Section: Orthopedics

Original Research Article

A STUDY ON ANALYSIS OF FUNCTIONAL OUTCOME OF PERCUTANEOUS RELEASE IN TRIGGER FINGER UNDER ULTRASOUND GUIDANCE – A NOVEL TECHNIQUE

A. Murugesan[1], S. Saravanan[1], L. Kumar[2]

[1]*Assistant Professor, Department of Orthopedics, Government Namakkal Medical College, Namakkal, Tamil Nadu, India*
[2]*Associate Professor, Department of Orthopedics, Government Namakkal Medical College, Namakkal, Tamil Nadu, India*

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Corresponding Author:
Dr. A Murugesan,
Assistant Professor, Dept of Orthopedics, Government Namakkal Medical College, Namakkal, Tamil Nadu, India.
Email: drmurugesh04@gmail.com

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ABSTRACT

Background: Trigger finger is a condition that causes painful catching or popping of the involved flexor tendon as the patient flexes and extends the fingers. This condition is also known as "stenosing tenosynovitis". The objective is to analyse the functional outcome of percutaneous release in trigger finger under US-guidance.

Materials and Methods: This prospective study was conducted among Patients with trigger finger satisfying the inclusion criteria attending OPD at Govt Rajaji hospital in the dept of Orthopaedics & Traumatology, Madurai. Duration of study was Aug 2016 to September 2018.

Results: Total no of Trigger finger with Froimson grade II to IV patients came to outpatient department in our hospital was 30 patients. Out of which 25 patients were operated with this procedure out of which 10 male & 15 female patients. It shows the prevalence was increased among female patients. Post operative rehabilitation was started according to the protocol. All the patients were followed up to 2 year at regular 3 months interval to assess the functional outcome. Functional outcome by DASH score and QUINNELL'S Grading score. DASH score is 100 point score, 30 questionnaire related daily activities. Lower the score better is the outcome. In our study, pre operative mean DASH score was 24.09 and post op mean DASH score was 3.99. It indicates that the percutaneous release of A1pulley in trigger finger improve the outcome of hand functions. QUINNELL'S Grading score using clinical assessment for severity of triggering after the procedure. Grade I as Excellent, Grade II as Good, Grade III- V as poor outcome. According QUINNELL'S Grading to 23 patients had excellent outcome, 2 patients had good outcome and none of the patients had poor outcome in our study. Total complications are two. Two patients had inflammation over the procedure site. Which was settled with analgesics and antibiotics within a week time, but the same 2 patients had occasional pain at the release site in the follow up period. Another two patients had hematoma following surgery for which compression dressing and analgesic were given. Hematoma was settled with in 5 to 7 days period.

Conclusion: Trigger finger Percutaneous release of first annular pulley (A1 pulley) under ultrasound-guided is a safe, pain free, effective and outpatient procedure for patients with Trigger finger. It is better alternative to open surgical procedure and can be considered as primary definitive treatment option for trigger finger.

Keywords: Trigger finger, QUINNELL'S Grading score, DASH score, Complication.

INTRODUCTION

Trigger finger is one of the most common pathologic conditions in hand surgery, with incidence rates of 2.2% throughout life time in the non-diabetic population more than 30 years and 10% in the diabetes mellitus populations.[1]

It's is more common in women than in men, and the incidence increases with increasing age, to a peak in the fifth or sixth decade of life. Its more commonly involved in thumb, followed by the ring, long, little, and index fingers in multi digit involvement. Secondary trigger finger can be seen in patients with diabetes, gout, renal disease, RA, and other rheumatic diseases and is associated with a worse prognosis after conservative or surgical management.[2]

There are various conservative and surgical methods for the treatment of trigger finger. Usually, trigger finger is initially treated with conservative managements, like wearing a splint and taking non steroidal anti-inflammatory drugs or undergoing cortisone injections in acute stage. If conservative managements fail, the A1 pulley can be surgically released; good results have been reported in 60%–97% of cases.[4]

Despite its popularity and efficacy, the classic open volar release technique for the A1 pulley release has been related to dissatisfaction rates as high as 15% to 26%.). Percutaneous surgical technique, as a convenient, cost-effective method with a low complication rate, is becoming more popular than open surgery. It was First described by Lorthioir in 1958.[4]

Blind percutaneous release of A1 pulley by using simple clinical landmarks was first described in 1958. The results and effectiveness were equal to that of an open release procedure; however, complications like wide release of A1 pulley that extends to the A2 pulley or injury to interdigital nerves have been reported. Even though, the complication rate is low (0.02%).

Jou and Chern,[5] introduced ultrasound imaging as an adjunct for guiding the needle in percutaneous release of trigger finger. With the use of modern ultrasonographic equipment, this type of treatment procedure can also be done using US guided technique and performed with a 2.5–2.6-mm hook or a 19-gauge, 1.27-mm needle. This technique has the advantage of providing direct visualization of the neurovascular structures during the procedure.In ultrasonography A1 pulley seen as (1): hypoechogenic or even Doppler hyperemic thickening of the A1 pulley with abnormal underlying flexor tendons.).

The purpose of our study was to analyse the functional outcome of percutaneous release in trigger finger under US-guidance.

MATERIALS AND METHODS

This prospective study was conducted among Patients with trigger finger satisfying the inclusion criteria attending OPD at Govt Rajaji hospital in the dept of Orthopaedics & Traumatology, Madurai. Duration of study was Aug 2016 to September 2018.

Sample size: 25 cases were taken up for our study.

Inclusion Criteria

- Adult Trigger finger – FROIMSON Grade 2,3 &4 who had not responded to conservative treatment
- Recurrent trigger finger inspite of local steroid injection at least for two episodes.
- Patient age from 30 to 70 years.

Exclusion Criteria

- Patient not fit for percutaneous release.
- FROIMSON grade 1.
- Bony deformities.
- Diabetic Patients.

Source of Data

All the patients selected for study were examined according to protocol, associated comorbities were noted and clinical and lab investigations carried out in order to see the fitness for surgery. Consent of the patient was obtained for procedure. Patients were followed till good functional out come is achieved Clinically. 25 cases were studied.

Pre operative preparation:

Patients underwent a pre-operative evaluation including the following parameters: TC, DC, Hb, ESR, CRP, urea, creatinine, blood sugar,RA factor. Nerve conduction study may be done in patients with any evidence of peripheral nerve involvement.

X-RAY: Plain xray of Hand to ruled out bony deformities.

instruments:

18 G Needle

Anaesthesia: Local anaesthesia with lignocaine.

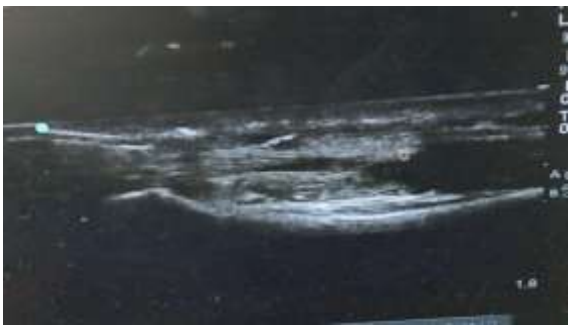
Procedure: Position -supine position and patient hand in arm table.

Under sterile aseptic precaution, surgical parts painted and drapped.

The Metacarpophalangeal joints are hyperextended by turn up the palm placing the hand over a rolled towel and it will displace the neurovascular structures dorsally. The first annular pulley (A1 pulley) is palpated directly over the metacarpal head of involved finger.

The skin and flexor tendon sheath are infiltrated with 2 to 3mL of 1% lidocaine solution using a 24-gauge needle.

A 18-gauge needle is placed percutaneously through the annular pulley, and placement within the flexor tendon is confirmed by ultrasonogram and also by asking the patient to slightly flex the digit.



The needle is withdrawn slowly and rotated to align the bevel of the needle along the longitudinal axis of the tendon under the guidance of ultrasound [Figure 1].

A sweeping motion is used to cut the first annular pulley (A1 pulley) proximal and distal to the site. Disappearance of a grating sensation indicates complete sectioning of the annular pulley and also checked the free movement of tendon over metacarpophalangeal joint under ultrasound guidance.

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

An adhesive bandage is applied, and the patient is instructed to use the hand for activities as tolerated. Patients should be advised to expect a mild to moderate degree of discomfort for several days; ice and anti inflammatory drugs are helpful in the immediate 48 to 72 hours postoperatively.

Post operative protocol:

- FOLLOW UP at 3rd day,7th day,3 weeks, 6 weeks, 12 weeks, 6 months,9 months,12 months,18 months & 24 months.
- Routine analgesics.
- Note for any Complications:
  - Infection
  - Recurrence
  - Digital nerve injury
  - Constant pain.

RESULTS

Age of the patients ranges from 30-70years with the mean age of 53 years. Among 25 patients studied 48% (12) of patients were 50-70 years of age .it shows increased incidence among older population when compare to young population.

Table 1: Age Distribution

Age (in years)	Frequency	Percentage (%)
30–40	3	12
51–50	9	36
61–70	5	20
71–80	8	32

Out of 25 patients, 10 patients were male and 15 patients were female. It comes around 60 % of female predominance, it reflects the high prevalence among female population.

Side distribution: Out of 25 patients studied 18 patients were affected with right hand and 7 were left hand with the percentage of 72% on the right side.

Froimson grade distribution: Out of 25 patients 23 were Grade II trigger finger and 2 patients was Grade III trigger finger.

Table 2: Froimson Grade Distribution

Froimson Grade	Frequency	Percentage (%)
Grade II	23	92
Grade III	2	8
Grade IV	0	0

Out of 25 patients 19 patients had Ring finger involvement,6 patients had middle finger involvement and one patient had index finger involvement.it shows Ring finger involvement is more common than other finger involvement.

Table 3: Finger Distribution

Finger	Frequency	Percentage (%)
Index	1	4
Middle	5	20
Ring	19	86
Thumb	0	0

Complications: Only two complication were observed in our study, first one is hematoma, was observed in two patients; it appeared Immediately after the procedure, for which compressive dressing applied and analgesics were given and became less noticeable 1 week later.

Two patients had inflammatory reaction at the needle insertion site, for which antibiotics and analgesics were given and the inflammatory reaction settled with in a 10 days period. The same two patients had occasional pain with normal movements of the finger even in the final followup.

Table 4: Complication

Complications	Frequency	Percentage
Hematoma	2	8
Inflamation	2	8
Digital nerve injury	0	0
Bowstringing	0	0

There were no other complications and no clinical signs of damage to the interdigital nerves, flexor tendons, or A2 pulleys and no bowstringing.

Preop and post op dash score: Post op dash score decreased significantly when compared to pre op which indicates better outcome with the treatment.

In post op QUINNELL'S score assessment 23 patients had excellent outcome, two patients had good outcome.

Table 5: Quinnell's Score Outcome Assesment

Quinnell's score	No of patients
GRADE I (EXCELLENT)	23
GRADE II (GOOD)	2
GRADE III-IV(POOR)	0

Total no of Trigger finger with Froimson grade II to IV patients came to outpatient department in our hospital was 30 patients out of which 5 patients were not willing for surgery, hence they were excluded from study. 25 patients were operated with this procedure out of which 10 male & 15 female patients. It shows the prevalence was increased among female patients.

Post operative rehabilitation was started according to the protocol. All the patients were followed up to 2 year at regular 3 months interval to assess the functional outcome.

Functional outcome by DASH score and QUINNELL'S Grading score.

DASH score is 100 point score, 30 questionnaire related daily activities. Lower the score better is the outcome.In our study, pre operative mean DASH score was 24.09 and post op mean DASH score was 3.99. It indicates that the percutaneous release of A1pulley in trigger finger improve the outcome of hand functions.

QUINNELL'S Grading score using clinical assessment for severity of triggering after the procedure. Grade I as Excellent, Grade II as Good, Grade III- V as poor outcome.

According QUINNELL'S Grading to 23 patients had excellent outcome, 2 patients had good outcome and none of the patients had poor outcome in our study.

Total complications are two. Two patients had inflammation over the procedure site. Which was settled with analgesics and antibiotics within a week time, but the same 2 patients had occasional pain at the release site in the follow up period. Another two patients had hematoma following surgery for which compression dressing and analgesic were given. Hematoma was settled with in 5 to 7 days period.

Age/Sex: 38/F

Diagnosis: Trigger Finger, Left F4 -Froimson Grade-II.

Pre Op Picture

Intra Op Picture

Post op Follow-up

Outcome:
PRE OP DASH SCORE: 14.2
POST OP DASH SCORE: 2.5
Excellent
Post op quinnell's score: excellent

DISCUSSION

Trigger finger is a common, debilitating condition of hand with incidence rates of 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 that seen in men. The incidence increases with increasing age, to a peak in the fifth or sixth decade of life. The commonly involved finger is the thumb, followed by the ring, long, little, and index fingers in multi digit involvement.

For Froimson grade I, mostly treated by conservative management with analgesics, splinting and physiotheraphy. In Froimson grade II, III & IV, after the conservative treatment and steroid injections are fail, it needs surgical procedures. Traditional open surgical procedure is performed by cutting the A1 pulley via a longitudinal or transverse incision. This technique has been used for a long time.

However the surgical procedures can present with unacceptable complications like impaired wound healing, bleeding, infection, and neurovascular injury. Even in healthy patients, for surgical procedure it needs significant recovery time, wound care, rehabilitation, and cost.

Lange-Riess et al, observed from their open surgery series for 305 trigger finger cases reported only a total of 9 complications, including 2 superficial wound infections,1 delayed wound healing, and 6 temporary digital sensory losses. No permanent complications were detected after 14-year follow-up period.

Percutaneous trigger finger release of A1 pulley offers an alternative to open surgery. Ultrasound visualization ensures placement of needle under the first annular (A1) pulley, above the flexor tendon and away from the neurovascular structures. It can be done as an outpatient procedure, and postprocedural care is nil. Patients may return to normal activities the next day.

Eastwood et al,[6] performed the percutaneous surgical release technique as a convenient, cost-effective procedure with a low complication rate, is becoming more popular than open surgery. He is the one who suggested Percutaneous release with an aim to reduce the complications that can be seen with open release surgery, such as infections, painful scar formation, bowstringing of the flexor tendons due to pulley damage, weakness, joint stiffness, and digital neurovascular damage.

Ha KI et al,[7] reported, no complications after their 185 Percutaneous release procedures. Wang HC did a retrospective study comparing 32 open surgical release cases and 40 Percutaneous release cases. No statistical clinical differences between these two procedures were detected. The results suggested that Percutaneous release is a satisfactory alternative to open release.

Gilberts et al,[8] observed in his long-term comparative study indicated outstanding results for both techniques. It is important to minimize the risk of A2 pulley injury during percutaneous trigger finger release. Flexor tendon bow stringing as a result of excessive A2 pulley injury (>25% of its length) is a well established, though uncommon, complication of open trigger finger releases. Using sonographically guided percutaneous needle techniques, did not observe any A2 pulley injury.

In 1958 Lorthioir1 first described the percutaneous trigger finger release has been advocated as an alternative to open release. The proponents of this technique argue that it provides safe division without the need for incisions, resulting in decreased post-operative pain and fast recovery. Furthermore, most of them feel that it reduces the costs, as it can be performed faster with local anaesthesia. Controversy persists regarding the safety and efficacy of this procedure. Despite the proposed advantages, percutaneous trigger finger release has not gained widespread acceptance due to concerns with injury to the tendon or neurovascular bundle during this blind procedure, inaccuracy of topographical landmarks, and potential for incomplete release.

In an innovative attempt to improve the safety of Percutaneous trigger finger release, Jou and Chern5 introduced usg guided imaging as an adjunct for guiding the needle. Their series reported 97% of patients with complete resolution of symptoms and what they subjectively felt was increased safety.

All the patients were operated only after obtaining informed consent. 25 patients were operated under local anaesthesia. Using the ultrasound for needle insertion and percutaneous release of A1pulley.

Post-operative rehabilitation done according to the protocol. Patients were followed up to two years to assess the pain, infections, severity of triggering recurrence using Quinnell's criteria and neurovascular injury. Quinnell's criteria and DASH

scoring was used to assess the functional outcome of percutaneous trigger finger release.

Advantages:

- It is a day care procedure.
- Minimally invasive
- Minimal or No damage to digital nerves and vessels
- No stitches needed
- Less expensive
- Procedure with good results in short term rehabilitation.

CONCLUSION

In conclusion, ultrasound -guided percutaneous release of the A1 pulley in trigger finger is achievable with an 18-gauge needle. The procedure is painless, quick, risk-free, low cost and requires almost no time off work, and can be performed on at-risk patients and as an outpatient procedure. The trigger digit resolved immediately and providing satisfactory results for all patients.

In our study, Trigger finger Percutaneous release of first annular pulley (A1 pulley) under ultrasound-guided is a safe, pain free, effective and outpatient procedure for patients with Trigger finger. It is better alternative to open surgical procedure and can be considered as primary definitive treatment option for trigger finger.

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