Synergistic impact of instrument-assisted soft tissue mobilization and extracorporeal shockwave therapy in grade 2 knee osteoarthritis myofascial pain syndrome: a case report

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Abstract

Knee osteoarthritis (KOA) is a chronic degenerative condition characterized by joint pain, stiffness, and reduced function, commonly affecting older adults. Myofascial pain syndrome characterized by presence of trigger points, is one of the etiological factors for pain and disability in knee osteoarthritis. This is the first case report to investigate the combined therapeutic effects of Instrument-Assisted Soft Tissue Mobilization and Extracorporeal Shockwave Therapy in managing Grade 2 KOA. The subject presented with persistent knee pain, decreased muscle strength, and difficulty with functional activities. The combined therapy of IASTM and ESWT was applied for three days a week over four weeks. Baseline measurements were taken for pain intensity, muscle strength, hs-CRP, and functional activity. The patient demonstrated notable improvements in pain, muscle strength, and function, suggesting that combining IASTM and ESWT is beneficial for managing myofascial pain syndrome in grade 2 KOA.

Keywords: Case report, Extracorporeal shockwave therapy, IASTM, Osteoarthritis, Myofascial pain syndrome

Introduction

Arthritis is joint inflammation causing pain and movement issues, with osteoarthritis (OA) being the most common type, mainly affecting knees and hips. Recent research has connected muscle pain in Knee OA (KOA) to myofascial trigger points (MTrPs) in adjacent muscles. [1] MTrPs can limit movement, with 11% to 50% prevalence in knee muscles, especially affecting hamstrings and quadriceps.[2] This is the first case report to investigate MTrPs-related pain in KOA, which is often neglected, and evaluated the effects of Instrument-assisted soft tissue mobilization (IASTM) and Extracorporeal shockwave therapy (ESWT) on hs-CRP, pain, muscle strength, and functional activity.

Case Description

A 52-year-old female arrived at the physiotherapy clinic with severe right knee pain, struggling to rise from chairs, climb stairs, and walk. Her pain began suddenly five months ago while getting up from a seated position. She has type 2 diabetes and has been on medication for a decade. She experiences severe knee pain that worsens with stairs, prolonged sitting, or standing. It eases with ice application and avoiding sustained knee flexion. On her initial assessment, she rated her pain as seven out of ten and experienced sleep disturbances. Clinical observation revealed an endomorphic body type with swelling in the right knee's anteromedial region but no deformity. Gait analysis showed decreased walking speed and limited weight-bearing on the right side. Palpation indicated increased temperature in the right popliteal fossa and G3 tenderness in the anteromedial area, along with trigger points in the quadriceps and hamstrings. Crepitus occurred during knee movement. Active knee flexion was slightly restricted, and passive motion was painful at the end range. Strength testing indicated right quadriceps strength at 90.8 N and right hamstring strength at 52.4 N, measured using a Hand-held dynamometer. The patient had significant functional limitations, with a WOMAC score of 68 out of 96. Blood tests showed an elevated hs-CRP level of 2.9 gm/dL. X-rays of the right knee indicated medial joint space narrowing and osteophytes. The patient was diagnosed with right-sided grade 2 knee osteoarthritis with myofascial pain syndrome. Written informed consent was obtained from the patient for publication of this case report.

Physiotherapy Intervention

The treatment sessions occurred three times a week for four weeks, incorporating extracorporeal shockwave therapy (ESWT) and instrument-assisted soft tissue mobilization (IASTM). ESWT targeted trigger points in the hamstring and quadriceps muscles while the patient was positioned prone and supine, delivering 4000 pulses at 2.2 bars and 6 Hz. IASTM was applied at a 45-degree angle using sweeping and fanning techniques over the trigger points, preceded by a hydrocollator pack for 5 minutes and followed by an ice pack for 15 minutes to minimize inflammation. Additionally, the patient received a home exercise program featuring isometric strengthening for the quadriceps, hamstrings, and VMO (ten-second holds for ten reps) along with hamstring stretches (30-second holds for three reps).

Results

a. Muscle Strength

Figure 1 represents the improvement of quadriceps and hamstring muscle strength after completion of treatment.

b. Pain Scoring

Figure 2 shows NPRS scores from Day 1 to Day 30, with pain decreasing from 7/10 to 0/10, where 0 denotes no pain and 10 denotes severe pain).

c. Functional Ability

Figure 3 shows patient functional improvement before and after intervention on the WOMAC scale

d. Tenderness

Figure 4 shows tenderness reduction during the treatment. On Day 1, tenderness was G3, while by Day 30, it improved to G1, indicating a positive response to the treatment.

e. High-sensitivity C-reactive protein (hs-CRP)

The hs-CRP decreased from 2.9 mg/L to 0.4 mg/L by day 30 of treatment, with a normal range of <1.5 mg/L. Figure 5 shows the changes in hs-CRP levels measured by the Immunoturbidimetry method.

The pain intensity of the MTrPs in the taut bands decreased, and the taut bands in the affected muscles were reduced.

Discussion

This case report showed that combining Instrument-Assisted Soft Tissue Mobilization (IASTM) with Extracorporeal Shock Wave Therapy (ESWT) markedly improved pain, muscle strength, function, and hs-CRP levels in a grade 2 Knee Osteoarthritis (KOA) patient.

KOA involves cartilage breakdown and pain, with myofascial trigger points playing a significant role in patients' dysfunction and discomfort. Dor et al. (2017) noted that MTrPs contribute to pain and muscle weakness, potentially affecting KOA progression. [3]. Inactivating MTrPs may aid in OA treatment due to their role in muscle dysfunction.[4]

In this case study, pain and tenderness in a KOA patient decreased from baseline, likely due to the neuromodulatory effects of IASTM and ESWT. IASTM promotes tissue healing and enhances circulation, effectively reducing pain signaling. In contrast, ESWT modulates pain pathways by stimulating substance P, facilitating cellular repair and leading to significant pain reduction, as shown in our study. Together, these therapies enhance musculoskeletal recovery, alleviate pain, and improve joint function and muscle engagement.

The present case report found that the combined application of IASTM and ESWT likely contributed to significant improvements in WOMAC scores. Arno et al. suggested that improvements in function after ESWT result from its analgesic effects, increased tissue perfusion, growth factor stimulation, and anti-inflammatory actions. [6] This combined approach likely reduced joint stiffness, improved mobility, and enhanced overall joint function, thereby leading to a significant improvement in WOMAC scores.

In addition to its mechanical effects, IASTM influences inflammatory markers associated with OA progression. A.E. Kozijn et al. identified CRP as a key factor in metabolic OA aggravation due to its role in cartilage degradation and osteophyte formation.[7] MPS can elevate hs-CRP levels.[8] Studies found that IASTM can reduce the hs-CRP level in patients with MPS.[9] Reduced hs-CRP levels suggest that combined IASTM and ESWT therapies may alleviate systemic inflammation, potentially easing pain and slowing osteoarthritis progression.

In this case report, muscle strength was improved post-treatment. Pain-related muscle inhibition is a common consequence of KOA,[10] and reducing pain may have a positive impact on strength improvement.

The case report found that IASTM combined with ESWT enhances pain relief, function, and muscle strength in KOA, but its single-patient design and short follow-up indicate the need for larger studies.

Acknowledgement

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Conflict of Interest

None

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Figure Legend 1: Pre-intervention and post-intervention changes in hamstring and quadriceps muscle strength, measured using hand-held dynamometer

Figure Legend 2: Pre- and post-intervention changes in pain intensity in KOA, measured using the Numerical pain rating scale

Figure Legend 3: Pre- and post-intervention changes in WOMAC scoring in KOA patient

Figure Legend 4: Pre- and post-intervention changes in tenderness grade in KOA patient, measured using Hutchinson's method

Figure Legend 5: Pre- and post-intervention changes hs-CRP level. hs-CRP is an inflammatory marker and is elevated in patients with KOA and is also associated with myofascial pain syndrome

Abbreviations

OA- Osteoarthritis

KOA- Knee osteoarthritis

ESWT- Extracorporeal shockwave therapy

IASTM- Instrument assisted soft tissue mobilization

MTrPS- Myofascial trigger points

NPRS- Numerical pain rating scale

VMO-Vastus medialis oblique

WOMAC- Western Ontario and McMaster Universities Osteoarthritis Index

Figures

Fig 1

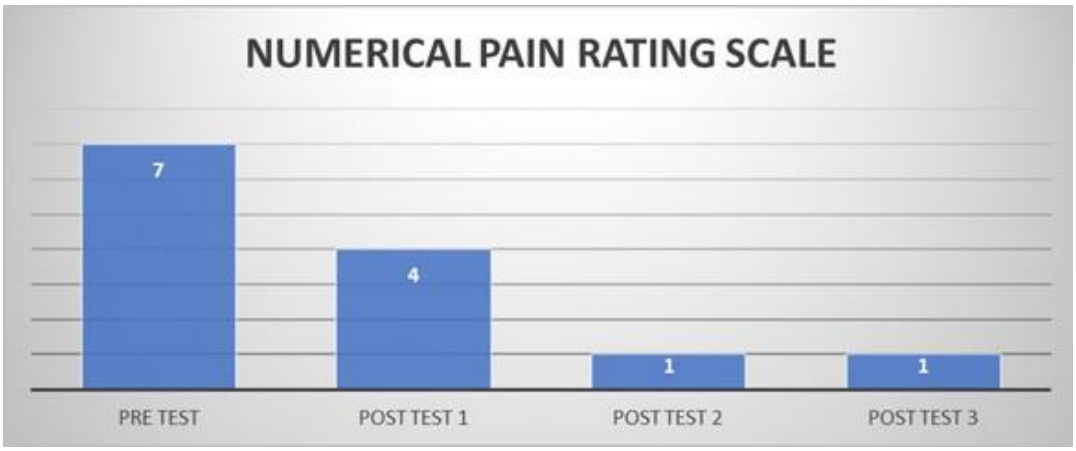

Fig 2

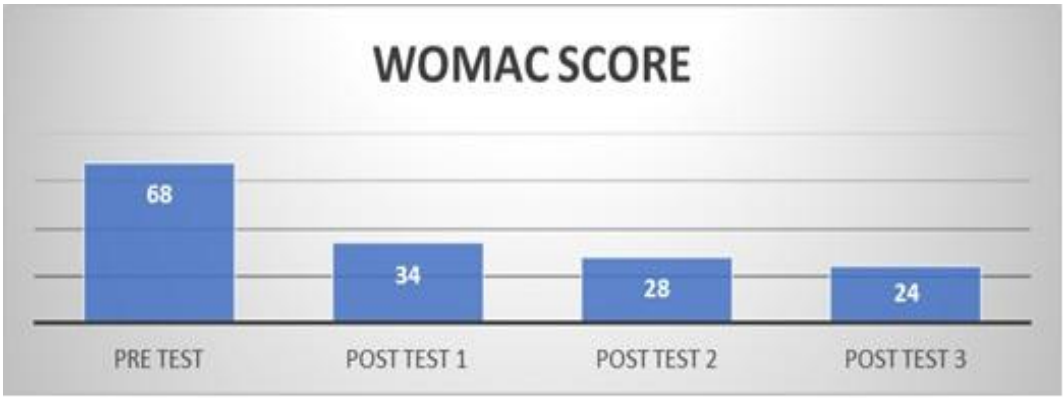

Fig 3

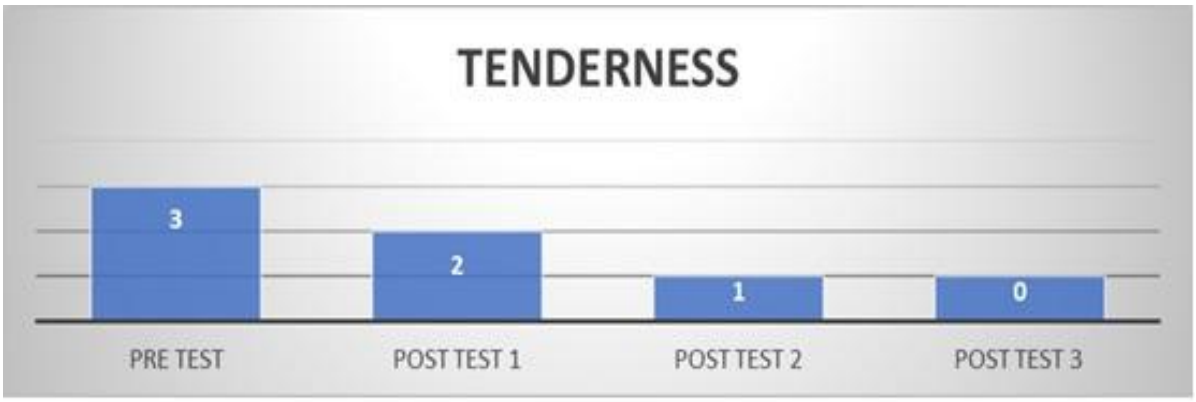
TENDERNESS
3
2
1
0
PRE TEST
POST TEST 1
POST TEST 2
POST TEST 3

Fig 4


hs-CRP LEVEL
2.9
0.7
0.4
PRE TEST
POST TEST 1
POST TEST 2

Fig 5