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Therapy options for Trigger Finger: Conservative Treatment vs. Surgery

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ABSTRACT

Introduction

Trigger finger, also referred to as trigger finger syndrome, is a condition caused by inflammation of the flexor tendons of the fingers and digital pulleys, resulting in pain and restricted movement. This issue affects numerous individuals, particularly the elderly and those who perform repetitive hand motions.

Aim

The aim of this study is to explore and compare the available treatment options for trigger finger, including rest, splinting, anti-inflammatory medications,

physical therapy, steroid injections, and surgical interventions. Both conservative and surgical approaches have their advantages and limitations, and their effectiveness varies depending on the individual patient's response.

State of Knowledge

Medical literature describes a variety of treatment methods, ranging from pharmacological approaches and physical therapy to steroid injections and, in more complex cases, surgical interventions. Conservative treatment, often the initial approach, aims to alleviate symptoms and can be effective in the early stages of the condition. Surgery, on the other hand, is considered when conservative treatment fails or in more advanced cases.

Summary

The choice of treatment for trigger finger should be tailored to the individual needs of the patient and the severity of the condition. Conservative therapy is effective in the early stages but does not always provide long-lasting relief. Surgery, although more invasive, is typically effective in advanced cases and often leads to a quicker restoration of full finger function.

Keywords: Trigger finger disorder; Stenosing tenosynovitis; Snapping finger; Corticosteroid injection; Conservative treatment; Surgery

INTRODUCTION

Definitions

Trigger finger (TF), also referred to as snapping finger or stenosing tenosynovitis, is a condition caused by inflammation of the annular ligament of the flexor tendon sheath (Ryzewicz & Wolf, 2006). In most cases, it affects the ring finger and thumb, while the middle, index, and little fingers are less frequently involved. This condition is not trauma-related but is characterized by

the formation of a nodule on the flexor tendon. The main causes are repetitive finger movements, localized injuries, or an abnormal healing process. As a result of tissue thickening around the tendons responsible for finger flexion, movement becomes restricted (Vasiliadis & Itsiopoulos, 2017). The hallmark of the condition is the sudden locking during finger flexion or extension, followed by a sharp release when the obstruction is overcome. This leads to pain and the characteristic "snapping" sensation when attempting to extend the finger (Durand et al., 2011).While some researchers define TF as stenosing tenosynovitis, studies show that inflammation is not always present, nor is the involvement of the tendon or its sheath mandatory. Although pathological changes most often occur in the A1 pulley, they can also be found in other areas, and in some cases, the A1 pulley remains intact, with only the tendon being affected (Shohda & Sheta, 2024). The exact cause of trigger finger is not fully understood, but it is believed to result from degenerative processes, aging, daily stress, and metabolic disorders. Mechanical causes include repetitive finger motions, microtraumas, and compression of the A1 pulley (Merry et al., 2020).

Epidemiology

The annual incidence of trigger finger (TF) is reported to be 28 cases per 100,000 people, with a total prevalence of 2.6% in the general population (Gil et al., 2020). This condition is more commonly seen in individuals with diabetes, hypothyroidism, and less frequently, gout. It is also associated with rheumatologic diseases such as rheumatoid arthritis and psoriatic arthritis. Patients with trigger finger are more likely to experience related conditions, including carpal tunnel syndrome, De Quervain’s disease, and Dupuytren’s contracture (Vasiliadis & Itsiopoulos, 2017).

The prevalence of TF among diabetic individuals is estimated to range between 5% and 20%, compared to 2% to 3% in the general population (Kuczmarski et al., 2019). Research suggests that in 70% of cases, the dominant hand is affected,

followed by the non-dominant hand, with both hands being involved in only 5% of cases. Additionally, the condition is significantly more common in women than in men (N. et al., 2021).

Symptoms

Patients typically report pain or a snapping sensation near the metacarpal head, making it difficult to grasp and hold objects. In more advanced cases, symptoms such as finger locking and limited mobility in the metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints may occur (Ryzewicz & Wolf, 2006). In the early stages of trigger finger (TF), patients may experience swelling and tenderness when pressing on the A1 pulley, while those presenting later often develop a palpable nodule and noticeable snapping during finger flexion and extension, which worsens when pressure is applied to the A1 pulley. In cases of early-stage trigger thumb, symptoms are usually confined to the proximal interphalangeal joint (Johnson, 2021).

Diagnostics

The diagnosis of trigger finger (TF) relies on a detailed patient history and physical examination. The physician will often palpate the palm, particularly over the A1 pulley at the base of the affected finger, where tenderness or a palpable nodule can be found. During the examination, the patient may be asked to flex and extend the affected finger, which can reveal the characteristic snapping motion that gives the condition its name. If the condition is severe, the finger may remain locked in place, requiring manual force to release it. Ultrasound can be used to assess potential changes at the tendon-ligament junction, which may aid in confirming the diagnosis (Cavalcanti Kußmaul et al., 2023). Ultrasound analysis of the thickened tendon sheath compared to healthy sheaths in the same hand has shown similar accuracy to direct measurements

taken during surgery. The degree of thickening seen in ultrasound correlates with the severity of symptoms (Bianchi et al., 2019). While not commonly required for diagnosing trigger finger, MRI may be useful in complicated cases or where other differential diagnoses are being considered. Although there is no universally accepted classification system for trigger finger, several models are useful for assessing the severity of the condition. The Quinnell classification and the modified Green's classification are commonly used in research, although neither is considered the gold standard (Matthews et al., 2019). Several conditions can mimic trigger finger symptoms, and it is crucial to rule these out during the diagnostic process. These include: Dupuytren's contracture, De Quervain's tenosynovitis, Arthritis, Carpal Tunnel Syndrome (Gil et al., 2020).

Anatomy

The flexor tendon sheath system of the fingers is a complex structure that plays a crucial role in the proper functioning of the flexor tendons. It consists of two main components: the deep synovial layer and the superficial fibrous sheath (Moutet, 2003). These sheaths, composed of dense fibrous tissue, surround the flexor tendons, forming a channel that stabilizes them(tendons) near the phalanges. This arrangement allows for effective transmission of force generated by the musculotendinous unit and maintains the flexor tendons of the hand in alignment with the joint axes (Doyle, 2001). In each finger, there are five annular pulleys (A1–A5) and three cruciate pulleys (C1–C3), which are arranged sequentially from proximal to distal (Lin et al., 1989). The A1 pulley is located over the metacarpophalangeal (MCP) joint, the A3 pulley over the proximal interphalangeal (PIP) joint, and the A5 pulley over the distal interphalangeal (DIP) joint. The cruciate pulleys, designated as C1, C2, and C3, are positioned between A2 and A3, A3 and A4, and A4 and A5, respectively. Proximal to the A1 pulley lies the palmar aponeurosis (Hauger et al., 2000). In the thumb, the pulley system has traditionally been described in terms of three

main components: A1, Ao (oblique), and A2. The A1 pulley is located over the MCP joint, while the Ao pulley extends from the proximal end of the proximal phalanx to its distal end, running obliquely toward the radial side. The A2 pulley is situated over the interphalangeal joint. More recently, a fourth pulley in the thumb, known as the variable annular pulley, has been identified, enhancing our understanding of the anatomy in this region (Zafonte et al., 2014).

Histology

The structure of the flexor tendon sheath consists of three distinct layers. The inner layer is avascular and may consist of one or two layers of cells, functioning as a sliding surface close to the flexor tendons (Lin et al., 1989). This layer contains cartilage-like cells and collagen fibers aligned parallel to the long axis of the finger. The intermediate layer is also avascular but thicker than the inner layer. It contains spindle-shaped fibroblasts, additional cartilage-like cells, and collagen fibers arranged orthogonally to the long axis of the finger. The outer layer, unlike the others, is well-vascularized and contains a rich network of capillaries (Doyle, 1988). Histological features of trigger finger include progressive fibrocartilage damage and vascular hyperplasia in the outer layer. The sliding surface of the affected pulley shows cracks, becomes thinner, and is gradually replaced by fibrous tissue. New vascular networks develop in the outer layer, leading to fibrocartilage infiltration (Schubert et al., 2012). Various histopathological changes can be observed in the diseased pulley, including irregularities in the connective tissue of the inner layer. Histological characteristics of the flexor tendons include separated, disorganized, and damaged collagen fibers, along with areas of excessive or reduced cell numbers and an increased amount of ground substance both around and between the collagen fiber bundles.(Doyle, 1989) Flexor tendons typically become swollen, and their cross-sectional shape appears more rounded compared to neighboring healthy tendons. While some studies report the presence of inflammatory cells in

the context of these histopathological changes, others do not, making it difficult to definitively classify trigger finger as a case of tendinous sheath inflammation (Schneider et al., 2019).

TREATMENT APPROACHES

Tabl 1. Comparison of Treatment Methods

(Amro et al., 2024; Ballard & Kozlow, 2016; Y.-P. Chen et al., 2021; Z. Chen et al., 2023; Diab, 2015; Ferrara et al., 2020; Fiorini et al., 2018; Fowler & Baratz, 2013; Gil et al., 2020; Huisstede et al., 2018; Iordache et al., 2023; Leow et al., 2021; Liang et al., 2023; Lunsford et al., 2019; Merry et al., 2020; Quinnell, 1980; Ryzewicz & Wolf, 2006; Sato et al., 2012; Tarbhai et al., 2012; Tye et al., 2023)

METHOD	DESCRIPTION	EFFECCTIVNESS	PRONS	CONS
Rest and ice packs	Limiting hand and finger movement, and using cold compresses	Effective mainly in early stages, less effective than other methods	Easy to implement, non-invasive, minimal risk of side effects	Short-term effect, addresses symptoms but not the root cause
Splints	Finger splints adjusted and used to prevent	Effective in symptom relief by stabilizing the finger and	Non-invasive method, helps	May restrict finger mobility, can be

	further damage and reduce symptoms	reducing tendon strain	prevent symptom aggravation, may replace more invasive treatments	uncomfortable, does not address the underlying problem, requires long-term use (at least 6 weeks)
Nonsteroidal anti-inflammatory drugs (NSAIDs)	Medications taken orally or applied topically	Effective in short-term pain relief and reducing inflammation	Easily accessible, effective in symptom relief	Long-term use can cause side effects such as gastrointestinal and kidney problems
Physiotherapy	Specialized exercises aimed at strengthening hand muscles and improving finger mobility	Supports conservative treatment, especially when combined with other methods like orthotics and splints	Improves mobility, reduces pain, supports the regeneration process	Effects may take time, requires regularity

Ultrasound kinesitherapy	Therapy using ultrasound to reduce inflammation and support tissue healing	Can relieve pain and accelerate healing in soft tissues	Non-invasive, painless method, can improve circulation and speed up recovery	Requires specialized equipment and regular therapist visits, effectivenes s varies depending on the case
Laser therapy	Laser treatment aimed at stimulating tissue regeneration and reducing inflammation	Effective in some cases in relieving pain and reducing inflammation	Non-invasive method, may speed up recovery	Requires regular therapy sessions, can be time-consuming and costly
Cryotherapy	Cold therapy aimed at reducing inflammation and pain by lowering the temperature in the affected area	Effective in reducing pain and inflammation, especially when combined with other methods	Easy to apply, can be used in both clinical and home settings	Short-term effect, does not address structural issues
Kinesio taping	Applying	Can support	Non-	Effectivenes

	special elastic tapes (taping) to improve circulation, stabilize, and reduce muscle tension	treatment by improving muscle and tendon function, but the effects are variable	invasive, easy-to-use method, may reduce pain and improve mobility	s varies by patient, requires regular application
Steroid injections	Injection of corticosteroids directly into the inflamed area	Very effective in short-term pain relief and reducing inflammation, often the first step before surgery	Quick results, reduces inflammation and improves mobility	Temporary effect, risk of recurrence, excessive steroid use can damage tissues
Tendon release under ultrasound guidance	This method uses ultrasound to precisely guide surgical tools to release the tendon, allowing for accurate localization of the affected part of the	Studies show that tendon release under ultrasound guidance is an effective treatment for trigger finger. Patient outcomes often indicate significant improvements in pain, mobility,	Minimally invasive, shorter recovery time, lower risk of complications, smaller scars	Requires specialized equipment, technical limitations, risk of symptom recurrence, requires surgical experience

	tendon and insertion of tools into the appropriate place	and finger function		
Percutaneous A1 pulley release	Involves inserting a needle or small scalpel through the skin near the A1 pulley without making a large incision to cut the A1 pulley and release the tendon	Highly effective with results close to open surgery, though slightly lower success rate (about 80-90%), faster return to normal activities	Minimally invasive procedure – no large incision, reduces infection risk and scarring, faster recovery compared to open surgery, can be done under local anesthesia in an outpatient setting	Higher risk of incomplete release of the pulley or damage to structures like nerves, no full visual control, slightly higher recurrence risk compared to open surgery, harder to perform in more complex cases

Open surgical A1 pulley decompression	Involves making a small incision near the metacarpophalangeal (MCP) joint to access the A1 pulley, which is then cut to release the locked flexor tendon	Considered a very effective method, providing a permanent solution, clinical success in about 90-100% of patients, relatively low recurrence rate compared to other methods	Long-term improvement in finger function, often with immediate symptom relief, full access to the A1 pulley allows precise and complete release, low recurrence risk, provides the surgeon with full control for visual assessment of anatomical structures	Involves a larger skin incision, which may lead to longer recovery, possibility of complications like infections, scarring, finger stiffness, or damage to nearby structures (nerves, blood vessels), requires local or general anesthesia and postoperative care

CONCLUSIONS

The treatment of trigger finger (TF) includes both conservative and surgical approaches, with the choice depending on the severity of the condition, the intensity of symptoms, and the patient's personal preferences. In the early stages of TF and with mild symptoms, conservative treatments such as immobilization, physical therapy, anti-inflammatory medications, and steroid injections can be effective. Steroids, in particular, help reduce inflammation and restore hand function, although their effects may be temporary, and recurrences are relatively common. Surgical intervention, which involves releasing the A1 pulley, is a reliable option for more advanced cases or when conservative methods have failed. Surgery offers long-term improvement, reducing the risk of recurrence, and is associated with a low complication rate and a short recovery period. In conclusion, both treatment options have value, but conservative therapy should be the first choice. If it does not yield the desired results, surgical treatment becomes the recommended alternative.

Disclosure

AUTHOR'S CONTRIBUTION

Conceptualization: F. Jasiński; methodology: I. Wiak; F. Czyżewski; software: K. Wojtach; check: F. Banyś, F. Czyżewski; formal analysis: K. Bochen, K. Pasierb, J. Szałajska; investigation: F. Czyżewski, A. Łukawski, I. Wiak; resources: K. Wojtach, F. Banyś; data curation: K. Bochen; F. Jasiński; writing-rough preparation: F. Jasiński, K. Pasierb, J. Szałajska; writing – review and editing: A. Łukawski, I.Wiak; visualization: F. Banyś,

A. Łukawski, K. Wojtach; supervision: F. Czyżewski, J. Szałajska; project administration: F. Czyżewski

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The authors deny any conflict of interest.

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