 focus on strength and flexibility	1.PIR and RI (15-20 seconds hold), 2.Piriformis stretch, Hip flexor stretch, hamstring stretch(hold for 20-30 second), single leg bridge, clamshell, leg lifts, side lying abduction(15 repetitions)
Week 5 enhancing functional strength	1.PIR and RI (30 seconds hold), 2.Piriformis stretch, Hip flexor stretch, Hamstring stretch Lunges, leg lifts.
Week 6 Integration and maintenance	1.Resistance band exercise in bridges, clamshell and leg lifts to strengthen Gluteus maximus and medius. This helps to stabilize the pelvis, reduce strain on piriformis muscle and improves Hip stability.

Results And Discussion

A six week Muscle Energy Technique in the patient with piriformis syndrome had a positive effect on relieving pain, improving Hip range of motion and enhancing lower extremity function in the patient with piriformis syndrome. After a six-week intervention, based on the scores there was a significant improvement in Hip range of motion, Numerical Pain Rating scale and Lower Extremity Functional scale. The Hip range of motion, measured by a goniometer showed notable improvement. Flexion ROM improved from 0-90 degrees to 0-120 degrees, abduction improved from 0-25 degrees to 0-40 degrees, and external rotation improved from 0-40 degrees to 0-50 degrees. There was a marked reduction in pain levels, with the Numerical Pain Rating scale (NPRS) scores decreasing from 7/10 to 3/10. Additionally, function of lower extremity was also improved, with the Lower Extremity Functional scale (LEFS) scores improving from 55/80 to 70/80. These results show that the treatment is effective in improving Hip mobility, reducing pain, and enhancing overall lower limb function.

Studies on reciprocal inhibition Muscle Energy Technique (MET) and post isometric relaxation (PIR) in acute piriformis syndrome suggest several mechanisms, by which these interventions improve clinical outcomes. MET involves activating the antagonistic muscles to the piriformis, which induces reciprocal inhibition of the piriformis. MET reduces the muscle tension within the piriformis muscle by decreasing muscular hypertonicity and enhancing neuromuscular coordination, thereby helping in relieving the pain and improving Hip ROM.[9] Post isometric relaxation (PIR) initiates an isometric contraction of the piriformis muscle followed by a passive stretching. This sequence stimulates the autogenic inhibition, a reflex mechanism that decreases the muscle tone, thereby relieving a tension within the piriformis. Hence, patients experience reduced pain perception due to relaxed state of muscle. Moreover, it enhances the flow of blood to the muscle, facilitating the removal of metabolic waste products and supporting tissue healing. This improved circulation helps to enhance the flexibility and range of motion of Hip joint.[10]

Muscle Energy Technique (MET) treatment for piriformis syndrome provides significant advantages including pain reduction, improved Hip mobility, enhanced lower limb function, improved muscle coordination, and supports long-term recovery through increased blood flow and tissue healing.[11] MET is effective in treating both acute and chronic piriformis syndrome by reducing muscle tension and improving function. In rehabilitation, MET accelerates recovery from Hip injuries by enhancing coordination and reducing muscle tension and facilitating a return to normal activities.[12,13] MET offers a non-invasive and cost-effective approach for managing piriformis syndrome, as it does not require expensive equipment or surgical procedures. MET effectively reduces pain and improves function, thereby decreasing the need for costly pain medications with potential side effects.[14] Improved functional outcomes from MET also results in fewer health care visits and lower treatment costs, thereby enhancing patient's quality of life and reducing indirect cost associated with disability.[15]

The intervention improved the intended parameters but had limitations including the single case study design and inability to evaluate long-term effect of exercises. Future studies with larger sample size and long term effect follow-up could assess the carry-over effect of Muscle Energy Technique on piriformis syndrome.

Conclusion

A six-week Muscle Energy Technique intervention in a patient with piriformis syndrome was effective in relieving pain, improving Hip range of motion (ROM) and enhancing the lower extremity function. Further research could be conducted in a larger population, over a longer duration, using different outcome measures and with different exercise therapy interventions tailored for individuals with piriformis syndrome.

Patient Consent: A written consent was obtained from the patient.

Ethical Clearance: Obtained.

Name of the ethics committee clearing the study: Institutional Ethics Committee AJ Institute of Medical Sciences and Research Centre. Date: 25/06/2024 DCGI Reg. No. EC/NEW/INST/2020/741Number: AJEC/REV/195/2024

Financial Support And Sponsorship- Nil

Conflicts Of Interest: There were no conflicts of interest.

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