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CASE REPORT Open Access

The role of physiotherapy in the treatment of chronic trigger finger—a case report

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Abstract

Background Trigger finger (TF) is a common condition more prevalent in women in their 5th decade of life. This causes pain and stiffness which limits daily activities. Corticosteroid injections are the first line of conservative management failing which surgery is done. Physiotherapy has shown a vital role in the treatment of trigger finger.

Patient and observation We reported a case of chronic trigger finger in a 75-year-old female with pain and stiffness. A 2 week of combined conventional and advanced physiotherapy approach was used. Pre- and post-test scores of pain and activity limitation were taken.

Result Pain scores reduced from 6 to 0 measured by the Nottingham Pain Rating Scale (NPRS) scale and activity limitation measured by the patient-rated wrist evaluation (PRWE) scale reduced from 67.5 to 10.5%.

Conclusion Two advanced techniques A1 pulley and dry needling along with conventional physiotherapy are better than any technique alone in managing a chronic case of trigger finger.

Keywords Advanced physiotherapy, Chronic trigger finger, Disability, Pain

Introduction

Trigger finger or stenosing tenovaginitis or tenosynovitis is a common hand disease with a prevalence of 2 to 20% globally. It occurs due to the entrapment of flexor digitorum superficialis and flexor digitorum profundus tendon along its course through fibro-osseous tunnels of the wrist, palm, and digits of the hand. The patient presents with a locking, popping sensation due to nodule formation which is a swelling of the tendon due to repetitive use of the tendon [1]. Overuse trauma, diabetes, and carpal tunnel syndrome are all risk factors for the development of trigger fingers. The thumb and ring finger of the dominant hand are most affected [2]. The condition develops gradually due to overuse and resolves spontaneously within 6 months [3].

Trigger finger can be managed conservatively or surgically. Common surgical techniques used are tenolysis either by percutaneous release or by a transverse incision in the distal palmar crease and endoscopic surgery. These techniques have potential complications [4] like tendon injury, infections, fat necrosis, and cutaneous discomfort [5].

Conservative treatment is the combination of steroid injections, ice, activity modification, reduce gripping activities, and physiotherapy interventions. Various techniques have been developed in recent times to improve the comorbidities associated with trigger finger. Dry needling in combination with an A1 pulley can be a new therapeutic approach to manage chronic trigger finger [5], along with conventional strategies avoiding the need for surgery.

Dry needling uses thin monofilament needles without injecting into the muscle tendons ligaments and subcutaneous fascia [6]. Stretching of the A1 pulley with isometric contraction of the flexor tendon is also a newly

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explored technique to stretch the A1 pulley effectively and break the scarring around the tendon. The examiner pushes the middle finger toward the dorsal side during the examination. An active flexor tendon contraction force by the subject and a counteracting flexor tendon force by resistance from the examiner can generate contact force that expands the first annular (A1) pulley toward the palm side. A combination of A1 pulley stretching and conventional training is effective to reduce pain and improve functionsignificantly [7] (Fig. 1).

Case report

A 75-year-old women patient came to Abhinav Bindra Sports Medicine and Research Institute with a complaint of pain in the middle and ring finger of the right hand while making a fist along with pain while opening the fist since the last 10 years with a popping sensation in both the middle and ring fingers and difficulty in gripping in the last 3 months. She was alright before 10 years when gradually she felt discomfort in the middle finger and took painkillers on the advice of an orthopedician. She also took homeopathic medication, but no relief was obtained. Five years ago, she developed similar symptoms in her ring finger which limited her gripping activities at home. The pain increased gradually over the years, and in the last 3 months, she developed a clicking/popping sensation while opening a fist with more increase in pain and discomfort which led her to use her left hand for all the gripping activities and avoid using the right hand. She then visited an orthopedic surgeon who recommended her for surgery and prescribed painkillers. Investigations showed a negative Rh factor. Any X-ray and MRI were not advised. The patient had a history of hypothyroidism for 7 years and she is on medication for the same. The patient is a housewife who is doing gardening for 5–6 h a day for the last 15 years. The patient then reported to our department. Assessment of the pain showed a gradual onset of dull aching type intermittent in nature. Gripping activity aggravates the pain and rest relieves her symptoms. On observation, the patient is having difficulty straightening her middle and ring fingers on the table (Fig. 2). On palpation, the patient has tenderness grade 1 on the middle interphalangeal joint of the middle finger and grade 2 on the middle interphalangeal joint of the ring finger. The most tender area on the ring and middle fingers was appreciated as the nodule/trigger point. On examination, the flexion range of motion of the middle interphalangeal joint of the middle and ring finger was limited by 10° on the ring finger and 15° on the middle finger. The range of motion recorded was middle finger 0–95° and ring finger 0–100°; PIP and DIP flexion and finger extension range were full in both the middle and ring fingers. Muscle power was assessed by MRC grading of manual muscle testing. The recordings are as follows: right finger flexor (flexor digitorum superficialis) of the middle finger is 4 and of the ring finger is 3+. Joint play movements testing revealed hypomobility. AP and PA glide of the middle interphalangeal joint of both the middle finger and ring finger were reduced. Joint play movements at the distal IP joint and MCP joint were normal.

Fig. 2 Pre-intervention observation of trigger finger of the right palm

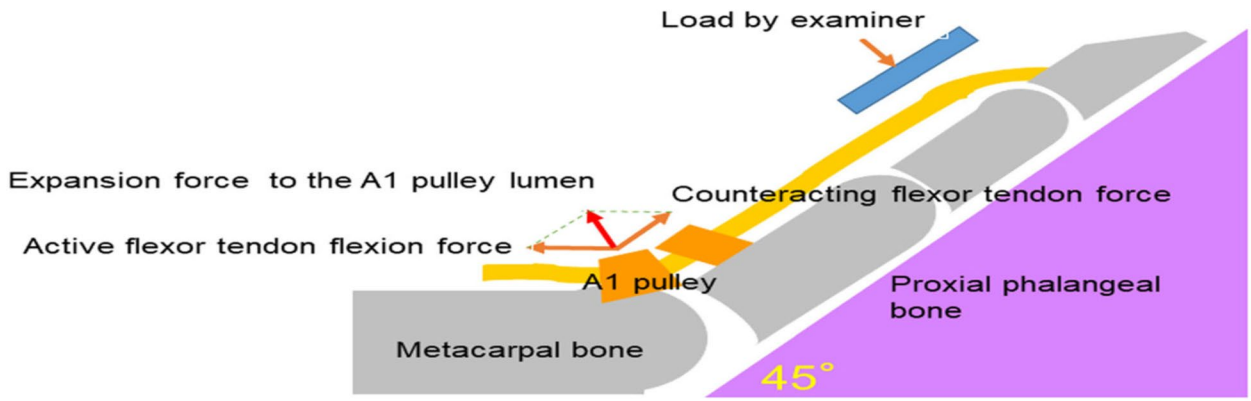

Fig. 1 A1 pulley. Taken from Shinya Tanaka et al. in 2021 [7]

Table 1 Pre-post score of the case for pain and functional disability

Outcomes	NRPS	PRWE scale
Baseline score	6	67.5%
7 days after intervention score	3	38.5%
15 days after intervention score	0	10.5%

To assess pain and disability in the activity of daily living, the "patient-rated wrist/hand evaluation" (PRWE) scale [8] was used. The baseline score recorded was 67.5% (Table 1).

The Quinnel grading [9] of the trigger finger was used to rate the severity of trigger finger. The scale recorded a grade of 4 (intermittent locking, actively correctable) in our subject. To differentiate this case from Dupuytren's contracture, a Hueston tabletop test was done which came negative, and to differentiate this case from rheumatoid arthritis, screening of other joints and blood examination were done, which showed Rh factor negative.

From the above history and clinical findings, a conclusion was reached for a case of trigger finger.

Based on tissue recovery time (7 days), 2 weeks was thought to be effective enough for the intervention using a combined approach primarily focusing on pain reduction and restoration of activity of daily living. Azizan et al. have shown 1 week of dry needling is effective. For follow-up, 2 weeks were taken [6].

Physiotherapeutic intervention

A 2-week advanced and conventional physiotherapy program was planned. Conservative management was aimed at reducing pain and improving functional activities. Baseline scores of pain and disability were measured by NPRS (primary outcome measure) and PRWE (secondary outcome measure).

Conventional technique

For pain reduction contrast, the bath method was used for 15 min, to improve mobility anterior–posterior (A-P) and posterior-anterior (P-A) glide (grade 2 mobilization) of the middle interphalangeal joint (10 repetitions, 2 sets, 15-s rest) [10], therapeutic ultrasound [11] (in pulse mode 1w/cm^2 for 8 min over the flexor tendon of middle and ring finger with a hand resting on a pillow and fingers slightly abducted) and tendon gliding exercise 10 repetition 3 set twice daily was given [12]. Tendon gliding exercises performed were rest, straight, hook, full fist, tabletop, and straight fist. Along with the conventional technique, the advanced technique of A1 pulley stretch and dry needling was also given.

A1 pulley stretch

The subject was made to sit in a comfortable sitting position on a chair with the right palm placed over the couch. The patient's middle and ring finger were placed on a wooden block alternatively at an angle of 45° each. The subject was asked to flex the ring or middle finger, and simultaneous resistance was given by the therapist producing an isometric contraction of the finger flexors of the middle and ring fingers. The intervention was given for 10 repetitions 3 sets for a total of 30 contractions with 15-s rest once daily for 2 weeks for a total of 14 sessions [7] (Fig. 3).

Dry needling

Two sessions of dry needling with disposable stainless steel needles (0.25×13) were inserted over the nodule in A1 pulley anatomical location. We used a fast in fast out method of dry needling with the needle inserted at a 45° angle at the level of the nodule giving the appearance of a cone shape. The insertion of the needle into the tendon was confirmed by observing the movement of the needle while the subject flexed and extended the distal phalanx [6] (Fig. 4). During the procedure, the hand of the subject was cleaned with isopropyl alcohol and the therapist used latex gloves during the procedure. To avoid needle stick injury, disposal was done in an appropriate sharp container. Care was taken not to insert the needle on the joint but on the nodule of the trigger finger.

Results

We used a mixed approach for treating trigger finger conservatively. After 2 weeks of training the pain scores measured by NPRS reduced from 6 to 3 in the 1st week and 0 in the second week. Similarly, the PRWE scale showed and reduction in activity limitation from 67.5 to

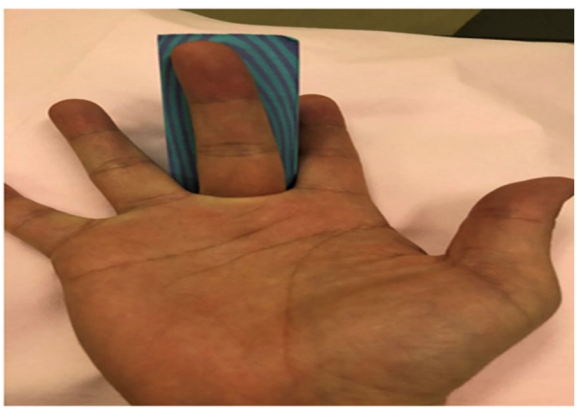

Fig. 3 A1 pulley stretch in 45° of flexion metatarsophalangeal joint; the wooden block was placed at a 45° angle to maintain the position throughout the treatment

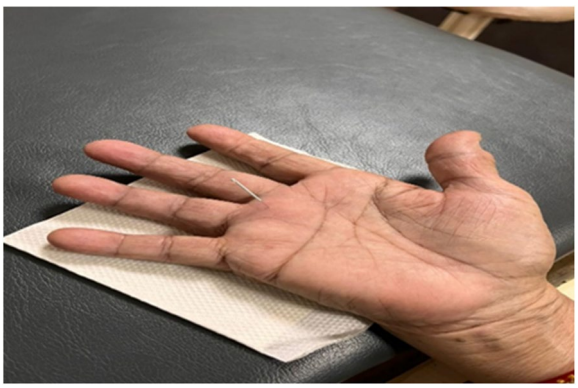

Fig. 4 Dry needling of A1 pulley

Fig. 6 Post-intervention observation of trigger finger of the right palm

38.5% in the 1st week and 10.5% in the second week. The baseline scores and post-intervention scores after the 1st week and 2nd week are given in Table 1 and Fig. 5. No adverse effects were found during or after the treatment.

Discussion

The results of this case study found improvement in a chronic trigger finger case with conservative and advanced physiotherapy techniques (Fig. 6). In conservative management, ultrasound sound wave causes tissue vibration, creating heat in tissue, increasing blood flow in the tissue, and removing inflammatory exudates [12–14]. Contrast bath use increases blood flow by the contraction and relaxation of the blood vessels which helps to reduce pain [12]. Along with the conservative treatment, an advanced technique such as A1 pulley stretching and dry needling was applied. A1 pulley stretching is a beneficial treatment of trigger finger that helps to increase the cross-sectional area of the A1 pulley luminal region, releasing the tension over the tendon and allowing its movement freely within the tendon sheath. A previous study suggested A1 pulley stretching improves 31.4 to 43.6% cross-sectional area respectively which helps to reduce the symptoms of trigger finger [7]. The improvement in the scores of patients rated wrist hand evaluation (PRWE) could have been the results of the A1 pulley stretch. This study also found improvement in NPRS scores for pain. This significant decrease in pain after 2 weeks of intervention could be due to the central effect of dry needling (i.e., activation of various sensory pathways and noxious inhibit control system resulting in neuromodulator in pain signaling). It also activates spinal segmental pain inhibitory and descending pain control pathways. Needle manipulation stimulates the release of endogenous opioids which is a mechanism of pain suppression in the periphery and spinal cord level secondary to needling treatment. Dry needling also has been shown to reduce the thickness of the flexor tendon after 1 week of dry needling. This study also found similar results where following 2 weeks of dry needling, improvement in the PRWE scores was seen [6]. The reduction in pain scores measured by NPRS and disability scores measured by the PRWE scale can be attributed to a combined effect of the abovementioned mechanisms. Ultrasound

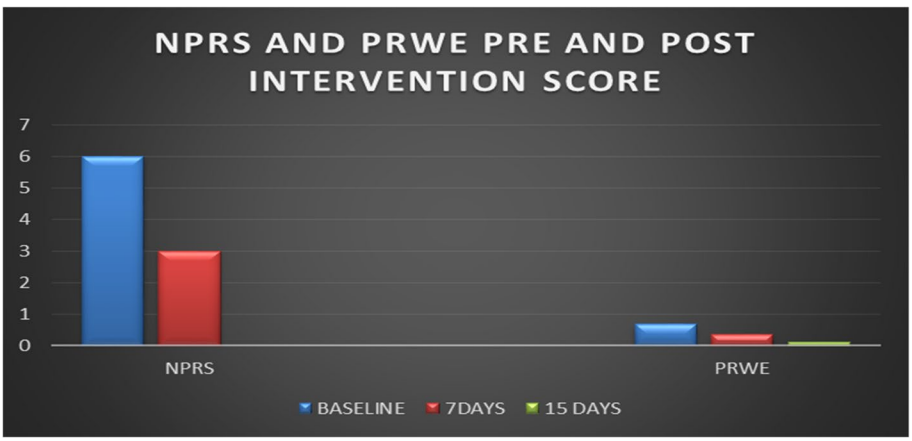

Fig. 5 Pre- and post-NPRS and PRWE scores

and contrast bath by vasodilatation helped in removing inflammatory exudates and dry needling activated the pain gate mechanism thereby reducing pain whereas A1pulley stretch decreased the tensile force thus allowing movement and reducing disability. The major limitation of this study was follow-up was not assessed after post-intervention. The findings of this report can also be used in trigger thumb. Further studies with a controlled group with a larger sample size can be conducted for better evidence. Long-term follow-up should be taken to the consistency of the treatment.

Conclusion

The results of this study found the combination of two advanced techniques A1 pulley and dry needling along with conventional physiotherapy is better than any technique alone in managing a chronic case of trigger finger. More studies should be conducted in the future using these techniques in acute conditions as well.

Abbreviations

TF	Trigger finger
NRPS	Nottingham Rating Pain Scale
PRWE	Patient-rated wrist/hand evaluation
OPD	Outpatient department
PA	Posteroanterior
AP	Anteroposterior
MRC	Medical Research Council

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Authors' contributions

We affirm that the submission represents an original work that has not been published previously and is not currently being considered by another journal. Also, we confirm that each author has seen and approved the contents of the submitted manuscript. This work was carried out in collaboration with all authors. AS designed the study and wrote the protocol. SS wrote the first draft of the manuscript. CM managed the data collection for the study. All authors read and approved the final manuscript.

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Availability of data and materials

The data collected and/or analyzed during the study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The study was done at Abhinav Bindra Sports Medicine and Research Institute, Bhubaneswar. Prior to this study, ethical clearance was taken from the ethical committee of the institute, and consent was taken from the patient. The study is not a clinical trial, so no clinical trial registration has been done. Prior to the start of the study, each procedure has been explained to the patient, and written consent has been taken for the same.

Consent for publication

The informed written consent form was signed by the patient before participation in the study and agreed to the publication of the treatment results.

Competing interests

The authors declare that they have no competing interests.

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