Integration of Muscle Energy Techniques in the Rehabilitation of Hip and Knee Osteoarthritis: A Case Report

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Abstract

Background:
Osteoarthritis (OA) is a progressive degenerative joint disorder that predominantly affects weight-bearing joints such as the hip and knee, leading to chronic pain, stiffness, reduced range of motion (ROM), muscle weakness, and functional disability. With the increasing aging population, OA poses a major public health challenge and significantly compromises quality of life. Conventional physiotherapy interventions emphasize pain reduction, joint mobility, muscle strengthening, and functional re-education. Muscle Energy Techniques (MET), a form of manual therapy utilizing voluntary muscle contractions against controlled resistance, have demonstrated effectiveness in managing musculoskeletal dysfunctions, particularly lumbopelvic disorders. However, evidence supporting their role within a comprehensive rehabilitation framework for hip and knee OA remains limited.

Objective:
To describe the clinical application of Muscle Energy Techniques as part of a multimodal physiotherapy rehabilitation program for a patient with combined hip and knee osteoarthritis and to evaluate its effects on pain, joint ROM, muscle strength, and functional performance.

Case Description:
A 62-year-old female diagnosed with right hip and left knee osteoarthritis presented with chronic pain, stiffness, reduced mobility, and difficulty performing activities of daily living (ADLs) and occupational tasks.

Intervention:
The patient underwent a structured physiotherapy program incorporating MET, therapeutic exercises, neuromuscular re-education, joint mobilization, soft tissue techniques, and functional training over 10 supervised sessions.

Results:
Post-intervention outcomes demonstrated clinically meaningful improvements. Pain intensity reduced from 8/10 to 3/10 on the Numeric Pain Rating Scale (NPRS). Hip flexion improved from 105°

to 115°, hip extension from 2° to 8°, and knee flexion from 108° to 115°. Muscle strength improved to near-normal levels, and functional outcomes, assessed using the Lower Extremity Functional Scale (LEFS), showed significant gains.

Conclusion:
This case highlights that integrating MET within a comprehensive physiotherapy program may enhance pain relief, joint mobility, and functional outcomes in individuals with hip and knee OA. MET appears to be a valuable adjunct rather than a standalone intervention, supporting its clinical utility in OA rehabilitation.

Keywords: Osteoarthritis, Muscle Energy Techniques, Hip Osteoarthritis, Knee Osteoarthritis, Physiotherapy Rehabilitation

Introduction

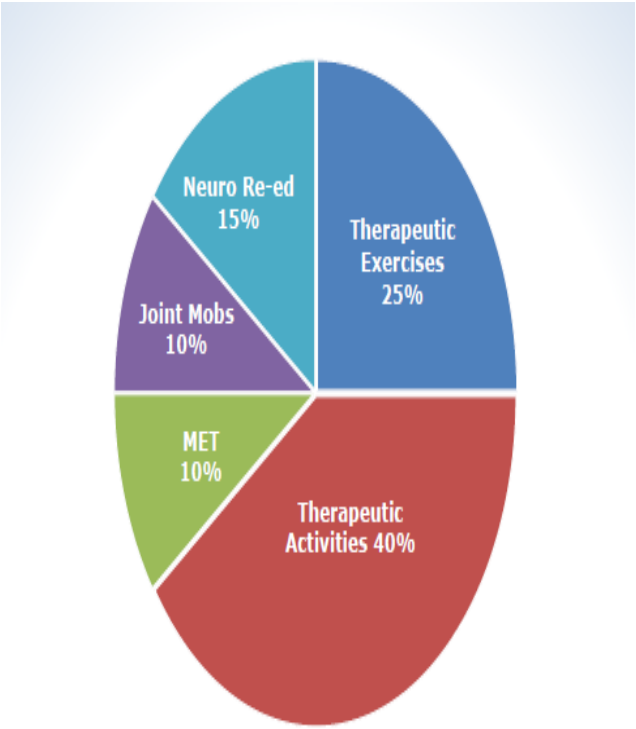
Osteoarthritis (OA) is the most prevalent form of arthritis and a leading cause of disability among older adults worldwide. It is characterized by progressive degeneration of articular cartilage, subchondral bone remodeling, osteophyte formation, synovial inflammation, and periarticular muscle dysfunction. The hip and knee joints are most commonly affected due to their role in weight bearing and locomotion, resulting in pain, stiffness, reduced range of motion, muscle weakness, and impaired functional capacity.

The etiology of OA is multifactorial, involving age-related changes, biomechanical stress, obesity, joint malalignment, muscle weakness, and previous injury. These factors collectively alter joint loading patterns, accelerate cartilage degeneration, and perpetuate a cycle of pain and disability. Individuals with hip and knee OA frequently report difficulty with gait, stair climbing, sit-to-stand transitions, and prolonged standing, which significantly impacts independence and quality of life.

Physiotherapy plays a central role in the conservative management of OA. Evidence-based interventions include therapeutic exercise, manual therapy, patient education, weight management strategies, and functional retraining. Strengthening of periarticular musculature, particularly the quadriceps and hip abductors, has been shown to reduce joint load and improve functional outcomes. However, pain, joint stiffness, and muscle tightness often limit participation and progression in exercise-based programs.

Muscle Energy Techniques (MET) are manual therapy interventions that utilize the patient's voluntary muscle contraction against a precisely controlled resistance applied by the therapist. MET is proposed to improve joint mobility, reduce muscle hypertonicity, enhance circulation, and modulate pain through neurophysiological mechanisms. Although MET has been widely used in the management of spinal and pelvic dysfunctions, its application in peripheral joint osteoarthritis, particularly within a comprehensive rehabilitation program, is under-reported.

Given the chronic and multifactorial nature of OA, a multimodal rehabilitation approach targeting pain, mobility, strength, and function is essential. This case report aims to provide clinical insight into the integration of MET as an adjunctive technique within a comprehensive physiotherapy program for hip and knee OA.



Objective of the Study

1. To evaluate the clinical effectiveness of Muscle Energy Techniques as part of a comprehensive physiotherapy intervention in hip and knee osteoarthritis.
2. To document changes in pain, joint range of motion, muscle strength, and functional performance using a case-based approach.

3. To explore the clinical relevance of integrating MET with conventional rehabilitation strategies in OA management.

Case Description

A 62-year-old female presented to the physiotherapy outpatient department with complaints of chronic pain in the right hip and left knee for the past three years. The pain was insidious in onset, gradually progressive, and aggravated by prolonged standing, walking, stair negotiation, and squatting. Morning stiffness lasting approximately 20–30 minutes was reported.

Radiological evaluation confirmed osteoarthritis of the right hip and left knee (Kellgren–Lawrence Grade II). The patient reported difficulty performing household activities and reduced tolerance for occupational demands. No history of recent trauma, surgery, or inflammatory joint disease was reported.

Clinical Examination

- **Pain:** NPRS score of 8/10 during activity
- **ROM:** Reduced hip and knee mobility with capsular end-feel
- **Strength:** Reduced lower extremity muscle strength (Grade 3+/5 to 4/5)
- **Gait:** Antalgic gait with reduced stance phase on the affected side
- **Function:** Difficulty with sit-to-stand, stair climbing, and prolonged walking

Methodology

Study Design

Single-subject clinical case report.

Inclusion Criteria

- Radiologically and clinically diagnosed hip or knee OA (Kellgren–Lawrence Grade I–III)
- Pain, stiffness, and reduced ROM
- Peri-articular muscle tightness
- Functional limitations in gait and ADLs

Exclusion Criteria

- Acute inflammatory arthritis or synovitis
- Recent fracture or surgery (<6 weeks)
- Severe osteoporosis or neurological involvement

Outcome Measures

- Numeric Pain Rating Scale (NPRS)

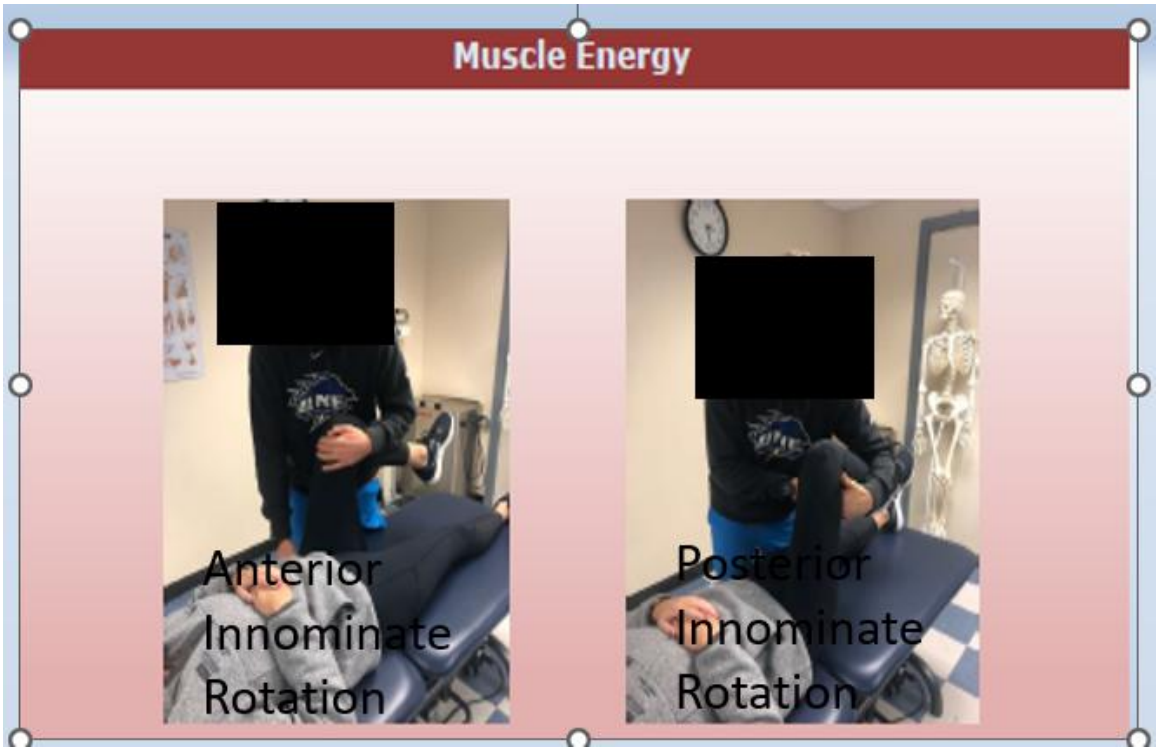
- Goniometric measurement of joint ROM
- Manual Muscle Testing (MMT)
- Lower Extremity Functional Scale (LEFS)

Intervention Protocol

The patient received physiotherapy **5 days per week for 10 sessions**, each session lasting approximately **25 minutes**.

Intervention Components:

1. Muscle Energy Techniques for hip flexors, extensors, abductors, and knee flexors/extensors
2. Therapeutic exercises (ROM and strengthening)
3. Neuromuscular re-education
4. Joint mobilization (Grades I–II)
5. Soft tissue massage
6. Functional training and gait re-education



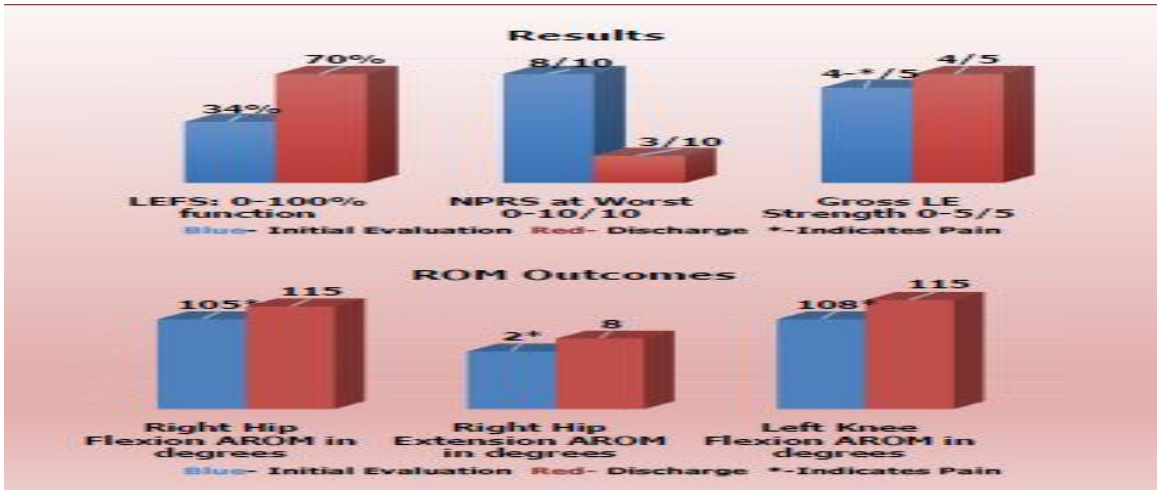
Results

Table 1. Changes in Pain and Functional Outcomes

Outcome Measure	Pre-Intervention	Post-Intervention
NPRS (Pain)	8/10	3/10
LEFS Score	32/80	58/80

Table 2. Changes in Joint Range of Motion

Joint Movement	Pre (Degrees)	Post (Degrees)
Hip Flexion	105°	115°
Hip Extension	2°	8°
Knee Flexion	108°	115°



Discussion

This case report demonstrates that integrating Muscle Energy Techniques within a comprehensive physiotherapy program resulted in meaningful improvements in pain, joint mobility, muscle strength, and functional performance in a patient with hip and knee osteoarthritis. The reduction in pain observed may be attributed to neurophysiological mechanisms associated with MET, including post-isometric relaxation, improved circulation, and modulation of nociceptive input.

Improvements in ROM suggest that MET effectively addressed periarticular muscle tightness and joint stiffness, thereby enhancing movement efficiency. When combined with therapeutic exercise and neuromuscular re-education, these gains translated into improved functional outcomes, as reflected by higher LEFS scores and improved gait patterns.

Consistent with existing literature, this case supports the concept that MET should not be used as a standalone treatment but rather as a complementary technique within a multimodal rehabilitation framework. Given the chronic nature of OA, addressing biomechanical, neuromuscular, and functional impairments simultaneously is essential for optimal outcomes.

Conclusion

This case-based analysis indicates that Muscle Energy Techniques, when integrated into a comprehensive physiotherapy program, can effectively reduce pain, improve joint mobility, enhance muscle strength, and restore functional independence in individuals with hip and knee osteoarthritis. While findings are encouraging, further controlled studies with larger sample sizes are necessary to establish standardized protocols and long-term effectiveness.

Clinical Implications

- MET can be safely incorporated as an adjunct to conventional physiotherapy in OA rehabilitation
- Integration of MET enhances pain modulation and joint mobility
- Multimodal rehabilitation yields superior functional outcomes compared to isolated interventions

- MET may reduce dependency on pharmacological management
- Clinicians should consider MET for chronic OA cases with persistent mobility restrictions

Conflict of Interest

The author declares no conflict of interest.

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