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Pelvic Realignment and Functional Improvement Following Muscle Energy Technique in Mechanical Sacroiliac Joint Dysfunction: A Case Report

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Abstract:

- ***Background:***

Sacroiliac joint dysfunction (SIJD) is a common cause of low back pain, often associated with pelvic asymmetry, altered biomechanics, and functional limitations. Muscle Energy Technique (MET) is a gentle manual therapy approach that utilizes active muscle contractions to restore joint alignment, reduce pain, and improve mobility.

- ***Case Presentation:***

A 38-year-old female patient presented with unilateral low back pain radiating to the buttock region for three months, aggravated by prolonged standing and transitional movements. Clinical assessment revealed pelvic asymmetry, localized tenderness over the sacroiliac joint, and positive provocation tests suggestive of SIJD. The patient underwent a physiotherapy program for 14 days, with MET as the primary intervention. MET was applied to correct anterior pelvic rotation and address associated muscle tightness, along with conventional exercises and postural advice.

- ***Outcomes:***

Pain intensity was assessed using the Visual Analogue Scale (VAS), functional disability using the Oswestry Disability Index (ODI), and pelvic alignment through clinical palpation tests. Post-intervention results showed a significant reduction in pain, improved functional ability, and correction of pelvic asymmetry.

- ***Conclusion:***

This case study demonstrates that Muscle Energy Technique is an effective and safe physiotherapy intervention for managing sacroiliac joint dysfunction. When integrated with conventional rehabilitation, MET can contribute to meaningful pain relief and functional improvement.

Keywords: *Sacroiliac Joint Dysfunction, Muscle Energy Technique, Physiotherapy, Low Back Pain, Pelvic Alignment.*

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I. INTRODUCTION

Low back pain is one of the most common musculoskeletal complaints worldwide and a leading cause of disability, reduced productivity, and diminished quality of life. It affects individuals across all age groups and places a substantial socioeconomic burden on healthcare systems. While lumbar spine pathologies are frequently implicated in

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low back pain, increasing attention has been directed toward the sacroiliac joint (SIJ) as a significant and often underdiagnosed source of symptoms. Sacroiliac joint dysfunction (SIJD) is estimated to account for approximately 15–30% of cases of mechanical low back pain, particularly in individuals with persistent or unilateral symptoms.

The sacroiliac joint is a strong, weight-bearing synovial joint that connects the sacrum to the ilium and plays a critical role in load transfer between the trunk and lower extremities. Although the SIJ allows only minimal movement, this limited mobility is essential for shock absorption and efficient force transmission during functional activities such as walking, standing, and lifting. Any alteration in joint alignment, mobility, or muscular control can disrupt normal biomechanics and lead to pain and dysfunction.

Sacroiliac joint dysfunction is a multifactorial condition that may result from trauma, repetitive mechanical stress, pregnancy, postural asymmetry, leg length discrepancy, or muscle imbalance around the pelvis and trunk. In females, hormonal changes and ligamentous laxity may further predispose the SIJ to instability and dysfunction. SIJD commonly presents with unilateral low back pain that may radiate to the buttock, groin, or posterior thigh, often mimicking lumbar disc pathology. Pain is typically aggravated by prolonged standing, sitting, stair climbing, rolling in bed, and transitional movements such as sit-to-stand.

Diagnosis of SIJD remains challenging due to the lack of a single gold standard clinical test. Imaging techniques such as X-ray and MRI are often inconclusive for functional SIJ disorders. As a result, clinical diagnosis relies on a combination of patient history, pain location, palpation findings, pelvic asymmetry assessment, and a cluster of provocation tests. Pelvic asymmetry, tenderness over the sacroiliac joint, and restricted or painful movement patterns are commonly observed clinical features. Accurate identification of SIJD is essential, as misdiagnosis may lead to inappropriate treatment and prolonged symptoms.

Conservative management is widely accepted as the first-line approach for SIJD, with physiotherapy playing a pivotal role. The primary goals of physiotherapy intervention include pain reduction, restoration of pelvic alignment, improvement of joint mobility, enhancement of muscular balance, and prevention of symptom recurrence. A combination of manual therapy, therapeutic exercises, postural correction, and patient education is commonly employed to address both the mechanical and functional components of SIJD.

Manual therapy techniques are frequently used to correct positional faults and improve mobility of the sacroiliac joint. Among these techniques, Muscle Energy Technique (MET) has gained considerable attention due to its gentle nature and active patient participation. MET is a form of manual therapy in which the patient actively contracts specific muscles against a controlled resistance provided by the therapist, followed by relaxation and repositioning of the joint. The technique is based on principles of post-isometric relaxation and reciprocal inhibition, which facilitate muscle lengthening and joint realignment.

In the management of SIJD, MET is commonly applied to address anterior or posterior innominate rotations, sacral torsions, and associated muscle tightness. By targeting key muscle groups such as the hip flexors, hamstrings, lumbar extensors, and gluteal muscles, MET aims to restore balanced muscle activity around the pelvis and normalize joint mechanics. The active nature of MET makes it particularly suitable for patients with pain or movement apprehension, as it avoids forceful manipulation and promotes neuromuscular control.

The proposed mechanisms by which MET reduces pain and improves function include normalization of muscle tone, reduction of joint stress, improved proprioception, and enhanced circulation. By correcting pelvic asymmetry, MET may reduce abnormal loading of the sacroiliac joint and surrounding structures, thereby alleviating pain and improving functional capacity. When combined with conventional therapeutic exercises and postural education, MET may contribute to both short-term symptom relief and long-term functional improvement.

Despite its widespread use in clinical practice, the scientific evidence supporting MET for SIJD is still evolving. While several studies have reported positive outcomes, variability in study design, sample size, and intervention protocols limits the strength of existing evidence. In this context, case studies play an important role in illustrating the practical application of MET, documenting clinical outcomes, and providing insight into individualized treatment approaches.

This case study aims to present the physiotherapeutic management of a patient with sacroiliac joint dysfunction using Muscle Energy Technique as the primary intervention. By evaluating changes in pain intensity, functional disability, and pelvic alignment following a structured 14-day rehabilitation program, this report seeks to contribute to the growing body of evidence supporting MET in the management of SIJD. The findings may assist clinicians in clinical decision-making and encourage further research into standardized, evidence-based rehabilitation strategies for sacroiliac joint dysfunction.

II. CASE PRESENTATION AND CLINICAL ASSESSMENT

A 38-year-old female patient presented to the physiotherapy outpatient department with complaints of unilateral low back pain radiating to the right buttock region for the past three months. The onset of symptoms was insidious, with no history of trauma, fall, or sudden injury. The patient reported that the pain gradually increased in

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intensity over time and began to interfere with daily activities and occupational responsibilities.

The pain was described as dull and aching in nature, with occasional sharp discomfort during transitional movements such as sit-to-stand, rolling in bed, and changing posture after prolonged sitting. The patient rated her pain as moderate in intensity and reported aggravation during prolonged standing, walking, stair climbing, and asymmetrical weight-bearing activities. Pain relief was noted with rest, lying supine, and avoidance of prolonged postures. There was no history of night pain or morning stiffness suggestive of inflammatory pathology.

The patient denied any radiation of pain below the knee and reported no associated neurological symptoms such as numbness, tingling, or weakness in the lower limbs. Bowel and bladder functions were normal. There was no previous history of low back pain episodes, spinal surgery, or pelvic trauma. The patient had no known systemic illnesses such as diabetes mellitus, rheumatoid arthritis, or ankylosing spondylitis and was not on any long-term medication.

➢ *Functional History*

The patient reported difficulty performing activities of daily living, including prolonged standing while cooking, walking for long distances, and bending to lift light objects. Occupational tasks involving sustained standing and frequent postural transitions aggravated symptoms. Recreational activities such as brisk walking and household chores were reduced due to fear of pain. The patient expressed concern about reduced work efficiency and dependency during daily activities.

➢ *Observation and Postural Assessment*

On general observation, the patient appeared well nourished and cooperative. Static postural assessment in standing revealed mild pelvic asymmetry, with the right iliac crest appearing lower than the left. There was a subtle shift of body weight toward the left lower limb during standing. Lumbar lordosis appeared within normal limits, and no visible scoliosis or spinal deformity was noted.

Gait assessment revealed a slightly shortened stance phase on the right side, suggesting pain avoidance during weight-bearing. No gross gait deviations were observed. During sit-to-stand transitions, the patient demonstrated guarded movement patterns and used upper limb support, indicating functional limitation due to pain.

➢ *Palpation Findings*

Palpation was performed with the patient in standing and prone positions. Localized tenderness was elicited over the right sacroiliac joint region, particularly at the posterior superior iliac spine (PSIS). Increased muscle tone and tenderness were noted in the right gluteal muscles and lumbar paraspinal musculature, suggesting protective muscle guarding. No warmth, swelling, or inflammatory signs were observed.

Palpatory assessment of pelvic landmarks revealed asymmetry between the anterior superior iliac spine (ASIS) and PSIS on the right side compared to the left, suggestive of anterior rotation of the right innominate bone. These findings were consistent across repeated assessments, increasing the reliability of palpation findings.

➢ *Range of Motion Assessment*

Active range of motion of the lumbar spine was assessed in standing. Lumbar flexion was mildly restricted and associated with discomfort at end range. Lumbar extension and lateral flexion were within functional limits but provoked mild pain on the right side. Lumbar rotation was pain-free bilaterally.

Hip joint range of motion was assessed in supine and prone positions. Hip flexion and extension were slightly restricted on the right side compared to the left. Passive hip extension elicited discomfort in the sacroiliac region, suggesting involvement of the hip flexors and associated pelvic mechanics.

➢ *Special Tests for Sacroiliac Joint Dysfunction*

A battery of sacroiliac joint provocation tests was performed to improve diagnostic accuracy. The FABER (Flexion, Abduction, External Rotation) test reproduced the patient's pain in the right sacroiliac region and was considered positive. The compression test and sacral thrust test also elicited localized pain on the affected side. Distraction and Gaenslen's tests were mildly positive.

The presence of multiple positive provocation tests increased confidence in the diagnosis of sacroiliac joint dysfunction, in accordance with recommended clinical guidelines.

➢ *Assessment of Muscle Length and Strength*

Muscle length testing revealed tightness of the right iliopsoas and hamstring muscles, which are commonly associated with anterior pelvic rotation. Manual muscle testing demonstrated mild weakness of the gluteus maximus and core stabilizing muscles on the affected side. These findings indicated muscle imbalance contributing to altered pelvic biomechanics and joint stress.

➢ *Outcome Measures*

To objectively assess pain, functional disability, and treatment effectiveness, standardized outcome measures were used.

Pain intensity was assessed using the Visual Analogue Scale (VAS), where the patient rated pain on a scale from 0 (no pain) to 10 (worst imaginable pain). Baseline pain levels were moderate and significantly interfered with functional activities.

Functional disability was measured using the Oswestry Disability Index (ODI), a validated questionnaire assessing limitations in activities such as standing, sitting, walking, lifting, and personal care. The baseline ODI score indicated moderate functional disability.

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Pelvic alignment was assessed through clinical palpation of pelvic landmarks, including ASIS and PSIS, in standing and supine positions. Asymmetry was noted at baseline and was documented for reassessment following intervention.

➢ *Clinical Impression*

Based on the patient's history, postural findings, palpation results, positive provocation tests, and outcome measure scores, a diagnosis of sacroiliac joint dysfunction with anterior rotation of the right innominate bone was established. The clinical presentation was consistent with mechanical SIJD rather than lumbar spine pathology.

The findings guided the formulation of a physiotherapy treatment plan focused on correcting pelvic asymmetry, reducing pain, improving functional ability, and restoring normal biomechanics through Muscle Energy Technique and conventional rehabilitation strategies.

III. INTERVENTION

The patient underwent a structured physiotherapy intervention program for a total duration of 14 days, with treatment sessions conducted five days per week. The primary objectives of the intervention were to reduce pain, correct pelvic asymmetry, restore sacroiliac joint mobility, improve muscular balance around the pelvis, and enhance functional performance. The intervention program was individualized based on clinical assessment findings and patient tolerance.

➢ *Muscle Energy Technique (MET)*

Muscle Energy Technique was the primary manual therapy intervention used in this case. MET was applied to correct the identified anterior rotation of the right innominate bone. The technique was performed with the patient in a supine position to ensure relaxation and optimal therapist control.

To address anterior pelvic rotation, MET was applied using isometric contraction of the right hip extensors and hamstring muscles. The patient was instructed to gently push her leg into the therapist's resistance at approximately 20–30% of maximal effort. Each contraction was held for **7–**10 seconds, followed by a relaxation phase, during which the therapist repositioned the pelvis toward a neutral alignment. This sequence was repeated three to five times per session, depending on patient comfort and tissue response.

Care was taken to ensure that contractions remained pain-free and controlled. Verbal cues and breathing instructions were provided to facilitate relaxation during the post-isometric phase. The MET protocol aimed to utilize the principles of post-isometric relaxation and reciprocal inhibition to lengthen shortened muscles, reduce joint restriction, and restore normal pelvic alignment.

Table 1 Muscle Energy Technique Protocol

Parameter	Description
Position	Supine
Target Dysfunction	Right anterior innominate rotation
Muscle Action	Isometric contraction of right hamstrings and hip extensors
Intensity	20–30% maximal effort
Hold Time	7–10 seconds
Repetitions	3–5 per session
Frequency	5 sessions/week for 2 weeks

➢ *Adjunct Conventional Physiotherapy*

In addition to MET, conventional physiotherapy interventions were incorporated to support and maintain treatment gains. Stretching exercises were prescribed for tight muscle groups, particularly the iliopsoas, hamstrings, and lumbar extensors. Stretching was performed within pain-free limits and held for 20–30 seconds with multiple repetitions.

Pelvic stabilization and core strengthening exercises were introduced progressively, focusing on activation of the transversus abdominis, multifidus, and gluteal muscles. Exercises such as pelvic tilts, bridging, and controlled functional movements were included to enhance neuromuscular control and improve load transfer across the sacroiliac joint.

➢ *Postural Education and Activity Modification*

The patient received education regarding posture, ergonomics, and activity modification. Advice was provided on maintaining symmetrical weight-bearing during standing, avoiding prolonged static postures, and using proper body mechanics during daily activities. The patient was encouraged to take frequent breaks during prolonged standing and to gradually resume functional activities.

A simple home exercise program was prescribed to reinforce clinic-based treatment and promote self-management. Compliance with home exercises was monitored throughout the intervention period.

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Table 2 Adjunct Physiotherapy Interventions

Intervention	Description
Stretching	Iliopsoas, hamstrings, lumbar extensors
Stabilization Exercises	Pelvic tilts, bridging, core activation
Postural Education	Ergonomics and symmetrical weight-bearing
Activity Modification	Avoid prolonged static postures; proper body mechanics
Home Exercise Program	Daily stretching and stabilization exercises

IV. RESULTS

Outcome measures were reassessed at the end of the 14-day intervention period and compared with baseline findings to evaluate treatment effectiveness.

➢ *Pain Reduction*

Pain intensity, measured using the Visual Analogue Scale (VAS), demonstrated a significant reduction following the intervention. The patient reported decreased pain during standing, walking, and transitional movements such as sit-to-stand and bed mobility. Pain at rest was minimal, and the frequency of pain episodes reduced substantially. The reduction in pain contributed to increased confidence in movement and participation in daily activities.

➢ *Functional Improvement*

Functional disability, assessed using the Oswestry Disability Index (ODI), showed marked improvement. The patient reported reduced difficulty in standing, walking, and performing household and occupational tasks. Improved functional scores reflected enhanced tolerance to daily activities and reduced dependence on rest or activity avoidance strategies.

➢ *Pelvic Alignment Correction*

Clinical palpation assessment revealed improved symmetry of pelvic landmarks, including the ASIS and PSIS, indicating correction of anterior pelvic rotation. Tenderness over the sacroiliac joint region was significantly reduced. Improved pelvic alignment was maintained during reassessment, suggesting effective neuromuscular adaptation and joint repositioning.

No adverse effects or symptom exacerbation were reported during the intervention period, indicating that the treatment approach was safe and well tolerated.

V. DISCUSSION

This case study demonstrates the clinical effectiveness of Muscle Energy Technique as a primary physiotherapy intervention in the management of sacroiliac joint dysfunction. The observed improvements in pain reduction, functional ability, and pelvic alignment support the role of MET as a safe and effective manual therapy approach for SIJD.

Sacroiliac joint dysfunction is often associated with altered pelvic biomechanics, muscle imbalance, and joint positional faults. Anterior rotation of the innominate bone, as observed in this patient, can increase stress on the sacroiliac joint and surrounding soft tissues, leading to pain and functional limitation. MET directly addresses these biomechanical impairments by restoring muscle length balance and joint alignment through active patient participation.

The reduction in pain observed in this case may be attributed to several mechanisms. MET may decrease joint stress by correcting pelvic asymmetry and improving load distribution across the sacroiliac joint. Additionally, neuromuscular mechanisms such as post-isometric relaxation and reciprocal inhibition may reduce muscle guarding and improve joint mobility. Enhanced proprioceptive input following MET may also contribute to improved movement awareness and motor control.

Functional improvement, as indicated by reduced ODI scores, highlights the clinical relevance of MET in improving activities of daily living. The integration of pelvic stabilization and core strengthening exercises likely played a crucial role in maintaining alignment correction and preventing symptom recurrence. Strengthening of deep stabilizing muscles enhances force closure of the sacroiliac joint, thereby improving joint stability during functional tasks.

The findings of this case study are consistent with previous literature supporting the use of manual therapy and exercise-based rehabilitation in the management of SIJD. The gentle nature of MET makes it particularly suitable for patients with pain sensitivity or movement apprehension, as it avoids high-velocity or forceful techniques.

➢ *Clinical Implications*

- Muscle Energy Technique can be effectively used as a conservative physiotherapy intervention for managing sacroiliac joint dysfunction.
- MET provides a gentle and active treatment approach, making it suitable for patients with pain or movement apprehension.
- Correction of pelvic asymmetry through MET may reduce mechanical stress on the sacroiliac joint and alleviate low back pain.
- Improvements in pain and pelvic alignment achieved through MET may enhance functional activities such as standing, walking, and transitional movements.
- MET can be safely combined with conventional physiotherapy interventions, including stretching, stabilization exercises, and postural education.

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- The technique requires minimal equipment and can be easily integrated into routine clinical practice by trained physiotherapists.

➢ *Limitations*

- This case study involved a single patient, which limits the generalizability of the findings.
- The absence of a control or comparison group makes it difficult to attribute improvements solely to Muscle Energy Technique.
- The short intervention duration of 14 days restricts evaluation of long-term treatment effectiveness.
- Lack of long-term follow-up prevents assessment of sustained pain relief and recurrence of symptoms.
- Pelvic alignment was assessed using clinical palpation, which may be subject to examiner variability.

VI. CONCLUSION

This case study demonstrates that Muscle Energy Technique is an effective and safe physiotherapy intervention for the management of sacroiliac joint dysfunction. Following a 14-day rehabilitation program, the patient showed significant reduction in pain, improved functional ability, and correction of pelvic asymmetry. The active and gentle nature of MET helped restore pelvic alignment and improve neuromuscular control without causing discomfort. When combined with conventional exercises and postural education, MET contributed to meaningful clinical improvement. These findings support the use of Muscle Energy Technique as a valuable component of conservative physiotherapy management for sacroiliac joint dysfunction.

FUTURE RECOMMENDATIONS

- Future studies should include larger sample sizes to improve external validity.
- Randomized controlled trials comparing MET with other manual therapy techniques are recommended.
- Long-term follow-up studies should be conducted to evaluate durability of treatment outcomes.
- Objective assessment tools such as imaging or biomechanical analysis may be incorporated to enhance diagnostic accuracy.
- Standardized MET protocols should be developed to improve reproducibility in clinical practice.

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