International Journal of Research in Orthopaedics
Maheshwari S et al. Int J Res Orthop. 2024 Mar;10(2):281-287
http://www.ijoro.org

DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20240331

Original Research Article

Percutaneous release of trigger finger and its functional outcome

Sulabh Maheshwari*, Aditya K. Mishra, Raunaq Saxena, Bilal Kaleem, Navneet Badoni

Department of Orthopaedics, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India

Received: 13 June 2023
Revised: 12 February 2024
Accepted: 13 February 2024

***Correspondence:**
Dr. Sulabh Maheshwari,
E-mail: sulabh.dec@gmail.com

ABSTRACT

Background: An overview of percutaneous release for trigger finger and its functional outcomes.
Methods: The present prospective controlled analytical study was conducted after taking approval from center human ethical committee. A written and informed consent was obtained. There were 50 patients who reported to outpatient department (OPD) with symptoms suggestive of trigger thumb/ finger, were subjected to the study.
Results: Most of the patients belonged to the age group of 41-50 years. Majority of patients were females (56%) and males were (44%). Most of the patients had the right 1st digit involved (32%), followed by left 1st and right 3rd digit (18% each). Before the release of affected digit, 56% were grade 3, 26% were grade 4 and only 18% were grade 1. Complete resolution immediately after the procedure was seen in 82% cases. Pre procedure, mean VAS of 8.4 reduced to mean VAS of 6.2 immediate post procedure. At 48 hours post procedure, mean VAS of 3.06 and mean VAS of 1.12 was seen at 1-month post procedure period. At 3 months post procedure, mean VAS of 0.42. 94% cases had no complications.
Conclusions: Percutaneous release of trigger finger is a safe and effective procedure associated with favorable functional outcomes. It provides an alternative treatment option for patients who have failed conservative management or prefer a minimally invasive approach.

Keywords: Percutaneous release, Trigger finger, Functional outcome, Minimally invasive surgery

INTRODUCTION

Trigger finger, medically known as stenosing tenosynovitis, is a common hand condition characterized by the painful catching or locking of a finger in a bent position.[1] It occurs when the flexor tendon sheath becomes inflamed, leading to the constriction of the tendon's movement. This condition can significantly impact an individual's hand function, causing pain, stiffness, and difficulty performing daily activities.[2]

Trigger finger is characterized by pathologic disproportion between the volume of the retinacular sheath and its contents. This disproportion prevents gliding as the tendon moves through the A1 pulley (Figure 2). This manifests as symptomatic locking or clicking flexion and extension of a finger or the thumb.[3]

The initial management of trigger finger typically involves conservative measures such as splinting, nonsteroidal anti-inflammatory drugs (NSAIDs), and corticosteroid injections. These treatments are often successful in relieving symptoms; however, some cases may be resistant to conservative therapy or experience recurrence after initial improvement. In such instances, surgical intervention becomes necessary to alleviate symptoms and restore hand function.[4]

Traditionally, open surgery involving a small incision and division of the A1 pulley, a constricted portion of the flexor tendon sheath, has been the standard surgical

treatment for trigger finger. While open surgery has demonstrated excellent outcomes, it carries inherent risks, including scarring, wound complications, and prolonged recovery time.[5] To address these concerns, a less invasive alternative known as percutaneous release has gained popularity in recent years.

Percutaneous release involves the surgical release of the A1 pulley using a small needle-like device, typically performed under local anesthesia. This technique avoids the need for a surgical incision and reduces the risk of postoperative complications. It offers advantages such as minimal scarring, faster recovery, and earlier return to normal activities.[6]

By examining the available literature and synthesizing relevant findings, this abstract aims to contribute to the existing knowledge base and promote a better understanding of percutaneous release for trigger finger. Ultimately, a comprehensive understanding of the procedure's functional outcomes will help clinicians make informed decisions regarding the optimal management of this common hand condition.[6]

The purpose of our study is to analyse the functional outcome of percutaneous release in trigger finger.

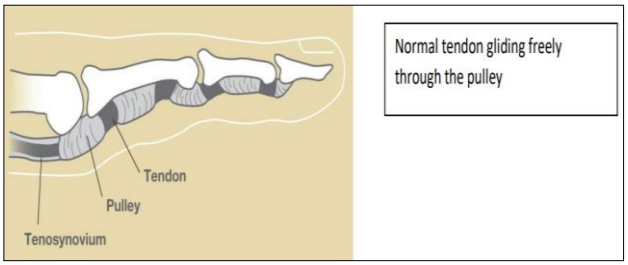

Figure 1: Normal gliding of tendon.

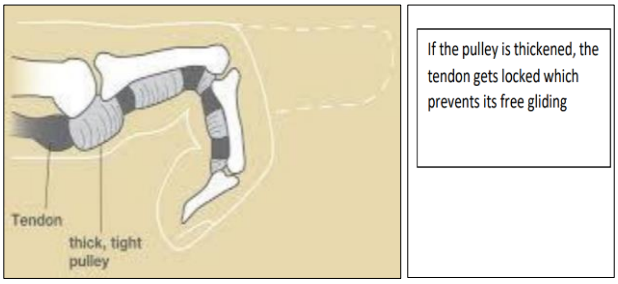

Figure 2: Locking of tendon.

METHODS

The present prospective controlled analytical study was conducted in the Department of Orthopaedics, at Shri Mahant Indiresh Hospital, Patel Nagar, Dehradun between December 2020 to June 2022 over a period of 18 months and were followed up for 3 months. Our hospital is 1500 bedded super-specialty hospital which caters the patients from Dehradun and the surrounding district of Uttarakhand and Uttar Pradesh (U.P).

Patient presenting in OPD with symptoms suggestive of trigger thumb/finger requiring treatment after thorough history and clinical evaluation were included in the study. There were 50 patients who reported to OPD with symptoms suggestive of trigger thumb/ finger, were subjected to the study. A written and informed consent after explaining the nature of the study was obtained from each study subject. The study was initiated after obtaining the approval of the Institutional Ethics committee SGRRIM and HS, Dehradun as per the ethical guidelines from the biomedical research on human subjects, Indian Council of Medical Research, New Delhi, 2006.

Exclusion criteria

Patients with known case of- previously treated with open release or percutaneous release, mixed connective tissue disorder, bony deformities, inflammatory disorders like amyloidosis, and patients who lost to follow up were excluded.

Procedure

The percutaneous release procedure was performed by a trained hand surgeon following a standardized technique. The procedure involved the use of local anesthesia to numb the affected finger.

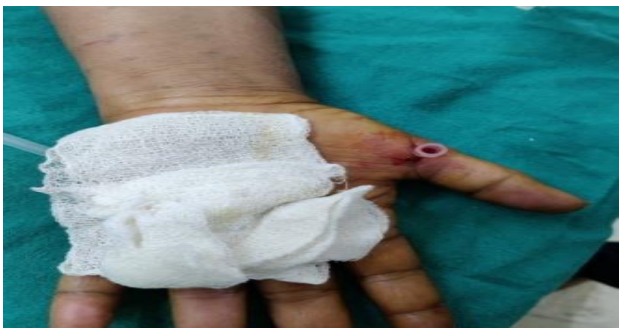

Figure 3: 18G hypodermic needle is inserted into the flexor tendon sheath.

The finger is held firmly and hyper-extended at the metacarpophalangeal joint. Hyperextension is essential, as it causes the flexor tendon sheath to lie directly under skin and allows the digital neurovascular bundles to displace to either side. A 18 G hypodermic needle is inserted into the flexor tendon sheath or nodule proximally, with the bevel of the needle oriented along the line of the finger.

Position of the needle in the tendon sheath is confirmed by actively flexing the digit and observing the motion of the needle. The needle is then withdrawn slightly until it ceases to move with flexion of the fingertip.

The A1 pulley is cut by moving bevel of the needle longitudinally from proximal to distal. A grating sensation is felt by the operator as the needle tip cut through the transverse fibres of the A1 pulley. Loss of the grating sensation indicates adequacy of the release, the patient is asked to actively flex and extend the finger to verify the success of the procedure.

Figure 4: Flexion to check release.

The needle is withdrawn and the patient is asked to flex and extend the digit several times.

If a patient demonstrated continued triggering the needle is reinserted more distally and additional release is performed.

Figure 5: Local anaesthesia mixed with steroid infiltration.

1 ml lignocaine mixed with 1 ml of injection depomedrol locally infiltrated. A compression bandage of the affected hand done and the patient is asked to remove the dressing after 24 hours and start the ice pack application. Activities of daily living or activities as tolerated started from the next day. Oral antibiotics and analgesic was prescribed for 5 days. Physiotherapy and rehabilitation is started after 2 days in the form of active finger movement and stretching and is given for minimum of 2-3 weeks.

Follow-up and data collection

Patients were scheduled for follow-up visits at specific time points, such as 1 week and 3 weeks postoperatively. During these visits, data on pain levels, range of motion, and hand function were collected using the designated assessment tools. Any complications or adverse events related to the procedure were also recorded. Missing data and patient dropout rates were carefully documented.

Outcome measures

The study assessed various outcome measures to evaluate the functional outcome of percutaneous release. The primary outcome measure was pain relief, which was typically evaluated using visual analog scales (VAS).

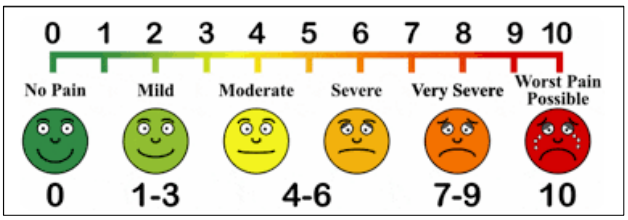

Figure 6: Visual analog pain scale.

Data analysis

The collected data were analyzed using appropriate statistical methods. Descriptive statistics were used to summarize the demographic characteristics of the study participants. Continuous variables, such as pain scores and range of motion, were presented as means with standard deviations or medians with interquartile ranges. Categorical variables, such as hand function outcomes, were presented as frequencies and percentages. Statistical tests, such as paired t-tests or Wilcoxon signed-rank tests, were employed to assess the significance of changes in pain scores, range of motion, and hand function from baseline to follow-up visits.

RESULTS

The study was conducted in the Department of Orthopaedics, Shri Mahant Indiresh Hospital, Patel Nagar, Dehradun. It was a hospital based Prospective controlled analytical study. During the study period of 18 months total 50 patients were enrolled with finger pathology whose symptoms were suggestive of trigger thumb/finger and following findings were observed.

Most of the patients belonged to the age group of 41-50 years which constituted 30% of the total cases, followed by the age group of 51-60 years that is 30% of the total cases, 5 cases each in age group of 31-40 years and 61-70 years that is 10% each of the total cases, only 4 cases and 6 cases were seen in the age group of <30 years and >70 years which was 8% and 12% respectively of the total cases. To summarised this, we concluded that 60% of total cases belonged to age group 41-60 years in our study (Figure 7).

Female: male ratio was 1.3:1in our study. Majority of patients were females (56%) and males were (44%) (Table 1).

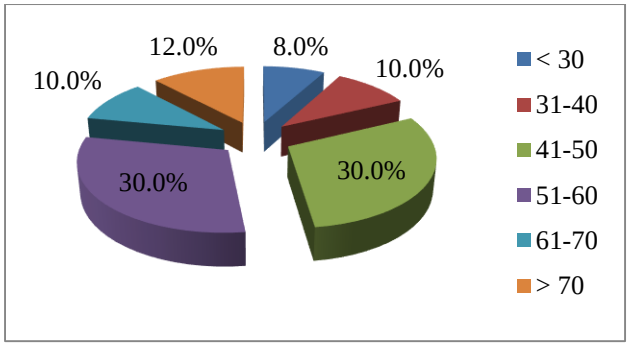

Figure 7: Age-wise distribution of cases in the study.

Table 1: Distribution of patients according to gender.

Sex	No. of cases	Percentage
F	28	56.0
M	22	44.0
Total	50	100.0

Most of the patients had the right 1st digit involved which was 32% (16 cases), followed by left 1st and right 3rd digit both of which were 18% each (9 cases each), 14% (7 cases) of right 4th digit were reported, 6% (3 cases) of right 2nd digit and 4% (2 cases) each of left 2nd, 3rd and 4th digit were reported.

Before the release of affected digit, 28 cases (56%) belonged to grade 3, 13 cases (26%) belonged to grade 4 and only 9 cases (18%) belonged to grade 1of grade of triggering (Figure 8).

Complete resolution immediately after the procedure was seen in majority of cases, so 41 cases were of grade 0 which constituted 82% of total cases, 7 cases (14%) had grade 1, 2 cases (4%) had grade 2 of triggering immediately after the procedure (Figure 8).

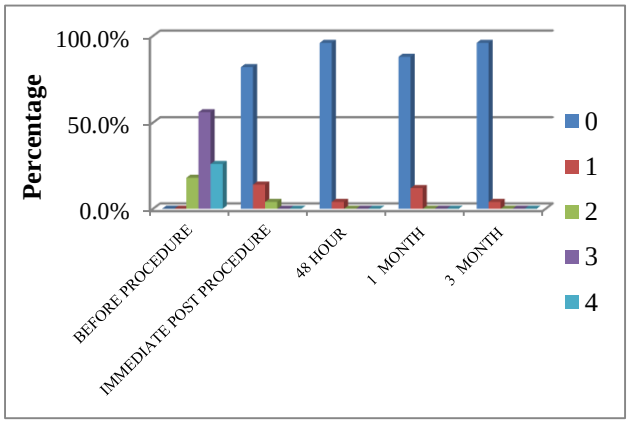

Figure 8: Distribution of cases according to change in grade of triggering pre procedure versus post procedure.

Mean VAS of 8.4 with maximum of 10 and minimum of 6 grading was seen pre procedure on VAS. Whereas Mean VAS of 6.2 with maximum of 10 and minimum of 2 grading was seen in immediate post procedure period. At 48 hours post procedure, Mean VAS of 3.06 with maximum of 8 and minimum of 0. Mean VAS of 1.12 was seen at 1-month post procedure period with a maximum of 7 and minimum of 0. At 3-months post procedure, mean VAS of 0.42 with maximum of 4 and a minimum of 0 (Figure 9).

Most of the cases 47 (94%) no complications were seen post procedure. Only 2 (4%) cases had scar tenderness and only one (2%) cases had tendon rupture (Figure 10).

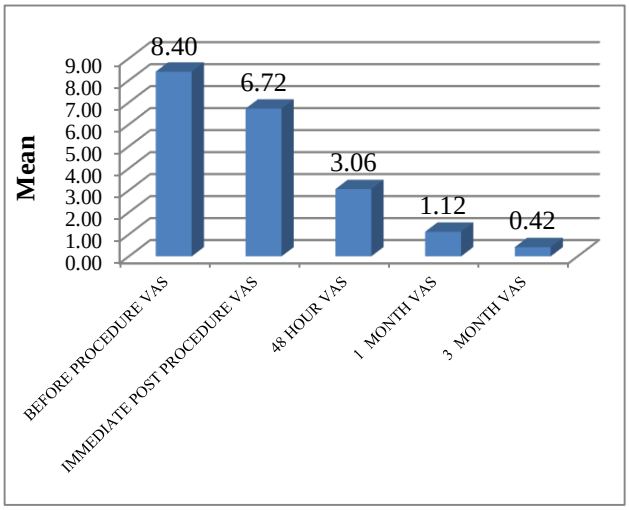

Figure 9: Mean VAS score at different time intervals.

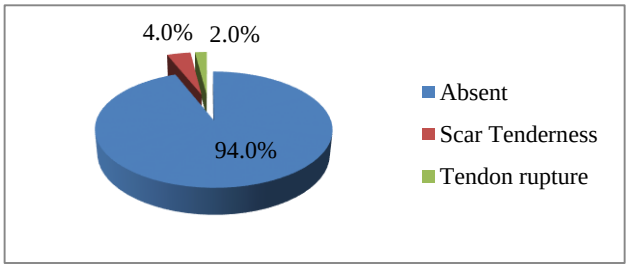

Figure 10: Distribution of cases according to complications post procedure.

DISCUSSION

Trigger finger is a common, debilitating condition of hand with incidence rates 2.2% in general population more than 30 years and 10% in the diabetes mellitus populations. It is more common in healthy middle aged women with a frequency of two to six times than that seen in men. The incidence increases with increasing age, to a peak in the fifth or sixth decade of life. It commonly involves the thumb, followed by the ring, long, little, and index fingers in multi digit involvement.

Many treatment options for trigger finger or stenosing tenosynovitis have been described. Conservative treatment in the form of splinting, NSAIDS and injection of steroid

have been recommended by many authors. Surgical treatment by cutting the A1 pulley can present with unacceptable complications like impaired wound healing, bleeding, infection, and neurovascular injury and needs more time to recovery and costly to patient.

In all these cases the results of percutaneous finger release, its functional outcome, pain assessment before and after the procedure on visual analogue scale (VAS) and complications were evaluated.

Demographic based

In the present study all the patients were categorised into <30 years, 31-40 years, 41-50 years, 51-60 years, 61-70 years and >70 years age groups respectively. Most of the patients were 41-60 years age (60%), followed by >70 years age group (12%), 31-40 years age group (10%), 61-70 years age group (10%) and only (8%) were of <30 years of age. In a study done by Panghate et al (56%) cases were >50 years of age, 39% were 40-50 years age and 5% were <40 years of age, which was similar to our study.[13] A study done by Rawat et al, the mean age of occurrence was 41 years and Pandey et al showed mean age of 52 years.[14,15]

Gender based

Our study, female: male ratio of 1.3:1 that is majority of patients were females. Similar results were seen in the study done by Panghate et al i.e. female: male ratio of 1.6:1.[13] Unlike our study Rawat et al had almost double incidence in females with female: male ratio of 2:1.[14]

Affected side

Right hand fingers (70%) were more involved than left hand fingers (30%), Thumb was most involved digit (50%) followed by middle finger (22%) which was trailed by the ring finger (18%) and index finger (10%) was the least involved digit. Similar to our study in a study done by Ghazy et al, right hand (70%) was more involved than the left hand (30%) and unlike our study in a study done by Rawat et al, right hand was involved in 60% of cases and left hand in 40% of the cases.[14,16] The results of Haki et al and Jegal et al were similar to our study with majority of cases having the thumb involved (43%) and (41%), which was followed by ring finger (19%) and (33%).[17,18] In a study done by Rawat et al, index finger (41%) was the most involved digit followed by thumb (38%) which was unlike our study.[14]

Grade of triggering

Majority of cases (56%) had grade 3 before procedure which was followed by grade 4 (26%) and grade 2 (18%). The grade of triggering in the immediate post procedure was grade 0 in most (82%) of the cases, followed by grade 1 (14%) and grade 2 (4%). On follow up at 3 months 96% of the cases were grade 0 which meant that complete resolution was seen, and only 4% of cases had grade 1 at 3 months follow up. Unlike our study Pandey et al had lower improvements in grades of triggering post procedure.[15] In a study done by Pandey et al, 69% cases had grade 2 of triggering pre procedure, 14% cases had grade 3, and 7% had grade 4, majority of their patients presented in grade 2 this maybe because the study was conducted in different geographic area, so variation is seen due to multiple factors like geographical condition, type of manual work and practices like taking medical treatment at the earliest.[15]

VAS score comparison

The pre procedure mean was 8.4 and at 1-month post procedure, the mean reduced to 1.7 and was only 0.95 at the follow up of 3 months. A study done by Panghate et al showed similar results with a pre procedure mean VAS score of 8.03, which improved to a mean VAS of 0.44 at follow-up.[13] Athough results in the study done by Jegal et al were slightly different from our study with a mean VAS of 5.8 before the procedure and reduced to 2.3 at 21 days follow up and further reduced to a mean of 1.3 at 3 months follow up.[18] In some studies like the study done by Colbourn et al instead of VAS scale numeric pain rating scale was used, as the authors found it simpler to administer to participant with varying cultural backgrounds.[19] Further research into valid and reliable outcome measures for trigger finger is recommended.

Complications

The complications following the percutaneous release of trigger finger and majority (94%) of the patients did not have any complications after the procedure, however scar tenderness was seen in 4% of the cases and tendon rupture in 2% of the cases. There was loss of finger flexion and patient was managed surgically with Tendon repair. Eastwood et al performed percutaneous release using a 21-gauge needle on 35 fingers with resolution of triggering in 94%.[20] Ragoowansi et al used a “lift and cut” percutaneous technique in 180 patients with a recurrence rate of 5% and no nerve or tendon injuries.[21] Haki et al used a specially designed hooked knife to perform percutaneous release in 185 trigger fingers and achieved satisfactory results in 94%.[17]

Rajeswaran et al performed ultrasound- guided percutaneous release in 35 fingers, with complete resolution of symptoms in 91%.[22] Pegoli et al compared open with endoscopic trigger in 200 patients and found equivalent results.[23] The published series for percutaneous release are much smaller than those for open release, generally fewer than 100 patients.

The published prospective randomized trials are too small to identify differences in infrequent adverse events such as incomplete release and nerve or tendon injury. The definition of an adverse event varies widely among studies. For instance, Will and Lubahn included postoperative pain and swelling as a complication and documented an adverse event rate of 30% of the patients

in their series, whereas Turkowski et al defined an adverse event as neurapraxia, tendon bowstringing, or ulnar deviation of the finger, and reported an adverse event in 8%.[25,26]

Randomized trials evaluating adjunctive techniques for percutaneous release techniques such as ultrasound guidance are needed to determine whether there is a benefit over blind release. Randomized trials comparing different percutaneous release devices (e.g., hypodermic needle, knife blade) may help determine the advantages and disadvantages of specific devices. The significance of incomplete release and superficial flexor tendon injuries with percutaneous release requires further study and longer-term follow- up with respect to recurrence and range of motion. The value of various approaches should be investigated because percutaneous release done in the office seems much more economical.

Limitation

First limitation of this study are small sample size and non-availability of complex cases with contracture and Fixed flexion deformity. Second, the pain tolerance is variable and varies patient to patient. So that difference in VAS scoring could be the limitation in this study.

CONCLUSION

In this study, we observed that percutaneous release with 18 G needle is a safe, inexpensive, fast, less distressing and more comfortable treatment. Injuries to the digital nerves were described as complications of the percutaneous technique. However, hyperextension of the finger helps to avoid injury to digital nerve. This technique can be performed as an outpatient procedure. It can be performed with ease, speed and safety in outpatient clinics and is well tolerated to the patients. It provides an alternative treatment option for patients who have failed conservative management or prefer a minimally invasive approach.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Notta A. Research on a particular condition of the tendon sheaths of the hand, characterized by the development of a nodosis along the path of the flexor tendons of the fingers and by the impediment of their movements. Arch Gen Med.1850;24:142.
2. Menzel A. On springing fingers. Boston Med Surg J. 1874;91:298-300.
3. Howard L, Pratt D, Bunnell S. The Use of Compound F (Hydrocortone) in Operative and Non-operative Conditions of the Hand. J Bone Joint Surg. 1953;35(4):994-1002.
4. Lorthioir J. Surgical Treatment of Trigger-Finger by a Subcutaneous Method. J Bone Joint Surg. 1958;40(4):793-5.
5. Hueston JT, Wilson WF. The aetiology of trigger finger explained on the basis of intratendinous architecture. Hand. 1972;4:257-60.
6. Doyle JR, Blythe WF. The finger flexor tendon sheath and pulleys: anatomy and reconstruction. AAOS Symposium on tendon surgery in hand. St. Louis: the CV Mosby Company. 1975;81.
7. Doyle JR, Blythe WF. Anatomy of the flexor tendon sheath and pulleys of the thumb. J Hand Surg. 1977;2:149.
8. Quinnell RC. Conservative management of trigger finger. The Practitioner. 1980;224:187-90.
9. Freiberg A1, Mulholland RS, Levine R. Nonoperative treatment of trigger fingers and thumbs. J Hand Surg Am. 1989;14(3):553-8.
10. Lin GT, Amadio PC, An KN, et al. Functional anatomy of the human digital flexor pulley system. J Hand Surg [Am]. 1989;14:949-56.
11. Yosipovitch G1, Yosipovitch Z, Karp M, Mukamel M. Trigger finger in young patients with insulin dependent diabetes. J Rheumatol. 1990;17(7):951-2.
12. Anderson B1, Kaye S. A prospective study of the response to local injection. Arch Intern Med. 1991;151(1):153-6.
13. Panghate A, Panchal S, Prabhakar A, Jogani A. Outcome of percutaneous trigger finger release technique using a 20-gauge hypodermic needle. J Clin Orthop Trauma. 2020;15:55-9.
14. Rawat P, Vij K, Percutaneous release of trigger finger: An easy and safe procedure. Indian J Orthop Surg. 2018;4(2):137-40.
15. Pandey BK, Sharma S, Manandhar RR, Pradhan RL, Lakhey S, Rijal KP. Percutaneous trigger finger release. Nepal Orthop Assoc J. 2013;1(1).
16. Ghazy AS, Bayoumy EM, Ali EE. Evaluation of percutaneous release of trigger finger. Benha J Appl Sci. 2022;7(2):79-82.
17. Haki et AL.reported no complications after their 185 PR procedures.
18. Jegal M, Woo SJ, Il Lee H, Shim JW, Park MJ. Effects of simultaneous steroid injection after percutaneous trigger finger release: a randomized controlled trial. J Hand Surg. 2019;44(4):372-8.
19. Colbourn J, Heath N, Manary S, Pacifico D. Effectiveness of splinting for the treatment of trigger finger. J Hand Ther. 2008;21(4):336-43.
20. Eastwood DM, Gupta KJ, Johnson DP. Percutaneous release of the trigger finger: An office procedure. J Hand Surg Am. 1992;17:114-7.
21. Ragoowansi R, Acornley A, Khoo CT. Percutaneous trigger finger release: The 'lift-cut' technique. Br J Plast Surg. 2005;58:817-21.
22. Rajeswaran G, Lee JC, Eckersley R, Katsarma E, Healy JC. Ultrasoundguided percutaneous release of the annular pulley in trigger digit. Eur Radiol. 2009;19(9):2232-7.

23. Pegoli L, Cavalli E, Cortese P, Parolo C, Pajardi G. A comparison of endoscopic and open trigger finger release. Hand Surg. 2008;13(3):147-51.
24. Patel MR, Moradia VJ. Percutaneous release of trigger digit with and without cortisone injection. J Hand Surg Am. 1997;22(1):150-5.
25. Will R, Lubahn J. Complications of open trigger finger release. J Hand Surg Am. 2010;35(4):594-6.
26. Gregory A. Turowski, Peter D. Zdankiewicz, J. Grant Thomson. The results of surgical treatment of trigger finger. J Hand Surg. 1997;22(1):145-9.

Cite this article as: Maheshwari S, Mishra AK, Saxena R, Kaleem B, Badoni N. Percutaneous release of trigger finger and its functional outcome. Int J Res Orthop 2024;10:281-7.