EFFECTIVENESS OF PERCUTANEOUS RELEASE OF A1 PULLEY WITH 18-GAUGE NEEDLE AND OPEN SURGICAL RELEASE IN THE TREATMENT OF TRIGGER FINGER

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ABSTRACT

Background: Trigger finger is relatively common problem among hand disorders and is treated conservatively, local steroids injections and open and percutaneous surgical methods. Aim of the study was to find the comparative effectiveness of percutaneous release of A1 pulley with 18-gauge needle and open surgical release in the treatment of trigger finger.

Subjects and Methods: This randomized control trial was done at Department of Orthopedics and Trauma, Khyber Teaching Hospital, Peshawar on 162 patientsfrom March 2015 to September 2016, presenting with any digit having trigger finger (Quinnell system of grading 2 to 4) in each group, to compare the effectiveness of open surgical release and (Group A) and percutaneous release with an 18-gauge needle (Group B) by re assessment at 6 weeks follow up. Data was analyzed with SPSS 23.

Results: In group A & B, there were 75 (46.30%) and 59 (36.42% males and 87 (53.70%) and103 (63.58%) females respectively.(p value = 0.0904) with mean duration of symptoms of 6.16 ± 2.69 and 6.25 ± 2.70 respectively.(p value = 0.709). Effectiveness of open surgical release groupand percutaneous release was 90.12% and 38.27% respectively (p value = 0.0001). Effectiveness according to Gender (0.490), age group (0.649) and duration of symptoms (0.559) was insignificant.

Conclusion: The open surgical release is more effective than percutaneous release of trigger finger using 18G needle in our local adult population.

Key Words: Trigger Finger; Percutaneous Release of A1 Pulley; Quinnell System of Grading.

INTRODUCTION

Trigger Finger (Stenosing tenosynovitis) is a common condition which causes pain and disability in the hand and accounts for a large number of patients presenting to the outpatient department[1]. It is caused by the inflammation and subsequent narrowing of the A1 pulley through which the flexor tendon passes at the metacarpal head, leading to restricted movement of the tendon through the pulley [2]. Overuse, repetitive movements, sports-related and professional activities have all been implicated as mechanical causes of pulley and retinacular thickening.[3]

Non-operative modalities include splinting, steroid injection, local anesthetic injection, and behavior modification. However, overall results with non-operative management have been variable and disappointing. Operative treatment of trigger thumb includes incision of the A1 pulley by percutaneous or open technique. Success rates have proven to be higher with surgical treatment, but so are complication rates.[4]

Percutaneous A1 pulley release is an effective, safe, and convenient procedure for the treatment of trigger finger[5]. Because of its minimal invasiveness, it reduces the risk of complications associated with open procedures. It can be carried out at an outpatient department, is less painful and allows the patient to return to daily activities and work in a shorter time[6]. A satisfactory result with complete relief of triggering was achieved in 93% of patients using percutaneous trigger finger release with no complications.[5]

In another trial the reported success rate was unsatisfactory with release achieved in three out of eighteen trigger fingers, an incomplete release in 83% of patients [7]. In one hundred percutaneous trigger finger releases, successful percutaneous release was achieved in only 59% of patients[8].

The present study was designed in order to determine the effectiveness of percutaneous release of trigger finger using 18G needle in our local adult population.

OBJECTIVE

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To compare the effectiveness of percutaneous release of A1 pulley with 18-gauge needle and open surgical release in the treatment of trigger finger.

MATERIAL AND METHODS

This randomized control study was done at Department of Orthopedic and Trauma, Khyber Teaching Hospital, Peshawar during 6 months fromMarch 2015 to September 2016 on162patients in each group selected by Consecutive (non-probability) sampling. The inclusion criteria adopted was; patients of either gender of 30-60 years, with any digit having Stenosing tenosynovitis with symptom lasting for at least 3 months. Trigger finger with Quinnell system of Grade 2-4 were included. The patients having rheumatoid arthritis, trigger finger due to trauma resulting in open or closed fractures of the hand or wrist, any contractures or palsies involving the hand, polyneuropathy were excluded from the study.

Patients with Trigger finger who present to the outpatient departments at Orthopaedic and Trauma unit, Khyber Teaching hospital were included in the study based upon the above-mentioned selection criteria. The purpose and benefits of the study were explained to the patient and all patient were explained that this study is done purely for research and data publication and if agreed upon, then a written informed consent was obtained.

Prior to the procedure the patients with trigger finger were assessed using Quinnell system of grading and following the procedure, follow up was done at 6 weekstime and improvement was measured using the Quinnell system of grading to confirm the effectiveness of the procedure.The Quinnell system grades trigger fingers as: 0 - normal movement, 1 - uneven movement, 2 - locking can be corrected with active motion, 3 - locking corrected with passive motion, 4 - unable to correct deformity.

After inclusion in the study, patients were divided into two groups by lottery method; Group A and B undergone open surgical release and percutaneous release with an 18-gauge needle respectively. A detailed history was taken followed by detailed physical and systemic examination. Prior to any of the above mentioned procedures, a single dose of Ceftriaxone 1gram was given intravenously after test dose for infection prophylaxis and then the hand with trigger finger was cleaned with povidine iodine solution and draped using standard sterilization protocol. The site was marked by first palpating the area of A1 pulley using anatomical landmarks and local anesthesia was administered by injecting 5ml of Xylocaine 2% subcutaneously at the site of A1 pulley and wait will be done for 5 minutes.

In group A, 1.5cm transverse incision was made over the metacarpophalangeal crease. The A1 pulley and the flexor tendon sheath were exposed using blunt dissection. Retractors were used to protect the radial and ulnar neurovascular bundles and the A1 pulley was transected parallel to the flexor tendon sheath. Free finger movements without triggering ensured adequate release. The skin was sutured with a non-absorbableProlene 2/0. In group B, an 18-gauge needle was inserted through the skin at the proximal extent of the A1 pulley and into the flexor tendon and withdrawn slowly until it no longer moved together with flexor tendon movements. Thereafter, the pulley was divided by moving the sharp tip of the needle from distal to proximal, parallel to flexor tendon. Complete release of the A1 pulley was ensured at the end of the procedure by free thumb movements without triggering.

After performing any of the above mentioned procedures, patients of either group were kept for 15 minutes under observation in the OPD for hemodynamic stability and then the patients were allowed to go to home. All patients were given Tab. Voltral 50 mg 8 hourly after meal for pain control for 7 days. Patient were re assessed at 6 weeks follow up to determine intervention effectiveness in terms of improvement in at least 2 grades on Quinnell system of grading for trigger finger from baseline.

All information was recorded in a specially designed proforma. Confounders and bias were controlled by strictly following exclusion criteria. All the procedures and follow ups were conducted by single fellow surgeon of CPSP with minimum of 5 years' experience.

Data was entered and analyzed with the help of software SPSS version 23. Chi Square test was used to see the effectiveness in both groups (A & B) keeping p value ≤ 0.05 as significant. Effectiveness was stratified among age, affected side, gender and duration of trigger finger to see the effect modification. The results were presented as tables and graphs/charts. Post stratification Chi- Square test was also applied and $p \leq 0.05$ was taken as significant.

RESULTS

The total number of patients in each group, presenting with trigger finger of any digit, was 162. There were 75 (46.30%) males and 87 (53.70%) females in group A while in group B, there were 59 (36.42%) males and 103 (63.58%) females. (p value= 0.0904).

Maximum patients having trigger finger in group A and B were from the age group of 30-40 years i.e. 56 (36.57%) and 64 (39.51%) respectively while minimum patients were from the age group of 51-60 years. i.e. 12 (19.35%) and 27 (1.23%) respectively. (p value= 0.135)

Right hand was affected in 95(58.64%) and 80 (49.38%) patients in group A and B respectively while left hand triggers fingers were 67 (41.36%) and 82 (50.62%) in group A and B respectively. (p value = 0.118)

The mean age of males and females in group A

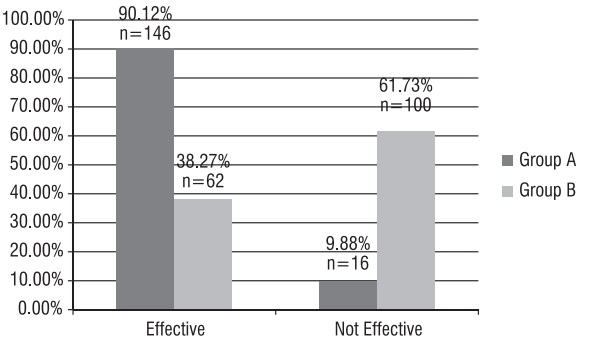

Figure 1: Effectiveness of open surgical release (Group A) and percutaneous release with 18-gauge needle (Group B) of a1 pulley in the treatment of trigger finger

Table 1: Gender Distribution of Effectiveness of open Surgical Release (Group A) and Percutaneous Release with 18-Gauge Needle (Group B) of A1 Pulley in the Treatment of Trigger Finger

Gender	Group A	Group B	P value
Male	68(46.58%)	27(43.55%)	0.490
Female	78(53.42%)	35(56.45%)	

Table 2: Age Groups Distribution of Effectiveness of Open Surgical release (Group A) and percutaneous release with 18-gauge needle (Group B) of a1 pulley in the treatment of trigger finger

Age Groups	Group A	Group B	p value
30-40	50 (34.25%)	21 (33.87%)	0.649
41-50	85 (58.22%)	32 (51.61%)	
51-60	11 (7.53%)	9 (14.52%)	

Table 3: Distribution of Effectiveness According to Duration of Symptoms in Patients with Trigger Finger Treated By Open Surgical Release (Group A) and percutaneous release with 18-gauge needle (Group B) of a1 pulley

Duration of symptoms	Group A	Group B	P value
3-6 months	89 (60.96%)	31 (50.00%)	0.559
7-9 months	39 (26.71%)	21 (33.87%)	
10-12 months	18 (12.33%)	10 (16.13%)	

was 40.70 years ± 7.34SD and 43.40 years ± 6.30SD respectively with overall mean age of 42.15 years ± 6.91SD while mean age of male and female in group B was 42.98 years ± 7.64SD and 41.73 years ± 6.62SD with respectively with an overall age of 42.19 years ± 7.01SD. (p = 0.954)

Maximum Patients were having 3-6 months duration of symptoms and were 100 (61.73%) and 99 (61.11%) in group A and B respectively while minimum patients were having 10-12 months and were 19 (11.73%) and 20 (12.35%) respectively in group A and B. (p = 0.132)

The mean duration of symptoms in group A and B were 6.16 ± 2.69 and 6.25 ± 2.70 respectively. (p = 0.709)

The frequency of trigger finger according to Quinnell system of grading for trigger finger in group A and B respectively were; Grade 2 in 37 (22.84%) and 40 (24.69%), grade 3 in 59 (36.42%) and 64 (39.51%) and Grade 4 in 66 (40.74%) and 58 (35.80%). (p= 0.899)

Effectiveness of open surgical release (group A) was noted in 146(90.12%) patients while in percutaneous release with 18-gauge needle (group B) of A1 pulley in the treatment of trigger finger was observed in 62 (38.27%) patients with a p value of 0.0001 which is highly significant.(Graph no.1) According to Gender distribution of effectiveness, 68 (46.58%) and 27 (43.55%) males in group A and B showed improvement respectively while in female it was 78 (53.42%) and 35 (56.45%) respectively. (p = 0.490). (Table No.1)Distribution of effectiveness according to age group, maximum effectiveness was noted 41-50 years which was 85 (58.22%) in group A and 32 (51.61%) in group B. (p = 0.649). Full detail is shown in table no. 2. Distribution of effectiveness according to duration of symptoms in patients, both groups showed maximum effectiveness in patients having 3-6 months duration of symptoms i.e. 89 (60.96%) and 31 (50.00%) in Group A and B while minimum was shown in patients having 10-12 months duration of symptoms i.e. 18 (12.33%) and 10 (16.13%) in group A and B respectively. The p value obtained was 0.559 which was statistically insignificant. (Table No.3)

DISCUSSION

Due to painful popping or clicking sound elicited by flexion and extension of the involved digit, the malady trigger finger earns its name. It was first described by Notta in 1850, it is caused by a difference in diameters of a flexor tendon and its retinacular sheath due to thickening and narrowing of the sheath.[9,10]Due to location of A1 pulley, it is subjected to the highest forces and pressure gradients during normal as well as power grip. Movement of the flexor tendon through the A1 pulley cause repeated friction and result in intratendious swelling resulting in fibrocartilagenous metaplasia.[11,12]

In our study female predominance (53.70%

and 63.58%) was noted. The female predominance in our study is attributed to the fact that with thorough counseling, majority of female patients agreed for the treatment; both open and percutaneous release while majority of male patients were insisting for conservative treatment**due to occupation.**

In our study, effectiveness of open surgical release (90.12%) was effective compared to percutaneous release with 18-gauge needle (38.27%). (p = 0.0001). The groups were statistically similar regarding age, gender, and laterality on initial admission.Guler F et al[13]compared the outcomes and complications of conventional open surgical release and percutaneous needle release in the treatment of trigger thumb and they advocate using open surgical release of trigger thumb they reported no recurrence, tendon bowstringing, joint stiffness, or loss of thumb range of motion. No patients in the open pulley release group had a digital nerve injury (P=.159). No statistical difference was found in the infection rate (P=.354). A total of 98.1% of patients in the open pulley release group and 97.1% of patients in the percutaneous release group were satisfied with treatment (P=.646).Although statistically insignificant, the authors believed that the 5.7% rate of iatrogenic digital nerve injury in the percutaneous release group is clinically significant and serious. On the other hand Dierks U et al,[14]ina prospective randomized trial for release of the first annular pulley (A-1 pulley) in trigger fingers with a percutaneous technique versus the open surgical technique, found that there was 100% success rate in terms of grip strength, active range of motion of the proximal interphalangeal joint, and residual pain in both groups.They recommended the percutaneous technique due to lower costs and quicker procedure with equal functional outcome.

Gilberts EC et al,[15]has reported excellent long-term results in open surgery for the treatment of trigger digits. In their study, recurrence was 1% after percutaneous release and 2% of patients after open release. Ninety-six percent and 98% of patients were either satisfied or very satisfied with the result after percutaneous and open surgery, respectively. Lin CJ et al,[16]evaluated trigger finger treated with either open or percutaneous release and noted that the long-term satisfaction rates were better in the open-release group. Huang HK et al,[17]has reported recurrence rate of 15% in percutaneous release of trigger digits. But on the other hand

In the literature, excellent results have been reported in percutaneous release of trigger finger. Mishra SR, et al[18]reported that 95.4% showed complete relief of symptoms with no recurrence and a statistically significant improvement in the range of motion, the visual analog scale score, and the Disability of Arm Shoulder Hand score with a P-value <0.0001 in percutaneous release.Dahabra IA et al,[19]in their study showed that with percutaneous release, satisfactory results were 92.8% in which fingers were completely free from triggering and treatment failure was7.2% which required open release.Pavlicný R[20]hadreported 95% complete relief of symptoms and restoration of a full range of motion in percutaneous release but 5% digits underwent repeat surgery.

To date, no study has been done in our set up comparing open and percutaneous release of A1 pulley by an 18G needle for trigger finger. We performed the study in a community setting with patients of various socioeconomic classes. Participants' compliance was high in follow up and our physician was expert in performing percutaneous release. In our study, statistical analyses were straightforward, and missing data analysis was not required. Also, there was no reported or recognizable side-effect during the course of the study like digital nerve or artery or tendon injury and infection. Overall, we have good evidence that open release of A1 pulley has good results in our set up as reported by other studies. We believe that precise anatomical knowledge of the pulleys are important factors for the effectiveness of the procedure and preventing complications. It must also be noted that the short follow-up period was the limitation of our study. Further research is needed to establish long-term effectiveness of both the proceedures. Also these modalitis should be compared with conservative treatment and local steroids injections.

CONCLUSION

From the results of our study it is concluded that

- The effectiveness of open and percutaneous release of trigger finger using 18G needle in our local adult population is 90.12% and 38.27% respectively.
- Werecommend open surgical release for the treatment of trigger finger due to its benefits in terms ofimprovement in Quinnell system of grading for trigger finger, direct exposure and visualization of anatomical structures and good long term results.

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