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# Effect of ultrasound, massage therapy and exercises on de-quervain's tenosynovitis

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**Abstract**
**Objective:** To find out the effect of ultrasound, massage and exercises on the De quervain's tenosynovitis. Description on Condition was known as De quervain's tenosynovitis which having painful on their wrist aspect of radial and thumb with the difficult of ROM due to cause by repeat and over usefully active. Diagnosis Confirms Finkelstein test was done and ROM for Universal goniometry. Treatments using Ultrasound, Massage Therapy and Exercise Therapy. Clinical features 2O years old young girl effect by de quervain's tenosynovitis and having a pain ,warms ,ROM normal but having pain full in active movement condition.
**Result:** The ultra sound, massage and exercises are effect on de quervain tenosynovitis. According VAS the subject had 6 in pre-test and later post test come on VAS 2 within a week. But the range of motion of thumb was normal by using universal goniometry measured.
**Conclusion:** It was conclusive that the De- quervain's tendon inflamed condition the ultra sound was effect and massage, exercises are also effects. It was observed as well as the single case study.

**Keywords:** de quervain's tenosynovitis, ROM of thumb, ultrasound, massage therapy, exercise therapy

## Introduction

The De quervain's tenosynovitis is first described by Swiss surgeon Fritz de Quervain's in year 1895 and it is described as a painful stenosing tenosynovitis of the first compartment of the hand. The cause of de Quervain's disease is not established. Evidence regarding a possible relation with occupational risk factors is debated [2]. Potential risk factors discussed in the literature did not find any evidence of a causal relationship with occupational factors [5].

However, researchers in France found personal and work-related factors were associated with de Quervain's disease in the working population; wrist bending and movements associated with the twisting or driving of screws were the most significant of the work-related factors [5]. Proponents of the view that De Quervain's syndrome is a repetitive strain injury [6] consider postures where the thumb is held in abduction and extension to be predisposing factors. Workers who perform rapid repetitive activities involving pinching, grasping, pulling or pushing have been considered at increased risk. Specific activities that have been postulated as potential risk factors include intensive mouse/trackball use and typing, as well as some pastimes, including bowling, golf and fly-fishing, piano-playing, and sewing and knitting [2]. Women are affected more often than men [2] The syndrome commonly occurs during and after pregnancy [6]. Contributory factors may include hormonal changes, fluid retention and more debatably lifting [6]. It was usually caused by repeated activity or may be caused by over use which results in micro trauma of dorsal compartment of the tendons of Abductor pollicis longus and Extensor pollicis brevis at the first dorsal compartment over the styloid of the radius leading thickening of the extensor retinaculum at the wrist. De Quervain's tenosynovitis is classically associated with localized tenderness and swelling in the region of the styloid process of the radius and wrist pain radiating proximally into the forearm and distally into the thumb. Other findings may include decreased abduction range of motion (ROM) of the carpometacarpal joint of the thumb, palpable thickening of the extensor sheath and of the tendons distal to the extensor tunnel, and crepitus of tendons moving through the extensor sheath.

The abductor pollicis longus and extensor pollicis brevis tendons pass through the first dorsal compartment of the wrist beneath the extensor retinaculum and can angle sharply when the wrist is deviated radially. Various repetitive pronation and supination movements of the forearm, ulnar and radial deviation of the wrist, and abduction/extension of the thumb have been described as movements that create stress on tendons passing through the extensor retinaculum.

Muckan concluded that firm grip (eg, wringing a cloth) or finger-thumb grip combined with radial deviation of the Wrist creates the greatest stress on the structures of the first dorsal compartment. This position causes the taut abductor pollicis longus tendon to apply a tensile force to the fibrous extensor retinaculum. The extensor retinaculum thickens to resist the strain, resulting in more pain and pressure.

Determination of whether a patient has de Quervain's tenosynovitis is based on the location of the patient's pain and the presence of swelling in the hand and decreased hand function. Finkelstein's test is also frequently used in the diagnosis. The patient is asked to place the thumb inside his of her closed fist. If the test is positive, passive or active ulnar

deviation of the wrist then produces pain over the styloid process of the radius.

De Quervain's treatment protocol currently consists of splinting the thumb, limiting activities, and prescribing anti-inflammatory drugs. Ultrasound, iontophoresis, and surgical release of the involved tendons are other approaches. For the relief or the treatment of De quervain's tenosynovitis ultrasound therapy is applied along the length of tendon. It should be noted however, that there are inconclusive findings to support or refute the benefits of these modalities.

Massage techniques also has proved its benefits over DeQuervain's diseases, It help to release soft tissues and thus improves the circulation. Exercises like active exercise and tendon gliding help to soft tissue release and improve the finger flexibility. Each technique has its own benefit. This study is planned to find out the effect by applying three techniques so that this type of combined therapy can be used to improve the treatment for subject in better way.

**Methodology**

**Study design** : Non Experimental design.
**Study type** : Case study (pre and post)
**Study duration** : 2 weeks.
**Study setting** : SRM Medical College Hospital and Research centre.

**Materials used in the study are**

- Ultrasound machine
- Ultrasound gel
- Cotton
- Powder
- Couch

**Fig 1:** Materials Used:

**Case Report**

21 years old female having the left sided thumb pain at the base of the styloid process of the radius. She stated that pain had started after a long distance bike ride. She described the pain as "achy" and occasionally "sharp" with certain movements for past one month. She also reported no weakness or previous episodes of this type of pain. She reported that pinching (between the thumb and her first finger), lifting a jug of water and pronation all aggravated her pain. She stated that there were no relieving factors. Otherwise she reported being "healthy," that she took no medications and and Greens Plus (a whole food high fiber chlorophyll supplement). She reported exercising regularly, She reported her diet as "good". Her family history included no other disease, diabetes and hypertension. The systems review was unremarkable. All red flags were normal.

She reported not having any imaging performed on her left hand, wrist or arm. The physical examination revealed a positive Finkelstein's test[12] on the left, with the patient stating it recreated her pain. Ranges of motion of the left wrist revealed decreased active, passive and resisted extension (by 50%), painfull active and passive pronation, ulna deviation and active and passive radial deviation. Thumb ranges of motion on the right revealed painful active and resisted abduction, passive adduction, flexion (at the end of active and passive), resisted extension and active and resisted opposition. Soft tissue palpation revealed tight and tender right abductor pollicus longus, extensor pollicus longus and brevis (tendon palpation recreated the pain and not palpation at the muscle belly), as well as the wrist extensors. The working diagnosis was subacute right-sided De Quervain's tenosynovitis / tendinopathy. The prognosis was rated as good.

The plan of management treatments for 2 weeks, followed by a re-evaluation. The treatments included ultrasound, Massage therapy, Exercise therapy. Home care advice included neutral positioning, pain-free range of motion exercises and soft-tissue therapy. She had started active exercise, but had not yet purchased a brace.

Twisting and lifting of the left wrist and hand/thumb continued to aggravate her complaint. On subsequent weekly visits aggravating factors included not wearing the brace, heavy lifting, and doing less home care the patient reported an improvement in her thumb with Exercises and Ultra sound, Massage without a wearing the brace. Discussion did occur for pain assessment, universal goniometry and treatment options, including a referral for a diagnostic ultrasound, massage therapy and exercise therapy, which she chose not to pursue. which revealed a positive Finkelstein's test. In addition to the self-care she was previously prescribed, she was given a small tool to do gentle soft-tissue release on alternate days at home. less of an improvement since the patient had not done as much home care. The patient then felt some improvement after applied massage therapist, since she only had pain directly over the tendon after their treatment. Subsequent visits showed an improvement in her condition with time off from work, after which the pain in her forearm resolved.

An increase in seasonal work demands aggravated her complaint, but with rest, more and soft tissue therapy, she reported tenderness only at the base of her thumb with palpation with treatment and an increase in home care, her condition improved. She had only mild soreness/"burning" and an overall improvement.

**Procedure**

The subject was selected according to the inclusive and exclusive criteria and informed consent was taken and treatment procedure was explained to the subject in detail and subject received for treatments for 2weeks. Pain was assessed by the visual analog scale and the range of motion of thumb was measured by universal goniometry before the treatment was started.

The subject received by the ultrasound, massage, and

exercises for 2 weeks.

**Ultrasound Therapy**
Patient was made to sit with the hand to be treated supported properly therapist applied ultrasound over the length of the tendon in gentle manner with the following ultrasound parameters.

**Ultrasound parameters were**
Mode : continuous.
Duration : 5 minutes
Intensity : 0.8watt/cm2
Frequency : 1MHZ

**Fig 2:** Application of Ultrasound

**Massage**
Thumb kneading massage and Thumb pad massage was given to the subject along the course of Adductor pollicis longus and extensor pollicis brevis tendon and thenar muscles for a period of 15 minutes

**Fig 3:** Hypothenar massage

**Fig 4:** Tendon massage

**Exercises**
Active exercises of wrist, thumb and tendon gliding exercises for adductor pollicis longus and extensor pollicis brevis muscles were the exercise received by subject treatments for 2 weeks continues for 2 to 3 times repeated in per/day.

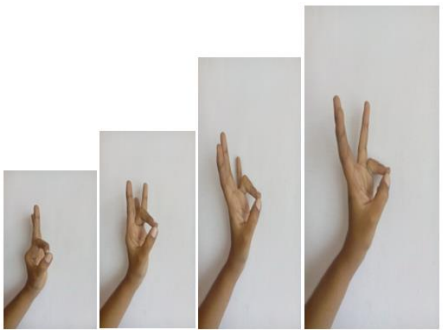

**Fig 5:** Thumb Opponens Exercises

**Range of Motion (Universal goniometry)**
(Flexion, Extension, Adduction, Abduction of Thumb).

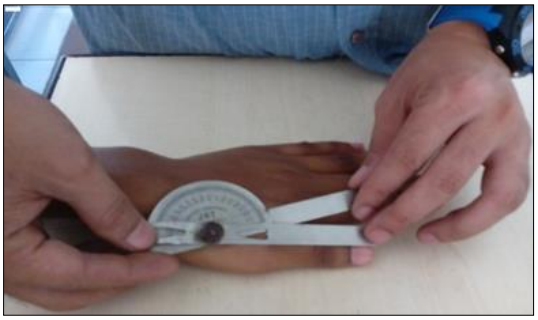

**Fig 6:** Thumb Abduction.

**Fig 8:** Thumb Extension

**Fig 9:** Thumb Flexion

## Data Analysis

**Table 1:** Comparison between Pre and Post-Test Values of Visual Analogue Scale

| Pre –Test | Post-Test |
|---|---|
| 6 | 2 |

This table shows the pre and post-test values of visual analogue scale

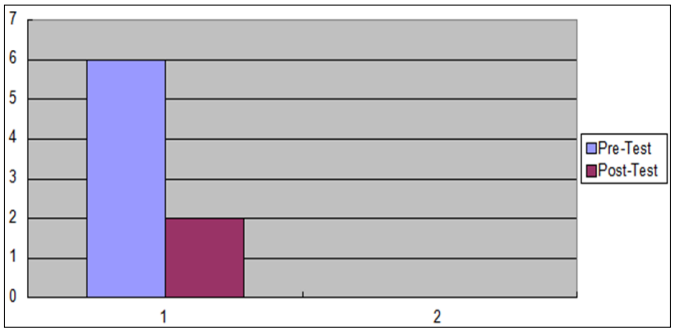


**Fig 1:** Comparison between Pre and Post-Test of Values of Visual Analog Scale

This Figure shows the difference between the pre-test and post-test values of visual analogue scale

**Table 2:** Comparison between Pre and Post-Test Goniometric Values of Thumb Range of Motion

| Serial No. | Name | Pre- Test | Post- Test |
|---|---|---|---|
| 1 | Flexion | 0-50 | 0-50 |
| 2 | Extension | 50-0 | 50-0 |
| 3 | Adduction | 70-0 | 70-0 |
| 4 | Abduction | 0-70 | 0-70 |

This table shows the pre and post-test goniometric values of thumb range of motion

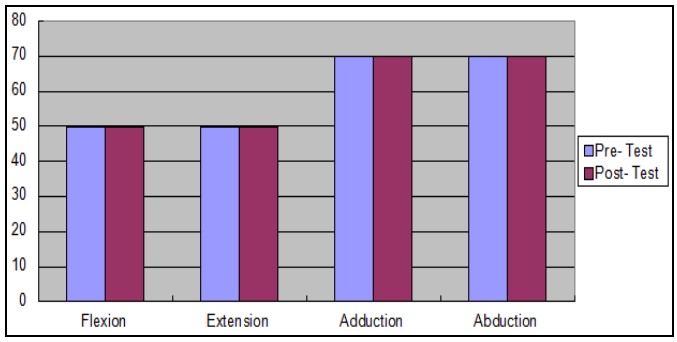


**Fig 2**

This Figure shows the difference between the pre-test and post-test values of goniometric measurement of left thumb.

## Results

According to the table 1 and Figure 1 the pre test and post test values of VAS shows that the pain is reduced.

According to table 2 and Figure 2, the goniometric range of motion of thumb is same in pre test and the post test which shows that there was no significant improvement.

## Discussion

Injuries of the hand and thumb can be challenging, since most patients frequently use them in their daily lives, thus delaying healing time. Predisposing factors include pregnancy, lactation and newborn care, musicians, dental hygienists, assembly workers, golfers, machinists, mountain bikers and video game playing [17, 15]. Risk factors include repetitive movements, hand position, frequency of movement and static postures [14]. There are many recommended conservative treatments, including rest, early immobilization and transverse friction massage [16], Exercise therapy East Asian therapeutic surface myofascial frictioning tool that has been shown to increase microcirculation and decrease local and distal pain.

Active treatment options include active pain-free range of motion exercises, tendon gliding, self-administered friction massage and training exercises Ultrasound has been found to be helpful in detecting anatomic variations in De Quervain's cases by visualizing the intra-compartmental septum in the first extensor compartment.

Detecting this variation assists accuracy and improves treatment results, since the extensor pollicis brevis compartment can be missed because of its separate, small and deep location. MRI has also been suggested to reliably detect increased tendon thickness or the abductor pollicus longus and extensor pollicis brevis and peritendinous edema in patients with a confirmed diagnosis of De Quervain's disease. For non-progressive cases, surgical l release/decompression may be recommended since many patients with De Quervain's have been found to have the Eextensor pollicis brevis tendon in its own compartment [16]. Surgical cure rates are reported as 88-91% [26, 27]. Unfortunately, surgery is more invasive, more costly and can be associated with more complications. This case had a favorable outcome, but many treatment modalities were used.

These modalities were chosen with the goals of reducing inflammation and pain, increase ranges-of-motion and strengthen the affected muscles and tendons. It is difficult to determine which modality was most effective, So the effect of comprehensive exercise program was studied in this study on dequervain's disease.

The result of the study shows that there was a significant reduction in pain post the management of Ultrasound, massage and Exercises. The Visual Analogue scale score which had a pretest score of 6 was reduced to a post test score of 2. This can be explained by the physiology of ultrasound therapy which increase s the blood flow in the treated area which speeds the healing process. It reduces swelling and oedema which are the main sources of pain.

Ultrasound waves gently massage the mucles, tendon and ligaments in the treated area. This enhances the recovery rate of damaged tissue without adding strain, and softens any scar tissue that is usually present in an injured area

This result goes in hand with Listo J.M (1997) who stated that ultrasound is mainly useful in reducing pain, edema, Swelling and to improve strength and Szumski AJ (1960) stated that thermal effects of ultrasound cause pain relief.

Massage may also have an effect over pain as the physiology attributes to increase in blood flow, increase in lymphatic drainage, neural stimulation, Encouragement of venous return, Relief of pain and Relaxation. These results are strengthened

by the studies of smith *et al*. (1994) and Hilbert *et al*. (2003). The results of the study does not show an improvement in Range of motion, In this study flexion, extension, abduction and adduction of thumb are taken in to consideration which can be better explained by the physiology that the ultrasound assist the break down and absorbtion of debris, thus assist in reducing pain and swelling.

This result is in controversy with GC Goats (1994) in his study reveals that deep transverse friction massage can produce therapeutic movement by breaking down the strong crosslinks or adhesions that have been formed and mobilizing the cross links between the mutual collagen fibres and adhesions between the repairing connective tissues and surrounding tissues.

Conditions of the wrist and hand can be challenging to treat since patients use their upper extremities in many daily activities. This case report demonstrates a single patient; therefore it is difficult to extrapolate the results to other cases. The resolution of her symptoms could also be due to the natural history of the condition. Generally, most recent reviews have found no strong evidence for or against conservative treatments for this condition. The condition is controls would assist in clarifying which conservative treatments are effective for this condition, since most evidence that is available are case reports. The results of this case may suggest that conservative comprehensive treatment may be useful in treating De Quervain's disease before more invasive procedures are pursued.

**Conclusion**

The study inclusive the Ultrasound therapy, Massage therapy, Exercises therapy where effected and reduced pain but showed no significant improvement in pain free range of motion in De- quervain's tenosynovitis.

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