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Ultrasound-guided microinvasive trigger thumb release with an 18-gauge blade-tipped needle

A case series

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Abstract

Ultrasound (US)-guided trigger finger release provides comparable outcomes to open surgical release, yet there is a lingering concern for neurovascular injury specifically in the thumb due to its unique anatomy. This study evaluated the outcomes of patients undergoing US-guided trigger thumb release. A retrospective case series of patients undergoing US-guided trigger thumb release using an 18-gauge blade-tipped needle evaluated outcomes, including resolution of mechanical symptoms, improvement in pain and function, ability to return to daily activities, major or minor complications, and need for revision procedures. Twenty-eight patients (29 cases) with an average age of 59.2 (31–91 years, SD 11.8) met criteria and agreed to participate in the study. Average follow-up time was 3.4 years (1.0–5.9 years, SD 1.2) post-procedure. 100% of the patients reported complete resolution of mechanical symptoms. Average numeric pain rating scale and Nirschl scores were 0.2 (SD 0.5) and 0.1 (SD 0.3), respectively. 100% of patients were able to return to work and 96% were able to return to recreational activities. No major or minor complications (including neurovascular injuries) were reported. No patients required a revision procedure. US-guided trigger thumb release using a blade-tipped needle appears to be a safe and effective procedure when performed by an experienced provider. Further research will be needed to establish its generalizability and characterize comparative outcomes and risk-benefit profiles of this technique compared to open surgical trigger thumb releases.

Abbreviations: FPL = flexor pollicis longus, NSAIDs = nonsteroidal anti-inflammatory drugs, US = ultrasound.

Key words: percutaneous, trigger finger release, trigger thumb, ultrasound

1. Introduction

Trigger finger, also called stenosing tenosynovitis of the finger flexor tendons, is a common cause of hand pain and morbidity, affecting over 200,000 individuals annually in the United States.[1] Prevalence is highest among females between 40 and 60 years old. There is a 2% to 3% lifetime risk of developing a trigger finger, which increases to 10% in individuals with diabetes.[2,3] Thumbs, specifically, are among the most affected digits.[4] Trigger thumb typically occurs when an individual develops inflammation of the flexor pollicis longus (FPL) tendon and flexor tendon sheath, leading to a size mismatch that causes painful mechanical catching and locking of the tendon at the A1 pulley, interfering with basic hand function.

While trigger thumbs usually respond to conservative treatment plans that begin with nonsteroidal anti-inflammatory drugs (NSAIDs), finger night splints, corticosteroid injections, and a hand therapy rehabilitation program,[1] many cases do not obtain significant clinical improvement with this approach. Refractory cases require an intervention in the way of a release, which consists of splitting the A1 pulley and tendon sheath such that the inflamed tendon can move freely. Doing so in the thumb is uniquely complicated by the neurovascular anatomy of the radial digital nerve that crosses from medial to lateral over the FPL tendon near the site where the A1 pulley is located, placing it at risk for injury during release.[5–9]

Traditionally, open trigger thumb releases have been the treatment of choice for those refractory to conservative management, however it is associated with elevated costs, long recovery times, and potential complications from the incision, including injury to the digital nerve and, less commonly, vascular injury, wound infection, and palmar scar hypertrophy, among others.[9,10] Awareness of the risk of neurovascular injury with open trigger release of the thumb increased around 30 years ago from clinical reports of radial digital nerve injury from transverse incisions near the metacarpophalangeal joint crease during open surgical procedures.[9] Cadaveric studies

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The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

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further emphasized the anatomic proximity of the neurovascular bundles and the uniquely oblique course of the radial digital nerve over the incised A1 pulley and flexor tendon sheath.[6,8,9] To address some of the issues with traditional surgical trigger finger releases, percutaneous trigger finger releases were developed, which improved upon certain aspects of open releases. These were associated with decreased morbidity and cost with more rapid return to function, however the risk of neurovascular injury posed by the unique anatomy of digital radial nerve was still present.

Percutaneous releases have been performed in the outpatient setting for the treatment of other trigger fingers as more cost-effective, less invasive, and comparably-successful options since their introduction by Lorthioir in the mid-20th century.[11,12] A study by Gancarczyk and colleagues comparing the cost-effectiveness of open and percutaneous trigger releases – factoring in the 6 days less of missed work associated with percutaneous releases compared with open releases – found percutaneous releases performed in-office to be half of the cost of primary open release in an ambulatory surgical center and a third of the cost of an open release performed in the hospital setting.[12] However, despite excellent results in other fingers, proposed percutaneous techniques have not been nearly as successful in the thumb. Specifically, percutaneous trigger thumb release techniques guided by anatomical landmarks alone have been associated with rates of digital nerve injury ranging from 3% to 6% and residual pain ranging from 14% to 16%.[4,6–8,12–15]

With the introduction of musculoskeletal ultrasound (US) and its increased use for interventional procedures, US-guided percutaneous releases of trigger fingers in other digits were developed. However, the same concerns over neurovascular injury have limited their adoption for trigger thumb releases in particular.[16] Microinvasive US guided trigger finger releases with a wide range of specialized minimally invasive instruments have been proposed as safer and more effective alternatives to a blind landmark-guided procedure, however many of these instruments may not be readily available for most providers. Our group's previous experience with performing trigger finger releases using standard issue inexpensive non-coring 18-gauge blade-tipped needles (Fig. 1) normally used in clinics for drawing up medications has shown it to be a safe and accurate technique[17,18] in digits other than the thumb. Use of this blade-tipped needle that functions as a "micro" scalpel under US guidance in combination with 3 tests for confirming release of the trigger finger anecdotally improved effectiveness of the release.[17,18] Additionally, eliminating the need for repeated fenestration usually needed to achieve a full release with standard 18-gauge needles could decrease the risk of damage to surrounding anatomy. US imaging allows direct intraprocedural visualization of the A1 pulley, and the musculoskeletal and neurovascular structures, including the radial digital nerve.[16–22] Despite this, longstanding concerns over neurovascular injury and perceived technical difficulty have slowed the clinical adoption of microinvasive releases specifically for thumbs.[4,14,16,23]

The objective of this study was to evaluate the outcomes of patients with trigger thumbs treated with the US-guided trigger finger release technique using an 18-gauge blade-tipped needle. The primary outcome measure for this study was patient-reported resolution of trigger thumb mechanical symptoms. Secondary outcomes included measures of hand/thumb pain, return to work and/or recreational activities, and the need for subsequent revision trigger thumb release. Major and minor complications were also recorded. It was hypothesized that there would be complete resolution of mechanical symptoms, low pain scores, and that patients would return to work or recreation activities unrestricted without requiring subsequent revision release.

2. Materials and methods

2.1. Study design and inclusion/exclusion criteria

Prior to initiating this retrospective clinical case series study, Ascension Health institutional review board approval was obtained and the study conducted in accordance with the Declaration of the World Medical Association (Ascension Health IRB; Project #RAL20230023). This study complies with the STROBE guidelines and reports the required information accordingly (see Supplementary Checklist). The study design and methodology for the current study builds off previous studies on US-guided trigger finger releases[16,17] but with the intention of specifically examining outcomes of releases performed on thumbs. Current procedural terminology codes of all trigger finger release procedures performed between September 2019 and June 2023 at an academic, outpatient orthopedic institution by a single sports medicine physiatrist (author, R.E.C.) with subspeciality training in musculoskeletal US (registered musculoskeletal sonographer), who has 13 years of experience in US-guided procedures were reviewed. Next, patients that specifically underwent trigger finger releases of the thumb were identified.

Inclusion criteria were primary diagnosis of a Green grade 2, 3, or 4 trigger thumb at the A1 pulley confirmed with a diagnostic US study on the same day of the procedure, failure of at least 2 conservative treatments (cortisone injection AND one of following: NSAIDs, splint, or hand therapy), and at least 6 months of follow-up time from the procedure. Exclusion criteria included: (1) worker's compensation cases, (2) those with prior trigger thumb release in the affected thumb, (3) those with complex regional pain syndrome of the hand, (4) those with carpal tunnel syndrome of the affected hand, and (5) those with osteoarthritis of the affected hand.

Figure 1. Nokor 18-gauge needle with a blade tip (BD Nokor™ Admix Needles). (https://www.bd.com/en-us/products-and-solutions/products/product-page.305215. Accessed May 15, 2025).

2.2. Trigger thumb release technique

The palmar side of the hand was prepared and cleaned, creating a sterile field for the involved hand, with the patient's hand supine on the table with a bolster roll under the hand and the thumb hanging off the edge to permit gentle hyperextension of the wrist in order to advance an 18-gauge 1.5-inch-long needle that has a scalpel-like blade at the tip (Nokor needle, Becton, Dickinson and Company, Franklin Lakes) (Fig. 1) in a straight line toward the A1 pulley. A Samsung HS60 US machine was used, with a Samsung LA4-18BD linear array transducer (Samsung NeuroLogica Corporation, Danvers) placed in long axis to the flexor pollicis tendons over the palmar surface with sterile gel to visualize the thumb's A1 pulley, flexor tendons, and neurovascular structures (Fig. 2). Mechanical catching of the tendon at the A1 pulley was noted and the diagnosis of trigger thumb was confirmed by sonographic visualization of

catching of the FPL tendon at the thickened A1 pulley. Local anesthesia was achieved by injecting 3 mL of lidocaine 1% with epinephrine into the overlying soft tissue and tendon sheath under live US guidance to separate the overlying adipose tissue from the A1 pulley. Next, the solution was injected distally to proximally into the tendon sheath to hydro-dissect the A1 pulley from the underlying FPL tendon. Once the patient was adequately anesthetized, the skin was incised at approximately 1 cm distal to the A1 pulley using the 18-gauge blade-tipped needle with the bevel down. The A1 pulley was visualized and centered on the screen as the needle was advanced from distal to proximal in-plane with long-axis positioning of the US probe, while keeping direct sonographic visualization of the nerves and vascular structures to ensure they were not injured (Fig. 3). Next, an incision through the A1 pulley and tendon sheath was made distally to proximally, carefully keeping the needle's blade-tip centered to avoid injuring bilateral lateral neurovascular bundles.

Following the incision, a successful release of the A1 pulley was confirmed with 3 previously described tests.[18] The 3 tests were (1) an US-guided diagnostic tendon sheath injection of 1 to 2 mL normal saline into the tendon sheath after the release to visualize and ensure that fluid is free flowing in the tendon sheath where the A1 pulley used to be (Fig. 4), (2) a dynamic US examination in which the tendon is observed gliding smoothly with no mechanical catching at the released A1 pulley, and (3) a dynamic manual test in which patients are asked to open and close all of their fingers 10 times, paying close attention to any residual mechanical catching of the tendon.[18] If any of these were positive, the incision was extended further proximally or distally along the tendon sheath, followed by another round of confirmatory testing. Following the release, patients were provided an adhesive bandage for 24 hours. They were allowed to perform all basic activities of daily living as tolerated 24 hours after the procedure, light duty after 1 week, and heavy duty after 2 weeks. Post-procedure pain was managed with over-the-counter acetaminophen or NSAIDs as needed. Narcotic medications were not prescribed to any of the patients.

2.3. Clinical outcomes data collection

To determine study eligibility and to collect study-related demographic and clinical data, each potential participant's electronic medical record was reviewed. Data for the study were obtained from patients' electronic medical record from routine clinical encounters and follow-up appointments. Specific demographic and clinical data were collected, including: age, gender, date of trigger thumb release procedure, procedure laterality, those undergoing concomitant trigger finger release of fingers other than the primary trigger thumb release, and occurrences of subsequent trigger thumb releases/procedures on the primary treated thumb at our institution. Informed consent was obtained telephonically for all individuals deemed eligible, and they were subsequently asked to complete a series of questions and surveys. Firstly, the patient was asked if they had any continued mechanical locking or catching of the finger. Additionally, a whole-number pain value was recorded using the Numeric Pain Rating Scale (0–10; 0 representing no thumb-/hand-related pain and 10 representing extreme thumb-/hand-related pain).[24,25] Thumb-/hand-related pain was further evaluated using the Nirschl Phase Rating Scale, which describes activity-based pain in 7 phases, ranging

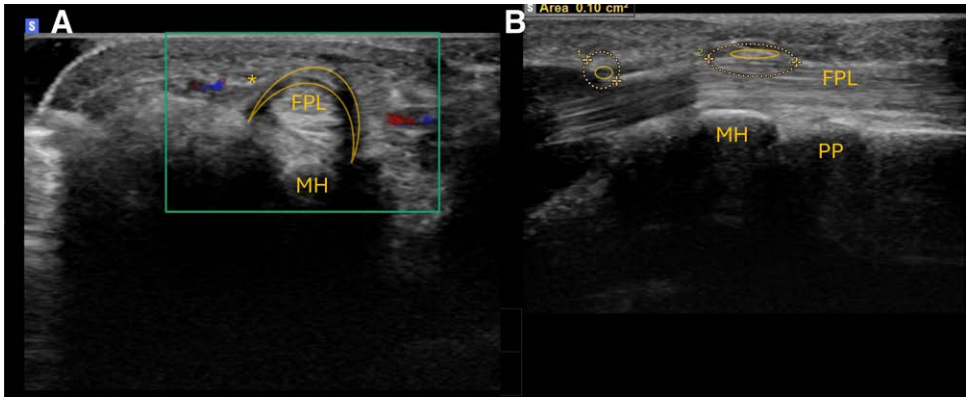

Figure 2. (A) Color Doppler short-axis ultrasound view of flexor pollicis longus tendon (FPL) and A1 pulley with radial digital nerve and radial and ulnar neurovascular bundles. (B) Long-axis view of A1 pulley distally and radial digital nerve crossing over FPL proximally. Flexor pollicis longus tendon (FPL), radial digital nerve (small oval overlay), A1 pulley (crescent in (A) and oval overlay in Fig. 3B), proximal phalanx (PP), and first metacarpal head (MH).

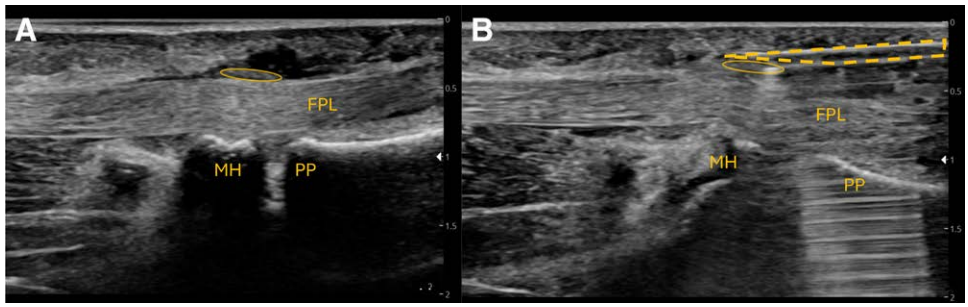

Figure 3. (A) Hydrodissection and (B) incision of the A1 pulley (oval overlay) after having confirmed no neurovascular structures were in the plane of incision. Note acoustic shadow in region dorsal to the needle obscuring metacarpal head in (B). 18-gauge blade-tipped needle (dashed overlay), flexor pollicis longs (FPL), metacarpal head (MH), and proximal phalanx (PP).

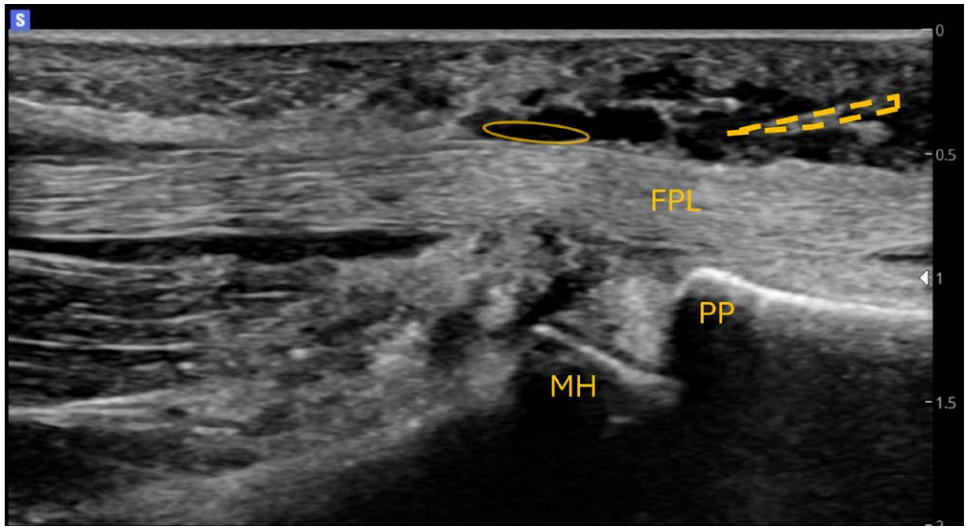

Figure 4. Long-axis ultrasound view of flexor pollicis longus (FPL) at the metacarpophalangeal joint (proximal phalanx, PP, and metacarpal head, MH) after A1 pulley release showing empty space where the A1 pulley was previously located (oval overlay).

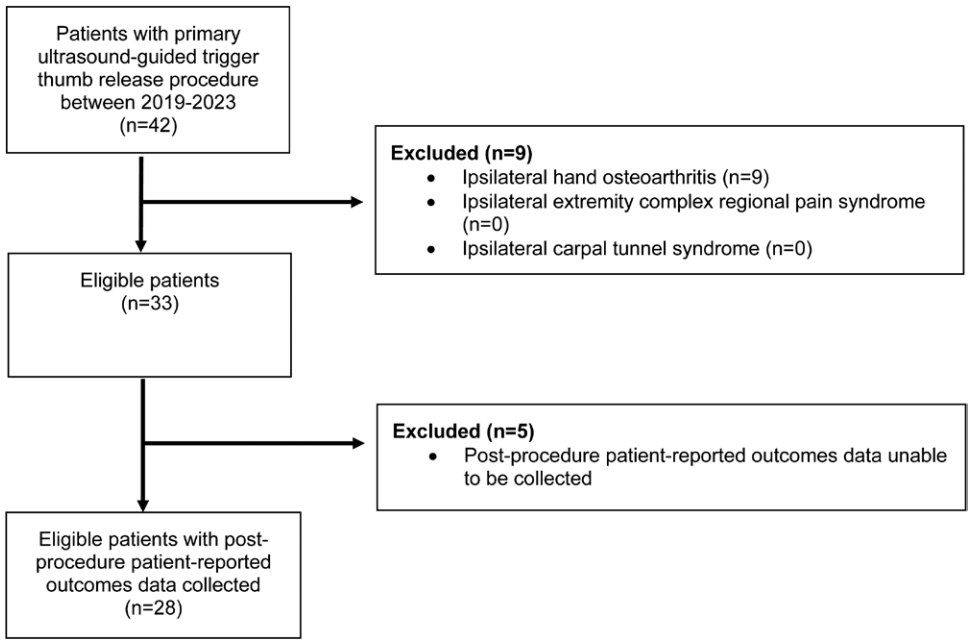

Figure 5. Cohort composition flowchart.

from phase 0 (no pain with activities) to phase 7 (constant pain at rest and pain that disturbs sleep).[26,27] The Nirschl Phase Rating Score was originally developed by Blazina and colleagues for grading phases of patellar tendon overuse and later adapted by Nirschl and Ashman for the description of lateral epicondylitis by quantifying chronicity and pain. It has since been adopted for evaluation of other tendinous injuries.[17,18,28] Lastly, patients were asked if they underwent any subsequent trigger thumb releases/procedures on the treated thumb at outside institutions. Major complications were those requiring surgery or resulting in significant limitations of activities of daily living, and minor complications were those that delayed recovery but responded to treatment and resolved or had little impact on function.[5] Clinical and questionnaire data were captured and stored using REDCap (Research Electronic Data Capture) electronic data capture tools hosted by Ascension St. Vincent's.

2.4. Statistical analysis

Summary statistics were calculated for baseline and/or follow-up demographic, clinical, procedural, and outcomes data across the entire cohort. Follow-up Numeric Pain Rating Scale and Nirschl Phase Rating Scale scores between male and female patients were compared using independent t-tests. Similarly, the proportions of complete trigger thumb mechanical symptom resolution at follow-up between males and females were compared using a Chi-square test. Lastly, the associations between demographic variables (age; follow-up time), injury/procedure variables (concomitant trigger thumb release), Numeric Pain Rating Scale and Nirschl Phase Rating Scale scores at follow-up were evaluated using linear regression. The associations between the same demographic and injury/procedure variables and resolution of trigger thumb symptoms were examined using logistic regression modeling. For all analyses, we P-values < .05 were considered statistically significant. All

Table 1

Demographic and clinical data for the included cohort.

Variable	Included cohort (n = 29 thumbs; 28 patients)
Age at procedure*, years	59.2 ± 11.8 Range: 31, 91
Follow-up time*, years	3.4 ± 1.2 Range: 1.0, 5.9
Gender, n (%)	Male: 14 (48%) Female: 15 (52%)
Concomitant trigger finger release during primary thumb release, n (%)	2 (7%)
Evidence of stenosing tenosynovitis along the flexor tendon sheath, n (%)	0 (0%)

*Data are presented as mean ± standard deviation.

Table 2

Outcomes data for the included cohort: subsequent procedures, complications, return to activity/work, and patient-reported outcomes.

Variable	Included cohort (n = 29 thumbs; 28 patients)
Complete resolution of mechanical trigger thumb symptoms following release, n (%)	29 (100%)
Numeric Pain Rating Scale score at follow-up*	0.2 ± 0.5 Range: 0, 2
Nirschl Phase Rating Scale score at follow-up*	0.1 ± 0.3 Range: 0, 1
Successful return to work, n (%)	26/26 (100%) Patients not working at time of procedure (n = 3)
Successful return to recreational activities, n (%)	25/26 (96%) Patients not participating in recreational activities at time of procedure (n = 3)

*Data are presented as mean ± standard deviation; Numeric Pain Rating Scale scored 0–10, with 0 representing no thumb-/hand-related pain; Nirschl Phase Rating Scale scored 0–7, with 0 representing no thumb-/hand-related pain or functional limitations.

statistical analyses were performed using SPSS Statistics, version 28.0 (SPSS Inc., Chicago).

3. Results

From an initial potential sample of 42 patients with primary US-guided trigger thumb release procedures, 33 patients met inclusion and exclusion criteria. 9 patients were excluded due to preexisting hand/thumb osteoarthritis. No patients were excluded due to having a history of complex regional pain syndrome or carpal tunnel syndrome of the affected hand. Follow-up outcomes data were successfully collected from 29 procedures (28 patients from 33 eligible; 88%), at an average follow-up time of 3.4 years (Fig. 5). Demographics, concomitant conditions, and procedure data for the included cohort are presented in Table 1. Among the included cohort, 52% were female, 2 patients (7%) underwent additional trigger finger releases of other fingers alongside the primary trigger thumb release, and no thumbs had evidence of mechanical catching at locations other than the A1 pulley.

Outcomes data are reported in Table 2. All 29 (100%) cases reported complete mechanical symptom resolution at follow-up with no recurrence of the mechanical symptoms. Because all patients reported complete resolution of trigger thumb symptoms, planned analyses evaluating predictors of this outcome measure, specifically could not be evaluated, however associations with mean Numeric Pain Rating Scale and Nirschl Phase Rating Scale scores were carried out and are presented in Table 2. Male and female patients did not differ in Numeric Pain Rating Scale scores at follow-up ($P = .94$) nor in Nirschl Phase Rating Scale scores at follow-up ($P = .96$). Examining predictors of Nirschl Phase Rating Scale scores, neither age ($P = .76$), follow-up time ($P = .11$), nor undergoing concomitant trigger finger release along with trigger thumb release ($P = .70$) were associated with Nirschl Phase Rating Scale scores at follow-up. All patients that worked before their procedure were able to successfully return to work, and 96% of patients reported being able to successfully return to their pre-trigger thumb recreational activities following release (Table 2). No patients required revision trigger thumb release procedures following their primary procedure, either at this institution or at outside institutions, and no patients reported unexpected complications following their trigger thumb release.

4. Discussion

This study evaluated outcomes following microinvasive trigger thumb release under US-guidance using an 18-gauge blade-tipped needle. For the primary outcome, no patients were found to have residual mechanical catching or locking of the thumb at an average follow-up time of 3.4 years. In addition, no patients required revision trigger thumb release surgery, and the average Numeric Pain Rating Scale and Nirschl Phase Rating Scale scores (0.2 and 0.1, respectively) were near zero. All patients were able to return to work, and only 1 patient was not able to return to the same recreational activities as prior to their trigger thumb release procedure. With a 100% success rate for resolution of mechanical symptoms, low pain scores, and rapid returns to both work and recreational activities, US-guided microinvasive trigger thumb release appears to be an effective procedure, regardless sex, age, follow up time, or concomitant trigger finger releases. Perhaps more importantly, no cases of neurovascular injury nor of any other minor or major complication were reported in the present study, highlighting its safety.

A recent systematic review of 17 studies evaluating US-guided percutaneous trigger finger releases reported comparable outcomes to that of the current study, including a pooled success rate of 97% successful resolution of mechanical symptoms and no major complications.[16] However, this same review by Nakagawa and colleagues noted the hesitance to adopt US-guided releases for the thumb due to concerns over neurovascular injury to the digital nerve and perceived technical difficulty.[16] Many of the studies in their review specifically excluded trigger thumbs.

Concern over neurovascular injury with release of the thumb's A1 pulley originated from clinical reports of radial digital nerve damage from transverse incisions near the metacarpophalangeal joint crease during open surgical procedures.[9] Cadaveric studies emphasized the anatomic proximity of the neurovascular bundles and the uniquely oblique course of the radial digital nerve over the incised A1 pulley and flexor tendon sheath.[6,8,9] The emergence of palpation-guided trigger thumb release techniques amplified these concerns since the neurovascular structures could not be visualized during the procedure.[6,8,12,16,29,30] Clinical studies evaluating palpation and landmark-guided percutaneous trigger thumb releases have reported rates of digital nerve injury ranging from 3% to 6% and residual pain ranging from 14% to 16%.[13,14] More recently, US-guided procedures have sought to retain the benefits of percutaneous procedures while offsetting the risk of neurovascular injury by improving visualization of the surrounding anatomy, but despite the apparent benefits of US-guided releases in other digits, open surgical release remains the technique of choice for the thumbs, specifically.[16]

Open surgical release is considered the gold standard for trigger thumb releases due to the efficacy and perceived safety

of performing the procedure under direct visualization of the flexor tendon sheath, A1 pulley, and surrounding neurovascular structures. Reported success rates for open procedures range from 60% to 97%,[15,31–33] however complications of open surgical release are not uncommon; major complications requiring reoperation or resulting in significant limitations of activities of daily living occur with open surgical releases in up to 3% of cases and minor ones that delay recovery but respond to treatment with little impact on function occur in up to 28%.[5] Open releases still leave room for improvement regarding operating room costs, postsurgical pain, prolonged recovery times, neurovascular injury, painful palmar scar formation, and potential superficial wound infections.[10,16,19]

Recent RCT and meta-analyses comparing US-guided releases against open surgical releases have established improved QuickDASH scores at 4 weeks and no differences at 12 weeks follow-up, demonstrating a more rapid functional recovery with US-guided procedures.[3,19,22,34] 3 separate RCT have established a 1 to 2 weeks shorter time to return to normal activities with US-guided versus open procedures with improved cosmesis and decreased scar formation.[19,20] Despite these benefits and promising results amid increasing rates of US-guided trigger finger release for other digits, providers have been slow to adopt trigger thumb releases specifically due to lingering concerns over the risk for neurovascular or tendinous injury.[16,23,30,35–37] In the current clinical study of 29 microinvasive US-guided trigger thumb releases with an 18-gauge blade-tipped needle, 100% of patients returned to work and 96% to recreational activities with no major or minor complications reported.

A distinct benefit of the proposed technique is its ability to be performed in an outpatient office with a readily-available, inexpensive 18-gauge non-coring needle usually used to draw up medications. Many different types of needle gauges and specialized instruments, including hook knives, and blade-tipped needles have been used, with 1 cadaveric study demonstrating less tendinous injury using a blade-like instrument compared to a 19-gauge needle.[16,30] Previous experience with the blade-tipped needle has led us to believe it allows for safer and more effective incision of the A1 pulley, compared to a regular needle that requires repeated fenestration of the A1 pulley until it releases, potentially decreasing the risk for iatrogenic injury.[17,18] Compared to other approaches using hook knives[19,38] or specialized minimally-invasive knives,[35,37,39] the presented approach using a readily-available 18-gauge non-coring needle with a blade-tip introduces less instrumentation into the tendon sheath, protects neurovascular and tendinous structures, and does not require specialized equipment.

Additionally, this technique could prove to be a more cost-effective solution. A previous cost-effectiveness analysis by Gancarczyk and colleagues reported that primary in-office landmark-guided trigger finger release followed by revision open surgical release if needed to be 7% less expensive than primary open surgical release in an ambulatory surgical center and up to 50% less expensive than primary open surgical release in a hospital setting.[12] Cost-effectiveness analysis of US-guided release compared to open releases either in ambulatory surgical center or hospital settings has not been performed, but decreased recurrence and need for ensuing revision surgeries, relative to the landmark-guided percutaneous releases evaluated in the original study, could predictably result in lower costs. Further, the cost of non-coring needles compared to that of hypodermic 18-gauge is not markedly higher, with both available in online marketplaces for <$1.

5. Limitations

There are several important limitations related to this study that should be recognized. Firstly, there is risk of recall bias due to the study's retrospective nature, as outcomes data were collected via questionnaire at a median of 3.4 years post-procedure. Due to the time interval between procedure and outcomes data collection, some patients were lost to follow up and were unable to be reached to complete their follow-up questionnaires. Additionally, objective or patient-reported pre-procedure baseline measures were not obtained, and thus the relative improvement from before to after trigger thumb release could not be quantified to establish either statistically significant or minimal clinically important differences. Analyses of associations between clinical characteristics and symptom resolution designed a priori could not be performed due to the uniformity of outcomes, with all patients' symptoms resolving. Additionally, the small sample size of our cohort may have predisposed our findings to type 2 error due to our comparisons being underpowered. Incorporating functional measures, such as an upper extremity-/hand-specific functional questionnaire may have provided additional data related to outcomes beyond only the resolution of mechanical symptoms and hand/thumb pain. A prospective study design, such as a randomized controlled trial, would allow for better control of unknown biases related to procedural outcomes as well as allow for direct comparison to control varying approaches to trigger thumb release. Indeed, most research evaluating the effectiveness of US-guided trigger thumb release procedures has come from level IV evidence, including case reports and case series. Future studies should evaluate the effectiveness of microinvasive US-guided trigger thumb releases as compared to other approaches, including open and endoscopic surgical releases, using randomized trials or propensity score matching studies. Contextualizing our findings, it is important to mention that this procedure should only be performed by physicians with training and experience in performing US-guided procedures. Since US use is operator-dependent, the external validation of this studies' results will rely on the ability of other clinicians and researchers performing this specific technique using this blade-tipped needle instrument.

6. Conclusions

Microinvasive trigger thumb release under US guidance with an 18-gauge blade-tipped needle appears to be a safe and effective procedure for trigger thumb release. It provided significant symptomatic relief, no reported complications, and no recurrence or need for subsequent revision trigger thumb release. In addition, the risk of tendinous or neurovascular injury is minimal given the direct sonographic visualization of at-risk structures when performing the procedure. Further research will be needed to characterize comparative outcomes and risk-benefit profiles of this technique compared to open surgical trigger thumb releases.

Author contributions

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Writing – review & editing: Tomas F. Vega, Ricardo E. Colberg, Victor J. Kremser, Sharan Sankar, Campbell B. Aiken, Trace Naman, Alexandra Yates, Matthew P. Ithurburn.

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