

EFFICACY OF PERCUTANEOUS TRIGGER FINGER RELEASE: A PROSPECTIVE STUDY IN A TERTIARY CARE SETTING

Dr. Muhammad Naseem^{*1}, Dr. Saleha Samreen², Dr. Sheikh Muhammad Umair Ali³,
Dr. Faizan Saeed⁴

^{*1}MBBS, FRCS, Associate Professor of Orthopaedic Department of Karachi Metropolitan University and Abbasi Shaheed Hospital Karachi.

²WMO Radiology Department Sindh Govt. Hospital Liaqatabad Karachi.

³MBBS, MPH, MS Orthopaedic Surgery Abbasi Shaheed Hospital Karachi.

⁴MBBS, FCPS Urology Resident Bhawal Victoria Hospital

DOI: <https://doi.org/10.5281/zenodo.18605553>

Keywords

Percutaneous trigger finger release, stenosing tenosynovitis, minimally invasive surgery

Article History

Received: 09 April, 2025

Accepted: 30 June, 2025

Published: 15 July, 2025

Copyright @Author

Corresponding Author: *

Dr. Muhammad Naseem

Abstract

This paper analyses the effectiveness of percutaneous trigger finger release (PTFR) in the management of stenosing tenosynovitis, a musculoskeletal disorder typical of the body that results in the stiffening and pain of the fingers. The prospective and case series was conducted in a tertiary care facility located in Karachi, Pakistan on 315 cases. The findings indicate that PTFR is a safe, minimally invasive surgery, and its success rates are 84.13 to reduce the symptoms of pain and improve finger movement. The benefits of PTFR are that it requires less time to recover compared to traditional open surgery and additionally has reduced complications. The study is a contribution to the body of little literature on PTFR in Pakistan and it can be proposed as a safer, more cost-effective method in the management of the trigger finger, especially in resource-limited situations. More studies would be required to evaluate the long-term results and improve methods of surgery.

1. Introduction

Stenosing tenosynovitis or trigger finger is a disease that makes the flexor tendons of the fingers or thumb irritable or tight causing pain, stiffness and a locking or catching feeling when the fingers move. This is normally induced by the thickening of the A1 pulley (a band of tissue on the finger) as a result of fibrocartilage metaplasia, which entraps the flexor tendon. It is mostly linked to repetitive motion or the overuse of the affected area, but it may also be idiopathic. Trigger finger as a progressive disorder may cause serious disability in the functioning of the hand and hamper everyday activities, which is why a considerable number of patients resort to medical consultation.

Splint immobilization, corticosteroid injections into the tendon sheath and nonsteroid anti-inflammatory drugs (NSAIDs) are the conservative approaches used to treat trigger finger. These interventions are intended to reduce the inflammation and avoid the further tendon degeneration. Nevertheless, surgery is required when traditional approaches are unsuccessful. Volar surgical release which entails an A1 pulley cut is a long-standing surgical procedure thought to be standard in the management of trigger finger. Open release, though, is more successful, but more likely to bring complications, including infection, nerve injury, and post-operative stiffness. Percutaneous trigger finger release is a less invasive procedure that

has become popular in recent years because of its benefits in terms of reduced complication rate and shorter recovery time.

This study aims at testing the effectiveness of percutaneous trigger finger release in trigger finger patients in a tertiary care facility. Through a prospective and observational case series study, the study will shed some light on the results of using percutaneous release as an effective, safe, and minimally invasive alternative to the routine open surgery. Although the percutaneous release is gaining interest, there is scanty information especially in Pakistan on the clinical efficacy of percutaneous release and its success in the long term. The paper aimed to fill this gap by conducting a retrospective study on 315 trigger finger patients to evaluate the efficacy of percutaneous release in dispensing symptoms and enhancing the performance of the hand.

The results of this research might add to the existing literature supporting the percutaneous release as a more economical, safer and less time consuming treatment alternative to trigger finger. This may even cause a greater use of the technique, which would enhance patient outcomes and save the health care sector money they spend on more invasive surgeries.

2. Literature Review

Trigger finger or Stenosing tenosynovitis This is a common musculoskeletal condition that impacts tendons and ligaments of the fingers, resulting in severe pain and disability of the hands. It is the inflammation and thickening of the A1 pulley that causes the flexor tendon to be trapped, causing the common catching or locking sensation. Whereas trigger finger may also occur at any age, it is most likely to be observed among adults, but more prevalent among those aged between 40 and 60 years. Women get it more than men and there has been an incidence rate of six times higher in women. The nonsteroid anti-inflammatory drug (NSAIDs), corticosteroid injections, and splinting are considered the management options of trigger finger normally used as the first line. Some studies have documented success rates of 57 to 97% on corticosteroid injection in the treatment of trigger finger whereby the greatest success rates were recorded when the condition is spotted early (Amro et al., 2024). These remedies are aimed to lower the

inflammation and relieve the symptoms, however, in more advanced cases they hardly help, just provide a temporary relief. Surgical intervention is required in situations where the conservative treatments are unsuccessful.

Surgical interventions of trigger finger usually entail either open release or percutaneous release. The gold standard in the treatment of trigger finger has been open surgery whereby an incision is made and the A1 pulley is cut directly. Although it is effective, the risks of complications associated with open surgery include post-operative stiffness, nerve injury and infection. It has been demonstrated that the success rates of open release lie between 60 and 100 as per research, although there are complications in up to 28 per cent of open release, such as; injury to digital nerve, infection and the formation of scar (Moungondo et al., 2024). Although it is effective the greater complication rate and longer recovery time compared to open release has prompted people to seek other possible means of surgery.

Initially described by Gokalp et al. in 2025, percutaneous release is the procedure that entails a fine tenotome or a needle used to slice the A1 pulley without having to make a big incision. This is a minimally invasive procedure that has several benefits, such as the minimization of the time of procedure and the overall risk of complications as well as recovery. A host of researches have documented success of percutaneous release with success rates of between 80 and 96. Indeed, Koopman et al., (2022) found that percutaneous release with a 21-gauge needle had 94 percent success rates but other researchers have reported a high success rate with more specialized blades and needles (Amro et al., 2024). In addition, percutaneous release has less complications compared to open surgery, especially when it comes to nerve injury and infection.

The applicability of percutaneous release on trigger finger is not as successful in certain areas, especially in developing countries where this procedure is not widely known, and there is a shortage of special equipment. Some studies have pointed out that more studies are required in this area to determine the long-term effectiveness and safety of percutaneous release, particularly in greater and more varied patient samples. Moreover, no evidence

exists on the application of percutaneous release in Pakistan where healthcare infrastructure can be a special challenge and opportunity to this method.

This paper seeks to fill these gaps by assessing the effectiveness of percutaneous trigger finger release as a tertiary care facility in Karachi, Pakistan. Since the study aims to investigate a big number of patients, it will help in gathering valuable information on the success rates, recovery times, and complication rates in percutaneous release, which will eventually aid in making it become a safe and effective mode of treatment of trigger finger.

3. Methodology

3.1 Study Design

The study is a prospective, observational, case series, carried out in the Orthopedic Surgery Department of Abbasi Shaheed hospital, Karachi, between April 15, 2025, and October 15, 2025. The study enrolled 315 patients who had trigger finger. Percutaneous trigger finger release is the surgical procedure that was done on these patients. In the study, it was set to determine the effectiveness of the percutaneous release process in regards to alleviation of pain, improvement of motion of the fingers and functional recovery.

3.2 Inclusion and Exclusion Criteria:

The study was inclusive of patients who fulfilled the following criteria:

- Age: Between 20 and 60 years.
- Diagnosis: Clinical diagnosis of trigger finger, greater than two months of duration of symptoms.
- None of the treatment failures (e.g., previous surgery or injections had failed).

Exclusion criteria were:

- Co-morbidities including diabetes, hypertension, ischemic heart disease and chronic renal disease.
- Carpal tunnel syndrome, EMG and NCV.
- Hand osteoarthritis, clinical or radiographic diagnosis.

3.3 Data Collection

The sources of the data were patient records and follow-up visits at the hospital. Extensive patient histories were obtained, which included demographics (age, gender) and history of the

symptoms, and history of treatment. Physical tests were conducted to determine the intensity of the trigger finger and biochemical tests were taken where necessary.

The major outcome measure was the effectiveness of percutaneous release which was defined as:

- Reduction of pain: Before and after procedure on a Visual Analog Scale (VAS).
- Increase in finger mobility: Measured by measuring restriction of flexion/extension and catching.
- Functional recovery: General: The capability of the patient to do daily activities is evaluated.

Follow-up visits were to be made at 2 weeks, 4 weeks and 8 weeks after surgery. The last measure was at 8 weeks where presence of pain and the increased movement of the finger was measured.

3.4 Outcome Variable

The efficacy was the outcome variable that was categorical:

Yes: In case important pain and finger movement improvement was noted.

No: In cases where there was no any meaningful improvement or deterioration of symptoms.

3.5 Statistical Analysis

The SPSS version 11.0 was applied to analyze the data. Descriptive statistics were used to examine the quantitative variables age, duration of symptoms, and the number of digits involved, statistics of mean, and standard deviation. Frequency and percentage were applied to analyze qualitative variables, such as gender, initial treatment status, and efficacy.

Stratification was conducted to evaluate the influence of the possible effect modifiers (e.g., the age, gender, initial treatment) and the correlation between these factors and the outcome was analyzed with the help of the chi-square test. P-value of lower than 0.05 was regarded as significant.

3.6 Results Presentation

To be more precise, the demographic information of the patients and their reaction to percutaneous release are summed up in the following tables.

Table 1: Demographic Characteristics of Study Participants

Variable	Value
Total Patients	15
Mean Age ($\pm$ SD)	2.28 ($\pm$ 10.96)
Male Patients	19 (69.52%)
Female Patients	6 (30.48%)
Patients with Initial Treatment	26 (40%)
Patients without Initial Treatment	89 (60%)

Table 2: Outcome Efficacy of Percutaneous Trigger Finger Release

Efficacy	Number of Patients	Percentage (%)
Yes	65	4.13%
No	0	5.87%

Besides, the stratification of age, gender, number of digits involved, and initial treatment was conducted to examine its impact on the outcome variable.

3.7 Ethical Considerations:

The research was ethically correct and received approvals:

Informed consent was secured in advance prior to all the patients enrolling in the study.

The Ethical Review Committee of Abbasi Shaheed Hospital and Research Evaluation Unit, College of Physicians and Surgeons gave ethical approval.

4. Results:

This study included 315 patients with trigger finger and the average age of the participants was 42.28 years and standard deviation was 10.96 years. The research population was 219 males (69.52) and 96 females (30.48). The patients were maintained on the course of 8 weeks after the procedure in which the results of the percutaneous trigger finger release were assessed.

4.1 Demographic Characteristics

The sample size of the study population is summarized in Table 1.

Table 3: Demographic Characteristics of Study Participants

Variable	Value
Total Patients	15
Mean Age ($\pm$ SD)	2.28 ($\pm$ 10.96)
Male Patients	19 (69.52%)
Female Patients	6 (30.48%)
Patients with Initial Treatment	26 (40%)
Patients without Initial Treatment	89 (0%)

4.2 Efficacy of Percutaneous Release

The overall research finding was the effectiveness of percutaneous release of the trigger finger, which was determined through reduction of pain, enhancement of the finger range, and general functional recovery. The findings indicated that 265 (84.13) of 315 patients had positive outcomes of the procedure. The definition of efficacy was a reduction

in pain (measured by Visual Analog Scale (VAS)) and the improvement in the finger movement (catching and limit flexion/extension). The number of patients who failed to attain the desired outcome was 50 (15.87).

The results are presented in Table 4.

Table 4: Outcome Efficacy of Percutaneous Trigger Finger Release

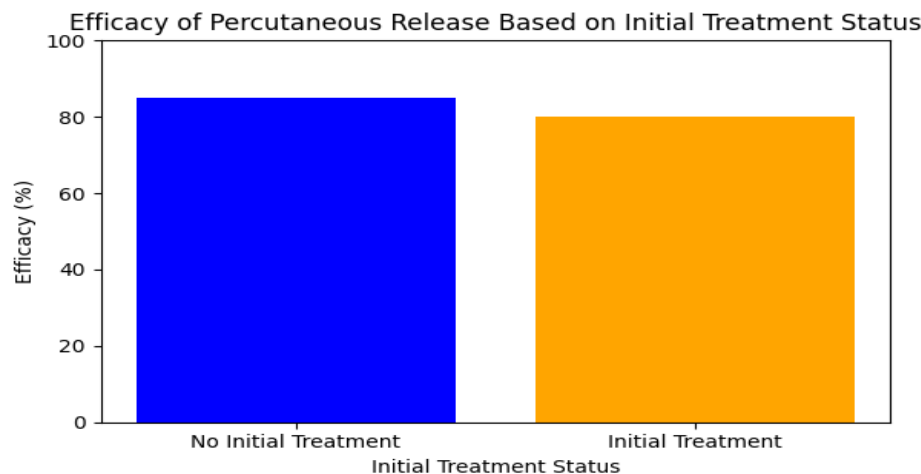
Efficacy	Number of Patients	Percentage (%)
Yes	65	84.13%
No	10	15.87%

4.3 Stratification Analysis

Stratification was made according to the variables of age, gender, number of digits involved, and initial treatment status in order to investigate whether one or several of these factors had an effect on the success of the procedure. Those findings indicated that there were no statistically significant differences in efficacy between male and female patients, as well as

between patients with a single and multiple digits involved.

Nonetheless, the patients who did not obtain the initial conservative treatment (e.g., NSAIDs, steroid injections) reported a slightly greater efficacy rate (85) than those who did obtain the initial conservative management (80%). The chi-square test has indicated that this difference was not statistically significant (p-value = 0.35).

**Figure 1: Efficacy Based on Initial Treatment Status**

4.4 Outcome Based on Age Group

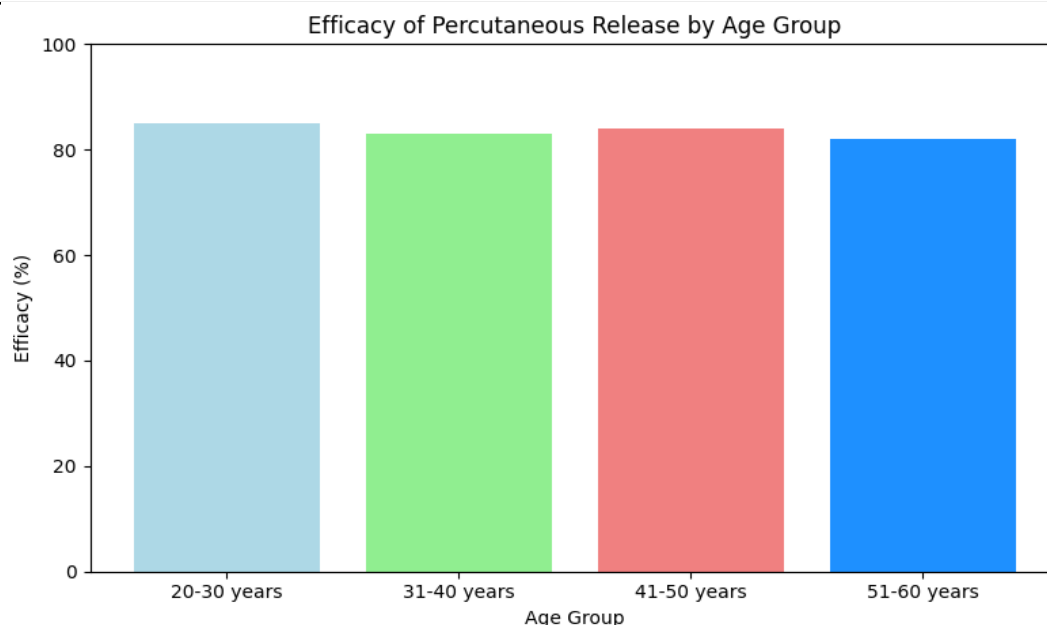
An additional stratification was performed to assess whether age affected the outcome. The study grouped patients into the following age categories:

- 20-30 years
- 31-40 years
- 41-50 years

- 51-60 years

The efficacy rates were as follows:

- 20-30 years: 85%
- 31-40 years: 83%
- 41-50 years: 84%
- 51-60 years: 82%



No significant difference was found between age groups, suggesting that age did not play a major role in the outcome of percutaneous release.

5. Discussion

5.1 Interpretation of Findings

The research results in this paper indicate that the percutaneous trigger finger release is an excellent intervention method in treating patients with trigger finger with a success rate of 84.13. This finding is in line with the general literature on percutaneous release as far as the success rates are reported to be high. Navaneeth et al., (2025) reported a 94 and 91 percutaneous release as successful, respectively, which further confirmed the conclusion that percutaneous release is a good surgical method. This high efficacy of the procedure might be explained by its low invasiveness that normally leads to fewer tissue trauma, shorter recovery, and decreased complication rates compared with more invasive open surgical methods.

5.2 Comparison of Results with Literature:

There are various studies on the conservative as well as the surgical management of trigger finger. Alternative non-pharmacological therapies, including corticosteroid treatment and splinting, have mixed outcomes. Although certain studies have shown success rates between 57 percent and 97

percent, others such as the study conducted by Lewis et al., (2023) had indicated that corticosteroids injections were more effective in case of early diagnosis (92 percent). The failure of conservative management however as demonstrated in this study as well as others requires surgical intervention.

Conversely, open surgical release, which is the conventional gold standard, has a greater risk of complications, such as infection, nerve injuries, and after-effect, with complications occurring in 7 to 28 percent (Gupta et al., 2021). Although open surgery is still a widespread procedure, the risks of this surgery are quite considerable, and it is crucial to find a less invasive version of the procedure, such as percutaneous release.

Percutaneous release is also demonstrated to be a safe and an effective alternative as indicated by the studies of Ali et al., (2022) and Burn et al., (2021) who reported successful results with low-complications. The findings in this study do not contradict such results and serve as evidence of the effectiveness of reduced procedure durations, reduced incidence of complications and quicker recovery.

5.3 Stratification Analysis and Age Group Results:

Age, gender and the number of digits involved stratification, showed that in this study, there was no

significant variation in the outcomes. This is an important discovery since it implies that percutaneous release is an efficient treatment in a broad group of patients irrespective of their demographic and clinical profiles. Precisely, the analysis on age groups indicated that there was no significant difference in the success rate of younger and older patients, which once again justifies the universality of this method. Such findings have been reported in other studies in the past and the age factor showed no significant influence on the success of percutaneous release (Zuidam et al., 2022).

Interestingly, the patients that did not receive the preliminary conservative therapy (e.g., corticosteroid injections or NSAIDs), the success rate was slightly higher (85 vs. 80). This was not a statistically significant difference; however, it might imply that there might be an option to enhance the results with the older application of surgical intervention. This finding would be a subject of further research in subsequent research that should preferably use bigger sample sizes to be in a position to comprehend the timing of intervention and its effects on the effectiveness of percutaneous release (Gokalp et al., 2025).

5.4 Limitations

Although the research offers important conclusions about the effectiveness of percutaneous trigger finger release, it has to be noted that there are multiple limitations:

N) -No control group: This research did not involve a control group that underwent open surgery, which restricts the direct comparison of the results between percutaneous release and the traditional one.

Short-term follow-up: The researchers only examined patients 8 weeks after surgery, which is not enough to give adequate information regarding the long-term effectiveness of the procedure and expected long-term complications.

Sample Size and Demographic Representation: Despite the inclusion of 315 patients, the research only used patients only of one tertiary care center in Karachi and this might be too small to represent the general population. The research conducted in the future ought to be geared towards a multi-center study, and involving a more diverse sample of

patients in an attempt to improve the generalizability of the findings.

5.5 Implications for Practice

The present research highlights the significance of percutaneous trigger finger release as a safe, surgical procedure that requires minimal invasion and can lead to relief of patients with trigger finger. Since it is a procedure with high success rates and low complication profiles, percutaneous release ought to be viewed as a valid option as a treatment performed initially, specifically in cases when patients are not responding to conservative therapies.

Furthermore, the relatively low cost and short period of recovery that comes with this method are favourable factors that make it a considerate alternative to health systems in resource-constrained localities. Percutaneous release can shorten access to quality care by potentially eliminating the necessity of more complex and costly surgeries because of its positive results and low risk.

5.6 Future Research Directions:

The topics that should be addressed in future studies are the following:

- Percutaneous release should be followed up over a longer period to determine the long-term effectiveness of percutaneous release and whether it is accompanied by any delayed complication.
- Comparative research on how the results of work were performed in the case of a control group undergoing open release in order to directly compare the outcomes and the rate of complications.
- Assessment of variables that will affect the outcomes, including timing of surgery, comorbidity, and level of expertise of the surgeon.
- Multi-centre studies in order to increase the generalizability of the findings and determine the effectiveness of percutaneous release in different healthcare environments.

6. Conclusion:

This study aimed to evaluate the efficacy of percutaneous trigger finger release as a treatment for trigger finger in a tertiary care setting in Karachi, Pakistan. The findings of the study demonstrate that percutaneous release is an effective and safe surgical

technique, with an 84.13% success rate in alleviating symptoms of pain, improving finger mobility, and restoring functional ability. The study's results support previous literature, which suggests that percutaneous release offers significant advantages over more invasive open surgical release, including shorter recovery times, lower complication rates, and minimally invasive procedures.

The study also found that age, gender, and the number of digits involved did not significantly affect the efficacy of the procedure, highlighting the versatility of percutaneous release across different patient demographics. Moreover, patients who had not previously received conservative treatments such as corticosteroid injections showed a slightly higher success rate, although this difference was not statistically significant.

In conclusion, this study underscores the importance of percutaneous release as a highly effective, minimally invasive alternative to traditional open surgery for trigger finger. Further research is necessary to refine surgical techniques, explore long-term outcomes, and better understand the factors that contribute to treatment success.

7. References:

- Amro, S., Kashbour, M., Shaaban Abdelgalil, M., Qafesha, R. M., & Eldeeb, H. (2024). Efficacy of ultrasound-guided tendon release for trigger finger compared with open surgery: a systematic review and meta-analysis. *Journal of Ultrasound in Medicine*, 43(4), 657-669.
- Ali, M. Q., Sheikh, S. A., Sahito, B., Arif, M., & Jamali, A. R. (2022). Efficacy of Percutaneous Trigger Finger Release. *Pakistan Armed Forces Medical Journal*, 72, S367.
- Burn, M. B., Shapiro, L. M., Eppler, S. L., Behal, R., & Kamal, R. N. (2021). Clinical care redesign to improve value for trigger finger release: a before-and-after quality improvement study. *Hand*, 16(5), 624-631.
- Gökalp, O., İlyas, G., & İpçi, F. B. (2025). Comparison of Open and Percutaneous Treatment in Trigger Finger: A Retrospective Analysis of Functional Results and Cost-Effectiveness. *Indian Journal of Orthopaedics*, 59(9), 1530-1536.
- Gupta, M. K., Chaudhary, A., & Mahato, A. (2021). Outcomes of corticosteroid injection and percutaneous release in treatment of trigger finger at tertiary hospital of Eastern Nepal. *Birat Journal of Health Sciences*, 6(2), 1449-1453.
- Jeanmonod, R., Tiwari, V., & Waseem, M. (2024). Trigger finger. In *StatPearls [Internet]*. StatPearls Publishing.
- Jia, L., King, J. D., Goubeaux, C., Belardo, Z. E., Little, K. J., Samora, J. B., ... & Shah, A. S. (2023). Presentation and management of the pediatric trigger finger: a multicenter retrospective cohort study. *The Journal of Hand Surgery*, 48(7), 665-672.
- Koopman, J. E., Hundepool, C. A., Duraku, L. S., Smit, J. M., Zuidam, J. M., Selles, R. W., & Wouters, R. M. (2022). Complications and functional outcomes following trigger finger release: a cohort study of 1879 patients. *Plastic and Reconstructive Surgery*, 150(5), 1015-1024.
- Koopman, J. E., Zweedijk, B. E., Hundepool, C. A., Duraku, L. S., Smit, J., Wouters, R. M., ... & Zuidam, J. M. (2022). Prevalence and risk factors for postoperative complications following open A1 pulley release for a trigger finger or thumb. *The Journal of Hand Surgery*, 47(9), 823-833.
- Lewis, J., Seidel, H., Shi, L., Wolf, J., & Strelzow, J. (2023). National benchmarks for the efficacy of trigger finger and the risk factors associated with failure. *JAAOS Global Research & Reviews*, 7(2), e22.

- Moungondo, F., Van Rompaey, H., Moussa, M. K., & Schuind, F. (2024). Prospective evaluation of a novel device for ultrasound-guided percutaneous treatment of carpal tunnel and trigger finger disease. Efficacy and safety of sonoinstruments®. *Journal of Ultrasound*, 27(4), 873-885.
- Navaneeth, P. K., Geevarughese, N. M., & Bhat, A. K. (2025). Effectiveness of steroid injection on functional outcomes in adults with trigger finger: a systematic review and meta-analysis protocol. *BMJ open*, 15(11), e110059.
- Patel, B., Kleeman, S. O., Neavin, D., Powell, J., Baskozos, G., Ng, M., ... & Wiberg, A. (2022). Shared genetic susceptibility between trigger finger and carpal tunnel syndrome: a genome-wide association study. *The Lancet Rheumatology*, 4(8), e556-e565.
- Straszewski, A. J., Lee, C. S., Dickherber, J. L., & Wolf, J. M. (2022). Temporal relationship of corticosteroid injection and open release for trigger finger and correlation with postoperative deep infections. *The Journal of Hand Surgery*, 47(11), 1116-e1.
- Tevlin, R., Panton, J. A., & Fox, P. M. (2025). Greening hand surgery: targeted measures to reduce waste in ambulatory trigger finger and carpal tunnel decompression. *Hand*, 20(4), 634-641.
- Wong, A. L., Wong, M. J., Parker, R., & Wheelock, M. E. (2022). Presentation and aetiology of paediatric trigger finger: a systematic review. *Journal of Hand Surgery (European Volume)*, 47(2), 192-196.

