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CASE REPORT

Effectiveness of ultrasound, IASTM, hold-relax, and active exercise in managing De Quervain tenosynovitis: A case report from Wonosari Hospital

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Abstract

Background: De Quervain's tenosynovitis (DQT) is an inflammatory condition of the wrist tendon sheath that causes pain and functional limitation. **Aim:** To describe the clinical outcomes of a combined physiotherapy intervention consisting of Ultrasound, Instrument-Assisted Soft Tissue Mobilization (IASTM), Hold–Relax technique, and Active Exercise in a case of DQT. **Methods:** This study was a retrospective documentation review designed as a single-case report. Pain, edema, muscle strength, range of motion (ROM), and functional ability were evaluated across six treatment sessions. Results: Clinically meaningful improvements were observed in pain reduction, edema reduction, increased wrist and thumb ROM, improved muscle strength, and reduced functional disability. **Conclusion:** The multimodal physiotherapy intervention showed positive improvements in this case of De Quervain's tenosynovitis. However, findings from a single case should be interpreted with caution.

Introduction

The hand, particularly the thumb, plays a crucial role in performing various daily activities such as using mobile phones, washing, gripping, and making a fist. When thumb coordination is impaired, daily activities are significantly disrupted. One common condition affecting the hand, especially the thumb, is De Quervain Tenosynovitis (DQT), which involves inflammation of the tendon sheaths in the wrist (Asih, 2021).

The etiology of De Quervain's tenosynovitis (DQT) remains unclear. However, repetitive thumb overuse such as typing, excessive smartphone use, and household activities—may contribute to tendon sheath inflammation and pain. Repetitive activities such as typing, excessive mobile phone use, and household chores can lead to characteristic inflammation. The cardinal symptoms of DQT include pain during wrist and particularly thumb movement, swelling around the wrist, and tenderness over the processus styloideus radii (Rehulina et al., 2022).

Globally, an estimated 1.71 billion people suffer from musculoskeletal disorders, particularly those affecting the upper extremities, such as Carpal Tunnel Syndrome, Trigger Finger, and De Quervain Tenosynovitis (Cieza et al., 2020). In the United States, the prevalence of De Quervain Tenosynovitis is higher among individuals engaged in repetitive hand use, such as machinists, physical therapists, and secretaries. Furthermore, women are affected more frequently than men, with a prevalence of approximately 2.8 per 1,000 residents compared to 0.6 per 1,000 in males. The highest prevalence is observed in individuals aged 40 years and older (approximately 2 per 1,000 residents) (Juliastuti, 2023).

In Indonesia, the prevalence of joint disease is reported to be 7.3%, with 9.2% of the population experiencing injuries. Injuries to the upper extremities, including the upper arm, forearm, dorsum of the hand, palm, and fingers, account for 32.4% of these cases. Among the common conditions affecting the upper extremities are musculoskeletal disorders (MSDs), a group of disorders involving the nerves, tendons, and

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muscles, such as Carpal Tunnel Syndrome, De Quervain Tenosynovitis, and Trigger Finger (Kemenkes, 2018).

Musculoskeletal disorders represent a common health problem. In Central Java, 12,213 cases of musculoskeletal disorders were reported, representing a prevalence of 30.7%, including conditions such as Trigger Finger, De Quervain Tenosynovitis, and Carpal Tunnel Syndrome (Kemenkes, 2018). In the Special Region of Yogyakarta, data from RSUD Wonosari recorded five DQT cases between 2024 and 2025.

Non-pharmacological management for De Quervain Tenosynovitis typically includes medication and local modalities such as ultrasound, splinting, and therapeutic exercise. Ultrasound therapy is beneficial due to its therapeutic effects, which include accelerating tissue repair, enhancing local blood circulation, promoting muscle relaxation, and reducing pain by supporting the recovery of damaged tissue (Adiputra, 2021). Instrument-Assisted Soft Tissue Mobilization (IASTM) can enhance blood and lymphatic circulation in swollen tissues (Cheatham et al., 2019). IASTM works by stimulating soft tissue mechanoreceptors, thereby enhancing lymphatic drainage and facilitating the removal of excess fluid and protein molecules from edematous areas, which accelerates the healing process and reduces swelling (Ardiyanti, 2022).

The Hold–Relax intervention is a therapeutic exercise modality that uses the Proprioceptive Neuromuscular Facilitation (PNF) method, which incorporates isometric contraction followed by relaxation, leading to improved muscle strength and flexibility (Oktafianti et al., 2020). This technique is considered effective for patients with De Quervain Tenosynovitis (Adiputra, 2021). Active exercise consists of movements performed independently by the patient without external assistance, resulting in muscle contraction against gravity. It aims to maintain muscle strength, reduce swelling, and improve joint range of motion (Kisner & Colby, 2017). Active exercise, as a form of isotonic exercise, can also stimulate muscle activation and functional recovery (Alfaini, 2021).

Methods

This study was designed as a single-case report using retrospective secondary data obtained from patient medical records and physiotherapy logbooks at Wonosari Hospital. The documentation method was employed without direct patient interaction. The data corresponded to six physiotherapy treatment sessions conducted on 05 February 2025, 07 February 2025, 10 February 2025, 13 February 2025, 17 February 2025, and 19 February 2025. Clinical evaluation data extracted from the records included pain intensity measured using the Visual Analog Scale (VAS), edema assessed through circumferential anthropometric measurements at the radial styloid process and 1 cm distal to the distal radius, muscle strength evaluated using the Manual Muscle Testing (MMT) scale, range of motion (ROM) measured with a standard goniometer, and functional ability assessed using the Wrist Hand Disability Index (WHDI).

The physiotherapy intervention consisted of a combination of therapeutic modalities administered across six treatment sessions. Ultrasound therapy was applied in pulsed mode at a frequency of 1 MHz with an intensity of 0.8 W/cm² for 5 minutes over the first dorsal compartment of the wrist. Instrument-Assisted Soft Tissue Mobilization (IASTM) was performed over the radial styloid region and surrounding soft tissue structures for approximately 3 minutes using moderate pressure to promote circulation and soft tissue mobility. The Hold–Relax technique, a proprioceptive neuromuscular facilitation (PNF) method, was applied to wrist and thumb muscles with five repetitions per session, each consisting of a 10-second isometric contraction followed by relaxation. Active exercises included wrist radial–ulnar deviation and thumb flexion–extension as well as abduction–adduction movements, performed in three sets of ten repetitions to improve muscle strength, joint mobility, and functional capacity. All interventions were delivered by a licensed physiotherapist according to standard clinical practice.

Results

This case report describes the clinical outcomes of a patient diagnosed with De Quervain Tenosynovitis who underwent six physiotherapy sessions at Wonosari Hospital. Evaluations were conducted at baseline (T0) and after each treatment session up to the sixth session (T6).

Pain

Pain intensity was measured using the Visual Analog Scale (VAS). Movement pain decreased from 6/10 at baseline to 4/10 at T6. Pressure pain decreased from 4/10 at T0 to 2/10 at T6. Resting pain was initially recorded as 1/10 and was no longer reported after the third session, remaining at 0/10 until T6 (Figure 1).

Edema

Edema was assessed using circumferential anthropometric measurements. At the radial styloid process, the circumference decreased from 15.5 cm at T0 to 15 cm at T6. Measurement taken 1 cm distal to the distal radius remained unchanged at 16 cm throughout the treatment period (Figure 2).

Muscle Strength

Muscle strength was evaluated using the Manual Muscle Testing (MMT) scale. Radial deviation, ulnar deviation, and thumb flexion improved from grade 4 at baseline to grade 5 at T6. Thumb extension, abduction, and adduction were graded as 5 throughout the intervention period (Figure 3).

Range of Motion

Range of motion measured with a goniometer showed improvement in several movements. Radial–ulnar deviation increased from 15°–0°–20° at T0 to 20°–0°–25° at T6. Thumb flexion–extension improved from 90°–0°–35° to 90°–0°–45°. Thumb abduction increased from 20°–0°–0° to 30°–0°–0° (Figure 4).

Functional Ability

Functional ability assessed using the Wrist Hand Disability Index (WHDI) showed a decrease in disability score from 24% at baseline to 4% at T6 (Figure 5).

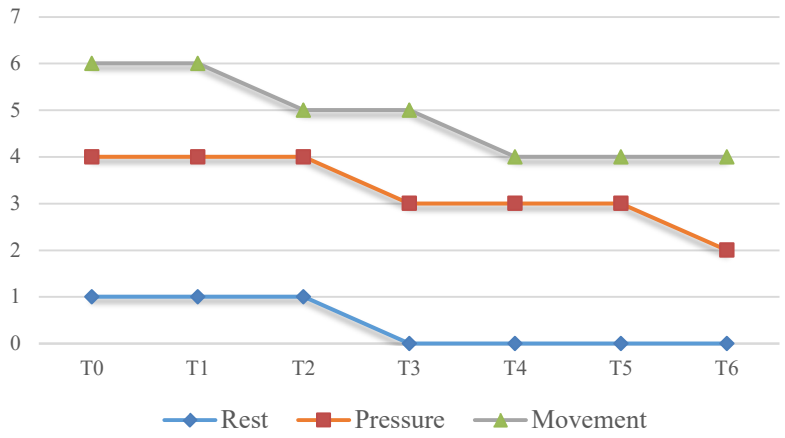

Figure 1. Changes in pain intensity (VAS) across six treatment sessions.

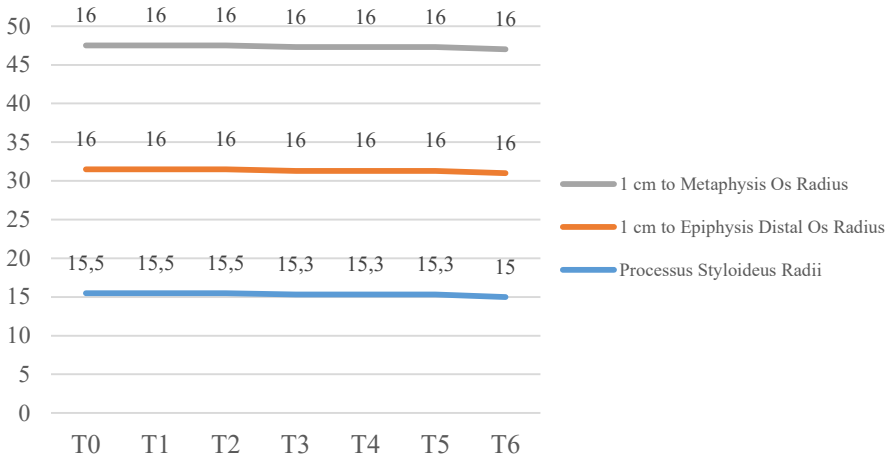

Figure 2. Circumferential edema measurements at the radial styloid regions.

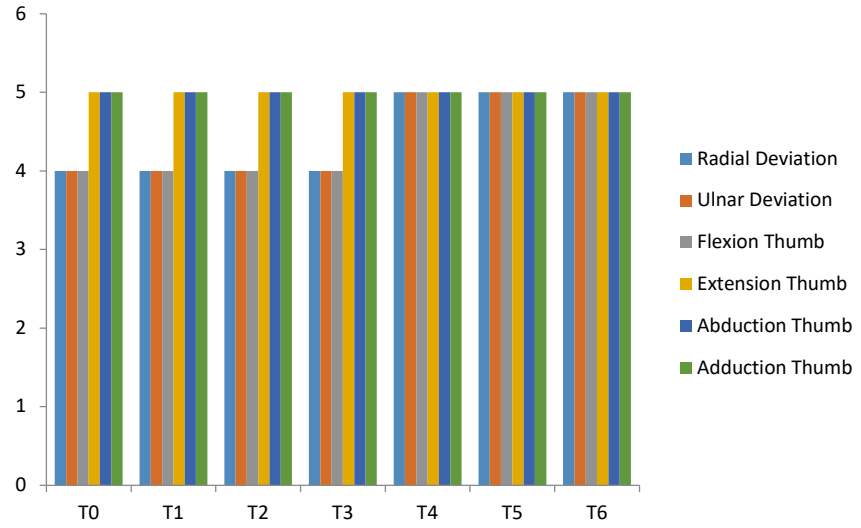

Figure 3. Manual Muscle Testing grades over treatment sessions.

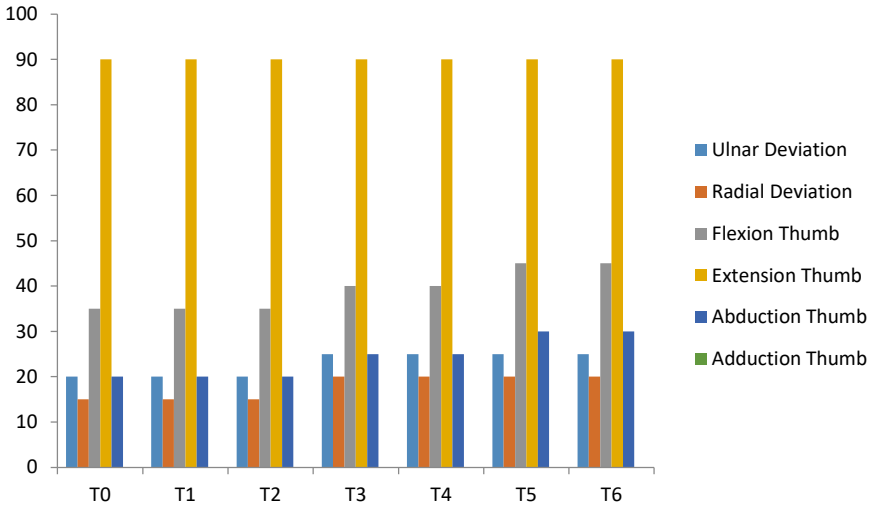

Figure 4. Wrist and thumb range of motion progression.

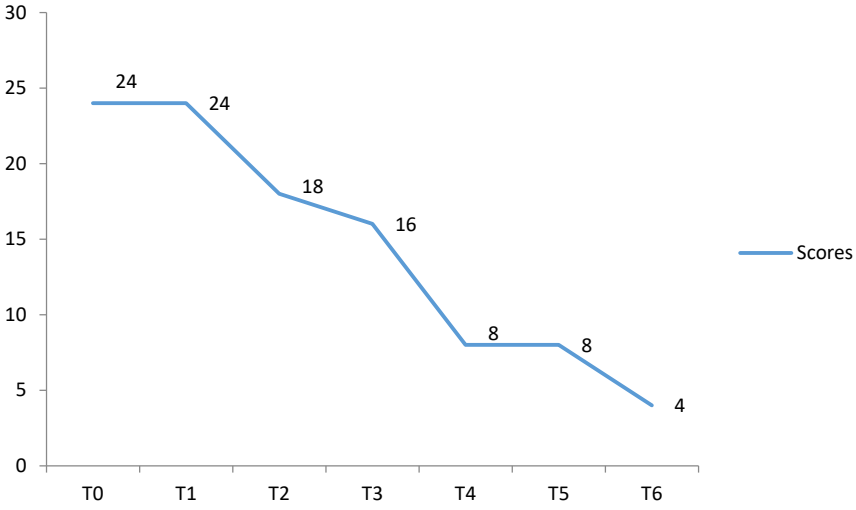

Figure 5. Changes in wrist hand disability index (WHDI) scores.

Discussion

This single-case report demonstrates clinically meaningful improvements in pain, edema, muscle strength, range of motion (ROM), and functional ability following a combination of ultrasound therapy, Instrument-Assisted Soft Tissue Mobilization (IASTM), the Hold–Relax technique, and active exercise in a patient with De Quervain tenosynovitis (DQT). The observed changes suggest that a multimodal physiotherapy approach may contribute positively to symptom reduction and functional recovery in this condition.

Pain reduction observed in this case supports the therapeutic role of ultrasound in managing DQT. Ultrasound is known to enhance local blood circulation, promote tissue healing, and facilitate muscle relaxation, which may contribute to decreased nociceptive stimulation in inflamed tendon sheaths. Previous studies have reported similar clinical outcomes, indicating that ultrasound can help alleviate movement-related and pressure-induced pain in DQT patients. The gradual reduction of pain across sessions may also reflect the cumulative effect of repeated therapeutic exposure and improved tissue recovery.

The reduction in edema following IASTM intervention aligns with the proposed mechanism of soft tissue mobilization in enhancing lymphatic and venous return. IASTM is believed to stimulate mechanoreceptors and improve microcirculation, thereby facilitating the removal of excess interstitial fluid in edematous tissues. Earlier studies have demonstrated that IASTM can effectively reduce soft tissue swelling and improve tissue mobility, supporting its role as an adjunct modality in DQT management.

Improvements in muscle strength are consistent with the application of the Hold–Relax technique, a proprioceptive neuromuscular facilitation (PNF) method that utilizes isometric contraction followed by relaxation. This technique is thought to promote neuromuscular activation, improve motor unit recruitment, and reduce pain-related inhibition, which together may enhance muscle performance. Similar findings in previous research indicate that PNF-based techniques can contribute to strength gains in patients with upper extremity musculoskeletal disorders.

The increase in ROM observed after active exercise may be associated with reduced pain, decreased edema, and improved soft tissue extensibility. Active movement promotes joint lubrication, enhances muscle flexibility, and prevents stiffness, which are essential components of rehabilitation in tendon-related disorders. Supporting studies have shown that structured exercise programs contribute to improved joint mobility and functional use of the wrist and thumb.

Functional ability improvement in this case likely reflects the combined effects of pain reduction, improved strength, and increased ROM. As pain and mechanical limitations decrease, patients are better able to perform daily activities involving gripping and thumb movements. Previous literature similarly reports that multimodal physiotherapy interventions can enhance upper limb function in individuals with DQT.

However, as this study represents a single-case report, the findings cannot be generalized to a broader population. Individual variability, differences in activity levels, and adherence to ergonomic modifications may influence outcomes. Therefore, further studies with larger sample sizes and controlled designs are needed to confirm the effectiveness of this combined physiotherapy approach.

Conclusion

The combined physiotherapy intervention consisting of ultrasound, Instrument-Assisted Soft Tissue Mobilization (IASTM), hold–relax technique, and active exercise demonstrated clinically meaningful improvements in pain, edema, range of motion, muscle strength, and functional ability over six treatment sessions in a patient with De Quervain Tenosynovitis. However, as this report describes a single case, the findings should be interpreted with caution and cannot be generalized. Further controlled studies are required to confirm the effectiveness of this multimodal approach.

Authors' Contribution

All authors contributed to the study concept, data collection, intervention implementation, literature review, manuscript drafting, and approval of the final version of the article.

Ethical Approval

This study received ethical exemption from the Ethics Committee of RSUD Wonosari in collaboration with Universitas Respati Yogyakarta (Approval No. 00.9/056/2025, dated 29 July 2025). The committee

confirmed that the case report met the criteria for exemption as it involved non-invasive physiotherapy procedures and anonymized patient information.

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Conflict of Interest

The authors hereby declare that there was no conflict of interest in conducting this research.

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