

de Quervain's tenosynovitis: a review of the rehabilitative options

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Abstract de Quervain's tenosynovitis is an overuse disease that involves a thickening of the extensor retinaculum, which covers the first dorsal compartment. A case study approach was utilized in this article to demonstrate many of the available medical and occupational therapy modalities to treat this condition. A 34-year-old right hand-dominant female who works in a daycare facility presents with radial side wrist pain during lifting activity for the past 4–6 weeks. The patient was diagnosed with de Quervain's tenosynovitis and conservative care was initiated. Conservative care involved anti-inflammatory medication and corticosteroid injections as well as occupational therapy to include splinting, activity modification, modalities, manual treatment, and therapeutic exercise. Although conservative care assisted the patient with her symptoms initially, she returned with increased pain and discomfort after 2 months time. At that point, surgery was discussed and performed to release the first dorsal compartment as well as the sub-compartment. The patient was provided with a splint postoperatively and initiated occupational therapy for edema and scar management, therapeutic exercise, and desensitization. Ultimately, the patient was able to return to work pain free.

Keywords Abductor pollicis longus · de Quervain's · Extensor pollicis brevis · Finkelstein's test · Tenosynovitis

Introduction

de Quervain's tenosynovitis predominantly impacts the abductor pollicis longus (APL) and the extensor pollicis brevis

(EPB) tendons, which pass through the first dorsal compartment of the wrist [2, 10, 12, 19]. The etiology of this disease is due to repetitive and continued strain of the APL and EPB tendons as they pass under a thickened and swollen extensor retinaculum [2, 10, 12, 19]. Patients present with complaints of pain and inflammation in the region of the radial styloid [11, 14]. This pain is exacerbated by motion and activity requiring ulnar deviation with a clenched fist and thumb metacarpophalangeal (MP) joint flexion. Specific activities that may incite complaints include wringing a washcloth, gripping a golf club, lifting a child, or hammering a nail. Inflammation is increased with continued performance of these or similar functional activities [14]. Physical examination may reveal swelling and tenderness in the region of the first dorsal compartment. Finklestein's test, which involves thumb MP joint flexion within a closed fist combined with active or passive wrist ulnar deviation, can result in a painful response over the styloid process of the radius [2, 10, 11]. This is due to a restricted gliding of the APL and EPB tendons in the narrowed compartment caused by a thickening of the extensor retinaculum and the APL and EPB tendons [2, 10, 11].

Conservative management of de Quervain's tenosynovitis differs based on the severity of the condition. Options include anti-inflammatory medication, corticosteroid injections, and occupational therapy (OT). If symptoms persist despite a trial of conservative care, surgical intervention may be warranted. Surgery consists of a release of the first dorsal compartment, including any sub-compartments, followed by immobilization and OT. Specific components of OT include activity modification with patient education, splinting, manual treatment, use of modalities, edema and scar management, as well as desensitization and therapeutic exercises [9–11, 15].

The purpose of this paper is to present the most common conservative and postsurgical intervention techniques used by occupational therapists in the rehabilitation of patients with de Quervain's tenosynovitis.

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Conservative care

Many patients with de Quervain's tenosynovitis are given a corticosteroid injection and a prescription for non-steroidal anti-inflammatory drugs (NSAIDs) for pain management upon initial presentation to the physician [9–11]. The corticosteroid injection is delivered into the first dorsal compartment [8, 11, 14]. Harvey et al. found corticosteroid injection provided prolonged relief in 80 % of cases in a study involving 71 patients [8]. Poor response to a corticosteroid injection has been correlated with poor technique and a likelihood of the EPB tendon lying in a separate compartment [8, 10].

The use of a thumb spica splint has been shown to assist with pain management by immobilizing the thumb and wrist joints, thereby preventing thumb MP joint flexion and wrist ulnar deviation [6, 10]. Ilyas et al. state that splinting is effective with a corticosteroid injection in immobilizing and resting the APL and EPB tendons in a position to decrease the friction in the joint that can lead to increased pain and inflammation [10]. However, studies have not shown splinting as a treatment tool to provide long-lasting relief beyond allowing the joints to rest in an immobilized position [9, 10]. In a study by Harvey et al., immobilization with corticosteroid injection was not found necessary; instead, mobilization was encouraged resulting in extended relief of pain symptoms in 80 % of cases [8]. Others have recommended splint use for comfort only in patients with increased pain [9]. If a splint is prescribed, a forearm-based thumb spica splint that immobilizes the joints with the wrist in neutral, 30° of carpometacarpal (CMC) joint flexion and 30° of thumb abduction with the thumb interphalangeal (IP) joint free is recommended [10] (Fig. 1).

OT can be used as an adjunct to the NSAIDs, corticosteroid injection, and splinting to decrease pain and inflammation while increasing the patient's function, range of motion, and strength. Adaptive equipment or modified techniques for activity performance is encouraged to allow for neutral wrist positioning during activities, such as repetitive typing and lifting, which place the wrist in ulnar deviation with the thumb



Fig. 1 Photograph of a thermoplast splint fabricated to treat de Quervain's tenosynovitis (courtesy of Ritu Goel, MS, OTR/L)

MP joint in flexion [15]. Ergonomic keyboards, key holders, and modifications to tools allowing for neutral wrist positioning are some examples of adaptive equipment available for patients to incorporate into their daily life activities.

Parents or caretakers of infants are at increased risk of developing de Quervain's tenosynovitis due to repetitive lifting and carrying actions forcing the wrist into ulnar deviation [5, 8, 10, 13]. Therefore, new parents and those involved in childcare are encouraged to limit lifting and carrying children as much as possible. Furthermore, soft tissue edema, fluid retention, and ligamentous laxity are common effects of pregnancy, which can impact the inflammatory response and pressure upon the first dorsal compartment [5]. Iontophoresis is a therapeutic modality used to deliver anti-inflammatory medications for edema control and to stimulate healing [7]. Patients are typically concurrently taking oral NSAIDs; however, the utilization of iontophoresis may reduce the need for extended oral NSAID use, thereby lessening the risk of adverse systemic effects [7]. Iontophoresis is typically delivered with dexamethasone, which has also been shown to be effective for pain control [7].

Therapeutic ultrasound is a modality used for a variety of musculoskeletal injuries to improve tissue extensibility, assist with pain relief, as well as promote healing of wounds, tendons, and bone through the use of "high-frequency sound waves" at varying parameters determined by the goal of treatment [7]. A frequency of either 1 MHz (deeper structures) or 3 MHz (superficial structures) is offered, where 3 MHz would typically be used for de Quervain's tenosynovitis [7]. Two classifications of therapeutic ultrasound include thermal (continuous ultrasound) or non-thermal (pulsed or low-intensity ultrasound), also referred to as duty cycle, where non-thermal effects have also been shown to occur with continuous ultrasound [7]. Typically, for de Quervain's tenosynovitis, non-thermal therapeutic ultrasound is used for its healing effects of tendon injuries and tissue regeneration [7]. Intensity varies from 0 to 2.0 W/cm [2], where an increase of intensity results in decreased time necessary to heat the underlying tissue [7]. In the case of de Quervain's tenosynovitis, the parameters are dependent upon the therapist's goals for treatment.

Following therapeutic ultrasound, soft tissue massage is performed along the first dorsal compartment tendons to relax tight musculature that can increase pain, as well as to enhance fluid drainage from muscle tissue [3]. In a study by Papa, Graston Technique (GT) was utilized in conjunction with eccentric therapeutic exercise to assist in soft tissue mobilization and promote healing [13]. GT, a form of augmented soft tissue mobilization (ASTM), is used to apply "controlled microtrauma" to the affected soft tissue [13]. The study found that use of GT decreased tenderness and promoted healthy healing of the soft tissue [13]. Unfortunately, limited evidence-based studies are available at this time describing this technique.

The goal of therapeutic exercises is to enhance gliding of the APL and EPB tendons in the first dorsal compartment [11]. Pain-free active range of motion (AROM) exercise is initiated to the patient's tolerance, focusing on the wrist and thumb joints. Tendon gliding of the APL and EPB tendons is gently incorporated into thumb MP flexion combined with wrist ulnar deviation [11]. Strengthening exercises are then initiated to assist in return to functional activity [11].

The treatment plan used by the authors for patients that present to OT for de Quervain's tenosynovitis is to splint the joint for immediate support and positioning, initiate range of motion therapeutic exercise, and implement modalities for pain relief such as therapeutic ultrasound and iontophoresis. When pain and edema have decreased, strengthening and functional activity are incorporated into the treatment plan in preparation for return to normal daily activities. Each patient's response to pain and treatment are different; therefore, deviation may be necessary.

Case presentation

A 34-year-old right hand-dominant female, working full-time in a daycare facility, presented to the office with complaints of radial side wrist pain for the past 4–6 weeks. She denied any history of trauma as well as any numbness or tingling. The patient stated that the pain is worse when she lifts up the children at work, and therefore, she is struggling to perform her required duties. She presents requesting treatment for this pain in order to permit her to continue to work. The patient has tried utilizing over the counter anti-inflammatories intermittently, which have provided some relief. The remainder of her history was unremarkable.

On physical examination, she had swelling and tenderness to palpation in the region of the first dorsal compartment (Fig. 2), and her Finkelstein's test was positive. The remainder of her examination was unremarkable including symmetric range of motion of her wrists bilaterally. After she was diagnosed with de Quervain's tenosynovitis, the patient was given



Fig. 2 Clinical photograph depicting the visual swelling that occurs in the region of the first dorsal compartment with de Quervain's tenosynovitis (courtesy of Joshua M. Abzug, MD)

a corticosteroid injection and prescribed anti-inflammatory medication. Additionally, she was referred to OT.

Initially, the patient did well with the conservative care and was able to continue to work full time. However, approximately 2 months later, her symptoms had worsened and she returned to the office requesting further treatment. At this point, the possibility of surgical intervention as a definitive solution was discussed. After discussing the risks, benefits, and alternatives, the patient opted to undergo operative intervention. A first dorsal compartment release was performed, including release of a sub-compartment for the EPB tendon. The release was performed on the dorsal ridge of the compartment. No subluxation was present following the release, and therefore, the retinaculum was not reconstructed. Postoperatively, the patient was splinted in a thumb spica splint and referred to OT. Six weeks following the procedure, the patient returned to the office with significant improvement in her complaints of pain. She was able to return to work full time without restrictions.

Postsurgical care

Although the use of splints has shown differing levels of effectiveness for conservative care of de Quervain's tenosynovitis, postsurgical patients are recommended to be placed in a thumb spica splint for 1 to 2 weeks to allow for healing and immobilization [10, 14, 15]. The splint is typically discontinued when the sutures are removed, approximately 10–14 days after the surgery [10].

Once the splint is discontinued, a formal OT consultation is performed to assess for postoperative edema, scar sensitivity, ROM deficits as well as deficits in nerve function for motor and sensation. Furthermore, daily life activities are discussed with the patient to identify areas of difficulty and the amount of assistance available at home. Education regarding the cause of de Quervain's tenosynovitis and tissue healing is provided. Additionally, the patient is educated regarding activity modification techniques such as use of adaptive equipment or incorporating ergonomics into daily activity performance [15]. Lastly, the patient is educated on how to prevent re-injury such as signs of overuse, location of pain, and biomechanics of activity causing strain to the first dorsal compartment [15].

Two weeks postoperatively, active and active-assisted range of motion exercise is initiated in an effort to decrease stiffness and promote healing of the affected joints [15]. Stretching the thenar musculature and forearm extensors/flexors is initially introduced to allow for pain-free and smooth gliding of the APL and EPB tendons within the first dorsal compartment, followed by unweighted eccentric hammer curl exercises in the direction of ulnar deviation blocking radial deviation [13]. Approximately, 4 weeks

postoperatively, gentle strengthening is initiated with a focus on simulating the patient's work and leisure activities [15]. Resisted eccentric thumb extension and abduction exercises are then performed in week 4 [13]. Finally in week 5, resisted eccentric wrist flexion and extension as well as forearm pronation and supination exercises are introduced [13].

Edema noted postoperatively in the thenar eminence, thumb MP joint, or wrist joint near the radial styloid can be treated with retrograde massage, which is a manual technique in which fluid is guided from a distal location to more proximal [16]. This technique is performed with lubricant and gentle firm pressure, facilitating movement of fluid from the fingertips proximal, crossing over the wrist joint, allowing the fluid to re-enter the lymphatic system [16]. However, the result is temporary in its effectiveness; therefore, patients are educated on how to perform the technique outside of therapy [16]. The patient may also be issued compression garments, such as Isotoner gloves or Tubi-Grip sleeves, in cases of pitting edema or increased inflammation [17]. The continuous use of a compression garment will minimize the amount of fluid retention in the hand, thereby allowing for increased active motion and decreased pain [17]. Cryotherapy, such as cold packs, is used to assist with edema management after performing therapeutic exercises and scar management techniques that may aggravate the surgical area and cause an increase in inflammation to the first dorsal compartment [7, 11]. Furthermore, patients are encouraged to perform AROM exercises, such as hand pumping, to facilitate fluid movement from the hand and digits back into the lymphatic system. Patients are educated on edema management techniques for carryover at home to assist in alleviating the inflammatory response.

The incision after a first dorsal compartment release can be longitudinal or transverse in the region of the first dorsal compartment [10]. Transverse (or cross) friction scar massage is initiated once sutures have dissolved or been removed and the scar has healed. Scar massage assists in decreasing the development of scar tissue, which can restrict available motion in the wrist and thumb joints [6, 15]. Patients are educated on performing this technique when outside of therapy as part of their home program to minimize scar tissue development and facilitate scar mobilization in between treatment sessions. Silicone gel sheeting is occasionally issued to patients for topical scar management over the dorsal scar incision. This sheeting is recommended if abnormal scarring occurs such as increased temperature of the surrounding skin, increased redness, increased pain, increased height of the scar, or increased firmness as noted in hypertrophic or keloid scars [4]. Berman and Flores found silicone gel sheeting to be effective in reducing scar volume, tenderness, itching, and redness of hypertrophic scars [4]. Furthermore, silicone gel sheeting has been shown to encourage scar softening if worn for at least 12 h daily for 2–4 months [1].

Desensitization of both nerves and the scar is performed after the procedure if decreased sensation or scar hypersensitivity is noted upon evaluation of the patient. In de Quervain's tenosynovitis, decreased sensation may be noted along the superficial radial nerve following the first dorsal compartment release [10]. Vibration is a method of desensitization involving a steady movement initiated on the outer edge of the painful area and then travelling toward the center [18]. Other forms of desensitization include exposure of the scar or skin to a variety of textures including sharp, dull, rough, soft, and wet objects for sensory re-education.

Our postoperative treatment program following first dorsal compartment release for de Quervain's tenosynovitis is to fabricate a thumb spica splint for immediate postoperative use. Two weeks following surgery, OT is initiated for ROM, scar management, and edema management using the abovementioned techniques. Four weeks following surgery, gentle strengthening and functional activity performance are incorporated into treatment in preparation for return to daily activity. Once the patient regains full motion and strength, he/she is released to resume all activities at work and for leisure.

Summary

Although OT treatment in combination with NSAIDs and corticosteroid injections has shown relief of symptoms in de Quervain's tenosynovitis, a first dorsal compartment release may be necessary if continued symptoms present. OT treatment methods for de Quervain's tenosynovitis assists with the healing of this disease through activity modification with patient education, splinting, manual treatment, use of modalities, edema, and scar management, as well as desensitization and therapeutic exercises.

Conflict of Interest Ritu Goel declares that he has no conflict of interest.

Joshua M. Abzug declares that he has no conflict of interest.

Statement of Human and Animal Rights This article does not contain any studies with human or animal subjects.

Statement of Informed Consent Informed consent was obtained when necessary.

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