

The conservative treatment of Trigger Thumb using Graston Techniques and Active Release Techniques®

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Objective: *To detail the progress of a patient with unresolved symptoms of Trigger thumb who underwent a treatment plan featuring Active Release Technique (ART) and Graston Technique.*

Clinical Features: *The most important feature is painful snapping or restriction of movement, most notably in actively extending or flexing the digit. The cause of this flexor tendinopathy is believed to be multifactorial including anatomical variations of the pulley system and biomechanical etiologies such as exposure to shear forces and unaccustomed activity. Conventional treatment aims at decreasing inflammation through corticosteroid injection or surgically removing imposing tissue.*

Intervention and Outcome: *The conservative treatment approach utilized in this case involved Active Release Technique (ART®) and Graston Technique (GT). An activity specific rehabilitation protocol was employed to re-establish thumb extensor strength and ice was used to control pain and any residual inflammation. Outcome measures included subjective pain ratings with range of motion and motion palpation of the first right phalangeal joint. Objective measures were made by assessing range of motion.*

Conclusion: *A patient with trigger thumb appeared to be relieved of his pain and disability after a treatment plan of GT and ART.*

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Objectif : *Pour consigner le progrès d'un patient souffrant de symptômes non résolus du Pouce à ressort, qui a subi un plan de traitement au centre duquel on retrouvait la technique Active Release® et la technique Graston.*

Caractéristiques cliniques : *La plus importante caractéristique s'exprime par la détente brusque ou la restriction de mouvement, plus particulièrement dans l'extension ou dans la détente du pouce. On croit que la cause de la tendinopathie du fléchisseur superficiel est plurifactorielle, comprenant notamment des variations anatomiques du système de fermeture ou d'étiologie biomécanique, que ce soit une exposition à une très grande force et à une activité inhabituelle. Le traitement conventionnel vise à résorber l'inflammation par l'injection de corticostéroïde ou à procéder par chirurgie pour enlever le nodule tendineux.*

Intervention et résultat : *Dans ce cas, l'approche d'un traitement prudent consiste à utiliser la technique Active Release® et la technique Graston (GT). Un protocole de rétablissement d'activité spécifique a été utilisé pour rétablir la force d'extension du pouce et on s'est servi de la glace pour contrôler la douleur et atténuer toute inflammation résiduelle. L'indicateur des résultats a compris des cotes subjectives de classification de la douleur avec différents mouvements et la palpation de la première jointure à droite. Les mesures objectives ont été effectuées en évaluant la portée du mouvement.*

Conclusion : *Un patient affecté d'un Pouce à ressort semble être soulagé de la douleur et de son handicap après un traitement aux plans GFT et ART.*

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KEY WORDS: AA1 pulley, Active Release Technique, Graston Technique, flexor tendinopathy, trigger finger, trigger thumb, metacarpophalangeal joints.

Introduction

Entrapment of the flexor digitorum superficialis or flexor digitorum profundus tendon along its course through fibro-osseous tunnels of the wrist, palm and digits of the hand results in a disorder known as trigger finger.^{1,2} Commonly, trigger finger occurs in the first digit and may be characterized by catching, locking, and painful snapping as the thumb is moved from flexion to extension. This involves the flexor pollicis longus muscle (see Figure 1) and is referred to as trigger thumb.¹ Onset is usually gradual, attributable to repetitive tasks, unaccustomed activity or compression of the pulley against hard objects. Some cases may also follow an acute trauma which may result in unwanted scarring such as seen with carpal release surgery. Snapping, clicking, locking, stiffness, and difficulty extending a flexed digit, often with discomfort or pain, are the most prominent symptom qualities.^{2,3} The flexor tendons of the hand are surrounded by double layered synovial compartments filled with synovial fluid, the deep layer is the visceral layer and contacts the tendon, the second, more superficial, layer is called the parietal layer. On the flexor side of the parietal layer, are ligamentous annular and cruciate pulleys that tether down the flexor tendon to the osseous structures of the hand. There are four annular pulleys, A1 which is most proximal and attaches to the head of the metacarpals to A4 which attaches to the distal portion of the middle phalanx (see Figure 1). Accordingly the cruciate ligaments are labeled as C1–C5 from proximal to distal as well. Entrapment may occur at various locations, the most common being at the site of the A1 pulley and the palmar aponeurosis pulley. Both may result from the fibrous thickening of the pulley or tendon characterized by granulation tissue and mucopolysaccharide accumulation or fusiform swelling of the tendon.^{2,4}

Trigger finger and trigger thumb, are common conditions with a reported prevalence of 2% up to 20%.^{1,2,5} Generally, trigger finger affects women more than men and the age distribution is bimodal with one group below six years of age and the other in their fifth and sixth decade of life.² Flexor tendon entrapment of the digits commonly

MOTS CLÉS : AAI, extension, technique Active Release, technique Graston, tendinopathie, doigt de détente, pouce à ressort, jointures métacarpo-phalangiennes.

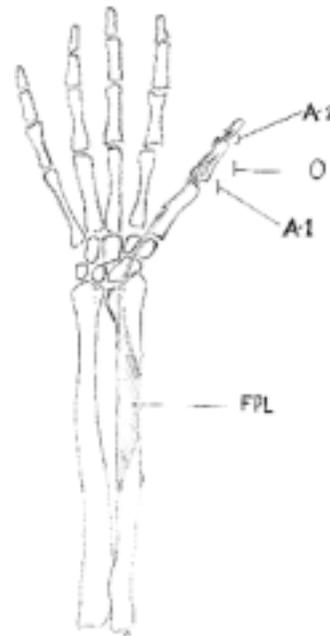


Figure 1 Flexor Pollicis Longus muscle (FPL), A-1 pulley (A-1), A-2 pulley (A-2), Oblique pulley (O).

presents with concurrent conditions including epicondylitis, peritendinitis, Dupuytren's contractures, de Quervain's tenosynovitis, and wrist fractures. Furthermore several studies suggest that individuals with insulin dependent diabetes, rheumatoid arthritis, carpal tunnel syndrome, arthritic changes in the wrist, hypothyroidism, mucopolysaccharidoses, amyloidosis, and congestive heart failure may be predisposed to flexor tendon entrapment.² The research on patients with trigger finger indicates various methods of treating patients including splinting, nonsteroidal anti-inflammatory agents, percutaneous injection of corticosteroids, and surgical release.^{1,5,6} Several of the aforementioned treatments are invasive and involve risk of radial digital nerve injury, tenolysis, infection and persistence.^{1,5,7} The purpose of this case report was to report on a patient with painful trigger thumb and limited function who underwent chiropractic treatment using Active Release Technique and Graston Technique.

Case report

This case report involves one male 42-year-old subject who had a clinical diagnosis and diagnostic ultrasound verification of trigger finger. The patient was a walk-in patient at a multidisciplinary sports medicine clinic. The subject presented with a moderately painful right thumb with restricted motion. The subject had an inability to actively flex and extend the right thumb, passive motions consistently produced pain and clicking. Palpation of the A1 pulley and joint play of the distal interphalangeal joint reproduced/exacerbated the reported pain. Palpable adhesions were noted in the flexor pollicis longus tendon of his right thumb. The subject reported he could previously extend the thumb all the way back to his forearm. The onset was gradual over the previous week and he did not experience any other symptoms, illnesses or co morbidities that could be associated with trigger finger. A previous diagnosis of trigger thumb was suggested by his sports medicine physician who suggested a corticosteroid injection. The diagnostic ultrasound report revealed a severe tenosynovitis involving the flexor pollicis longus of the right thumb, and a prominent thickening of the A1 pulley of the thumb measuring approximately 5mm. Upon real-time evaluation, the technologist noted triggering in keeping with a trigger finger. Bony proliferative changes were seen within the subjacent distal interphalangeal joint, however no cystic or solid mass was seen in this area. The left side was normal in comparison. Clearly, the diagnostic imaging impressions were consistent with a trigger thumb on the right side.

Treatment

The patient was treated with ART (see Figure 2), and Graston technique by a certified provider (see Figure 3 and 4), followed by ice post-treatment. In addition the patient was advised to self mobilize the thenar eminence and 1st digit.

Results of treatment

There were 8 treatment sessions that were performed on the subject over a 4-week time period. After the first treatment involving ART and Graston technique, the subject had increased range of motion (ROM), however moderate pain was still present at end range. Specifically, there was no clicking with flexion or extension and the extension of the thumb was restored to full range. After the third treat-



Figure 2 ART of 1st right metacarpophalangeal joint capsule.



Figure 3 Graston Technique performed on 1st right metacarpophalangeal joint capsule volar surface.



Figure 4 Graston Technique performed on 1st right metacarpophalangeal joint capsule dorsal surface.

ment, there was minimal pain upon palpation and the ROM was full without pain. The patient reported to be utilizing his stick shift handle in his car to help self mobilize. By the sixth treatment, there was full pain free ROM and only minimal pain at the capsule with deep palpation, although some weakness/fatigue was becoming evident with repeated flexion. Flexor pollicis longus was rated a 4/5 (patient could hold the position against strong to moderate resistance with full range of motion). At this point the subject reported that he was able to perform all activities of daily living. At the seventh treatment, ROM remained full with no recurrence of pain, snapping, or clicking. There was still some mild residual pain at the right capsule of the interphalangeal joint but less than previous. By the eighth treatment, there was no pain and only slight irritation at the capsule in full flexion when forced. There was mild weakness (4/5) present as noted in the previous visit but no palpable adhesions were present. The patient had full normal range of motion restored in the right thumb with no pain. The subject was given “theraputty” and released with thumb exercises (flexion, extension, abduction & adduction) to continue on with strengthening at home. Two months after discharge and 14 months after discharge, he was contacted by telephone and he reported no re-aggravations or further complications, with complete resolution and increased strength to pre-injury status.

Discussion

Trigger thumb is known as a disorder characterized by snapping or locking of the thumb. Most cases are secondary to thickening of the digit's A1 pulley, but other pulley sites, the metacarpophalangeal joint or the carpal tunnel can be involved. As a result, a consideration of these areas and surrounding tissues is reasonable and should be considered in a complete assessment.

Digital tendon flexor sheaths have a membranous synovial component and a ligamentous retinacular component. The ligamentous retinacular component is called the pulley. There are two types: a cruciate pulley and an annular pulley. The annular pulleys undergo the greatest stress from the flexor tendon.² The most proximal annular pulley is called the A1 pulley and is 5mm proximal to the metacarpal phalangeal joint, distal to this are pulleys A2, A3 and A4. The pulleys possess two layers. The outer vascular layer is a dense capillary network, and the inner is composed of dense collagen bundles with spindle

shaped fibroblasts;¹ this avascular layer is nourished by diffusion from the synovial fluid. When injured, the pulleys have been observed to possess thick and fibrous tendon sheaths, and exhibit nodular and fusiform swelling covered with granulation tissues.² The tissue displays increased chondrocytes, and increased glycosaminoglycans, with proliferation of fibrous tissue.⁸ Because of these changes, there is decreased space for the flexor tendon to pass under the pulleys and it becomes trapped.

Graston Technique®, also referred to as an augmented soft tissue mobilization technique, employs specially designed stainless steel instruments with beveled edges to augment a clinician's ability to perform soft tissue mobilization. The instruments are utilized in a multidirectional stroking fashion applied to the skin at a 30°–60° angle at the treatment site. This application allows the clinician to detect irregularities in the soft tissue texture through the undulation of the gliding tools.⁹ In addition to removing scar tissue adhesions, Graston Technique® is proposed to enhance the proliferation of extracellular matrix fibroblasts, improve ion transport and decrease cell matrix adhesions.¹⁰ Augmented soft tissue mobilization has been suggested to be useful in the treatment of chronic ankle fibrosis and to loosen tight patellar retinaculum.¹¹

Graston Technique® and ART techniques have been proposed to remove adhesions, and promote the restoration of normal tissue texture. Good results for these treatment goals using Graston Technique® and ART techniques have been shown in the resolution of conditions including lateral epicondylitis,¹² overuse syndromes¹³ and carpal tunnel syndrome.¹⁴ It follows that the treatment of trigger thumb using these techniques on the pulley structures of the flexor tendon, the carpal tunnel and surrounding tissues is both appropriate and reasonable.

Active Release Technique is designed to accomplish three unique objectives: restoring free and unimpeded motion of all soft tissues, the release of entrapped nerves, vasculature, and lymphatics, and to re-establish optimal texture, resilience, and function of soft tissues.¹⁵

It is suggested by the authors that this protocol be completed before surgical intervention is attempted. Treatment should be initiated at the onset of symptoms or at the earliest time available. Symptom and objective improvement is often evident in the first to third treatment.¹⁵ A 50% improvement within this timeframe is common and may be expected.¹⁵

The chronic nature of the symptoms associated with trigger finger makes conservative treatment difficult and often frustrating. Still conservative care is always recommended as a treatment plan prior to surgical intervention.^{4,12,13,14,16,17} Complications of surgery of tendon reconstruction include synovitis around the implant, infection or wound breakdown, disruption of the distal implant juncture, and flexion deformity of the proximal or distal interphalangeal joint.¹⁸ Adhesions may also develop as a result of the surgery, which may prevent a successful recovery of the digital motion and may require tenolysis.^{1,7, 8,18} Contractures may also develop during the post-operative phase.¹⁸ Open surgical release of trigger thumb has a repeated success rate of between 97–100% but may be complicated by nerve damage.⁵

Other research indicates that modalities such as ultrasound, heat, and massage can help control pain by affecting the local metabolism of the involved sites by resolving local edema by breaking up proteoglycan bonds that hold water.^{4,12}

Corticosteroids have been shown to be effective in the first two weeks of treatment but the patients improvement deteriorates by 3 months (failure rate of 41%).¹² Percutaneous trigger thumb release with a hypodermic needle combined with steroid injection had a higher success rate (91% than steroid injection alone 47%).^{19,20}

Active Release Technique has had a 71% success rate, measured subjectively in an observational study treating lateral epicondylitis and carpal tunnel syndrome.⁴ After 4 weeks of treatment with ART, 50% of patients being treated for a tendinopathy were discharged.¹³

Overall, published research studies do not favor any particular type of treatment for the resolution of trigger thumb. There is not sufficient scientific evidence to favor any particular type of treatment for a flexor tendinopathy. Non-operative treatment has been deemed highly successful in clinical practice and is preferable over surgery. Research efforts should focus on demonstrating the most cost-effective and least invasive treatment options for patients with a flexor tendinopathy.

The results of this study demonstrate improvements in range of motion, pain and function within 8 treatments using ART and Graston techniques on the flexor pulleys and flexor pollicis. Subjectively the patient felt better and was satisfied with the outcome.

Conclusion

Trigger Thumb is a condition characterized by fibrocartilagenous metaplasia and hypertrophy of the surrounding structures of the flexor tendon resulting in a painful and debilitating restriction of motion. The causes of this flexor tendinopathy are believed to be multi-factorial including anatomical variations of the pulley system and biomechanical etiologies including exposure to shear forces and unaccustomed activity. Conventional treatment aims at decreasing inflammation through corticosteroid injection or surgically removing imposing tissue. Both of these alternatives are invasive, and current research reveals that inflammation may not be significant factor in the development of this condition. Adhesions and nodules can be evaluated clinically at several locations along the flexor tendon and confirmed with diagnostic ultrasound. In this case, a patient with trigger thumb appeared to be relieved of his pain and disability with increased range of motion after having eight treatments of ART and Graston technique. As a result, a prospective study to investigate these soft tissue mobilization techniques is warranted.

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