Original Article

Role of Open Surgical Release of A1 Pulley (Annular) in Treatment of Trigger Finger of Hand

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ABSTRACT

Objective: To study the effectiveness of surgical incision of A1 pulley in treatment of trigger finger.
Study Design: Observational study.
Place and Duration of Study: This study was conducted at the Department of Orthopedics Islam Medical College of Sialkot during March 2018 to Feb 2019.
Materials and Methods: All patients with Trigger Finger are included in our study which include 50 cases. Our study included patients with trigger finger grade III and above as per Qunitell classification. We noted the profile details including Mean age and Gender and recorded treatment results for statistical analysis using SPSS Version-20.
Results: In our data trigger finger was found in all 50 subjects with 14 males (28% of total patients) and 36 females (72% of total patients). Mostly patients around 26% felt ring finger and thumb trigger digits, 20% felt middle and index finger digits while only 8% felt it in more than one finger. Amongst the males pain was felt in ring finger joint mostly on right side i.e. 36% while females most affected joint was thumb with 63% left side dominance .The Mean success rate recorded was 77%.
Conclusion: Thus the open surgical release of A1 pulley is an effective method for trigger finger management.

Key Words: A1 pulley release, Trigger finger, Qunitell Grading, Visual analogue Scale

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INTRODUCTION

A person's ability to use his hand normally is significantly important and it comprises of proper functioning of hand including strength, sensation and range of motion. Trigger finger is an illness caused from a stenosed digital flexor tendon sheath.
In 1850, a French physician Alphonse Notta defined trigger as something caused due to the difference in diameters of a flexor tendon and its retinacular sheath as this sheath thickens and narrows. His report consisted of four case studies involving adult subjects.[1] Due to discovery of Alphonse Henri Notta, this tendon nodule is also known to be Notta'snode.

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Trigger finger is also known as Stenosing flexor tenosynovitis of the digital flexor tendon sheath which happens mainly when there is a misalliance between the flexor tendon and the retinacular pulley system at the first annular (A1) pulley. At the base of the finger, lies the A1 pulley over the metacarpophalangeal (MCP) joint. When the flexor tendon gets inflamed, it damages the ability to slide over the flexor tendon sheath. Up till now no specific cause can be attributed to it although extensive use, sports or repetitive movement of the finger can be a cause.[2] Usually this triggering co-exists with other conditions such as diabetes, rheumatoid arthritis, amyloidosis, and carpal tunnel syndrome.[3]
Among the healthy population meaning non-diabetic or patients with no other condition, trigger finger has a lifetime incidence of 2 to 3%. Trigger finger patients initially present with painless snapping or feeling of complete locking of digits and sometime difficulty in extending digits. Often the pain extends down to the palm. Some may even feel difficulty in holding objects and doing tasks and in severe cases the finger gets locked in one position.
Usually diagnosis includes looking for symptoms of tenderness in the palm over the flexor tendon sheath or swelling of the tendon sheath or trigger feeling as he bend the hand or straightens all fingers. Traditional methods of treating the disease includes changing of the activity splinting, short-term nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroid injection,

and other related therapies.[4,5] When the non-surgical treatment fails to improve the disease, it's suggested to opt for surgical treatment which aims to release the A1 pulley that was causing hindrance to the tendon movement thus the flexortendon
easily glides through the tendon sheath. Reported success rate of surgical release of the A1 pulley in a study was 60 to 100%[6,7].

MATERIALS AND METHODS

The detailed study was conducted in Islam Medical College of Sialkot and all patients with Trigger Finger during March 2018 to Feb 2019 are included in our study which included 50 cases. Our data collection team recorded the profile details including age gender and side involved , symptoms and Quintell grading and kept following up for 30-day for clinical assessment and recorded the outcomes post treatment and statistical evaluation and analysis was performed using SPSS Version 20.

In the process, a single experience surgeon is involved to perform the open trigger digit release. Patients were identified with trigger finger grades I to IV according to the Quintell classification grading system and assessed using VAS (Visual analogue Scale) scores pre and post-surgery. Only patients falling under Grade-III (passively correctable) as per Quintell classification system were included.

Exclusion Criteria

- Patients with a history of handtumor;
- Patients with an immunological disease for instance rheumatoidarthritis;
- Patients with previous surgery or hand traumacondition;
- Patients with a neurologic insufficiency in the same upperextremity.

Inclusion Criteria: All the patients of surgical incision of A1 pulley in treatment of trigger finger were included in this study

First the patient is made to lay in a supine position with his/her arms on his side such that his body and arms are at equal levels. The volar part of the hand is faced upwards and a small incision starting from 1 to 1.5 cm is made on the volar side of the hand centered over the A1 pulley .Thus the hand position increases the accessibility of surgeon to inner neurovascular structures. In case of thumb, the radial nerve is immediately protected for major nerve injury. The A1 pulley is insecure and released longitudinally to the base of pulley. After this flexor tendon is de-compressed at the center and distally. As soon as the patient flex and extend the finger to sense no triggering, the injured spot is closed. After the surgery, patients are not requested to keep their hands elevated and prescribed non-steroidal anti-inflammatory drugs (NSAIDs) and icepacks if needed.

RESULTS

A total of 50 patients consisting of 28% males and 72% Females were included in the study with the mean age noted to be 36.3 ± 5.042 years where the maximum age documented was 49yrs and minimum was 18 year old. **(Table-1).**

Table No.1: Demographics

	Variable	Total Population n=50
Demographics	**Mean Age ± SD**	36.1 ± 5.642
	Maximum	49
	Minimum	18
	Male to Female	28% : 72%

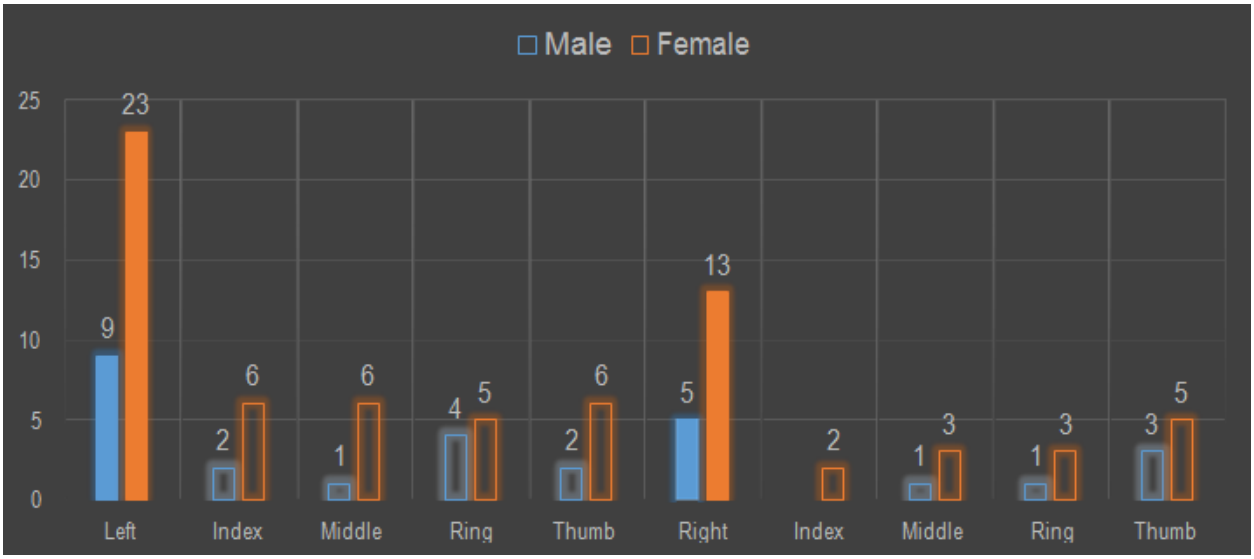

Figure No.1: Distribution of Patients with Trigger Finger Digits Gender wise

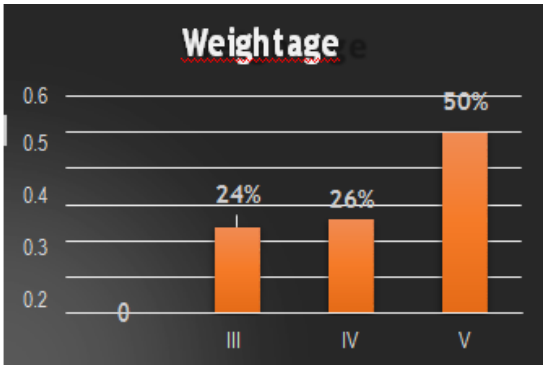

Figure No.2 Quintell Classification of trigger finger patients

Amongst the 50 subjects stage 3 (24%) and Stage IV (26%) while 50% experienced stage V of the stenosing tenosynovitis (shown in Figure-2).

Around 6% were diabetic and 4% had mild rheumatoid arthritis in their clinical history.

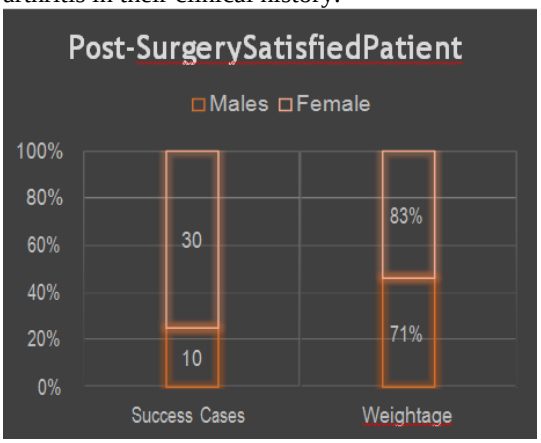

Figure No.3: Post-Surgery Success Rate of Patients

Using VAS pre and post-operation, we found 83% female patients were satisfied with the surgery while 71% men were completely satisfied and had average VAS scores decline from 95.2 to 6.91mm after 30 days.(Figure-3).

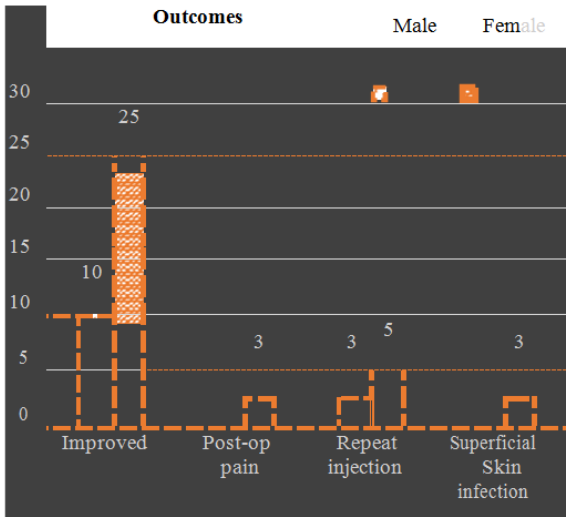

Figure No.4: Outcomes of Surgical release of A1 Pulley

However 70% wholly improved with no resulting complications while 8% patients felt post-operative pain, 16% required repeat injection and 6% suffered mild skin infection post- surgery. (Figure-4)In the diabetic patients the amount of repeat injection was 33%.

DISCUSSION

Trigger Finger usually results after traumatic inoculation of the flexor tendon sheath using a pathogenic bacterium.[8,9] The pathology of stenosing tenosynovitis, also known as trigger finger, lies in the disparity between the size of the flexor tendon sheath and its fillings within the first annular (A-1 pulley).

Repeated attempts of the tendon to glide through the stenotic sheath ultimately leads to inflammation and the inability to flex or extend the digit smoothly. This initially starts as a clicking that may be painless in nature and may eventually progress to a finger that becomes locked in flexion. This often requires passive manipulation of the pathologic finger into extension. These patients often present with pain localization to the palm, metacarpophalangeal (MCP) or proximal interphalageal joint (PIP).[1] Nonsurgical modalities include steroid injection and splinting.[8] At our center, nonsurgical treatment generally involves local steroid injection assuming the patient has no active osteoarthritis or signs of active infection.[1,3] If symptoms persist after this period, surgical intervention is strongly considered. The main focus during operative controlling lies in surgical release of the entrapped tendon. A transverse incision is made on the volar aspect of the hand overlying the metacarpophalangeal (MCP) joint and the A1 pulley. Dissection is carried out down to the A1 pulley. Special attention must be paid to the radial and ulnar sides of the pathologic digit to avoid neurovascular injury. The pulley is then divided, freeing the tendon beneath it. Ultimately, the goal of the procedure is complete release of the pulley of the pathologic digit with preservation of all other pulleys and structures.

Around 60 to 97% cases shown improvement by conservative management in a study conducted by Salimet at al.[10] Similarly patients who reach stage III and above

i.e. pass the stage of normal and uneven movement falling into actively correctible to fixed deformity have been reported to fail recovery through conservative management possibly due to the secondary process where within the flexon tendon thickens an hypotrophy occurs which can only be helped by a surgical release of the A1 pulley.[5,11,12]

In our study the mean age group of patients with trigger finger was 36.38 years with female to male weightage of 72% to 28%.

Somewhere else the mean age group of 59yr was observed with female to male patients weightage i.e.

67% vs 33% while a local study concluded 88.8% satisfaction rate of the trigger patients.[1,13]

In our data frequent triggers were observed in ring and middle fingers i.e. 26% and 20% and 32% in thumb. Thus mostly middle-aged women are most frequently seen suffering from this disease with trigger occurring particularly in the ring and middle fingers and most frequently in thumb.[8,14]

We reached an average 77% satisfaction rate in trigger finger patients post-surgery however resulting complications were only observed in 6% patients i.e. skin infections .Similar findings were observed with wound infections between 2 to 5% (3, 10).In a reflective study somewhere else conducted on 59 subjects, 97% satisfaction rate was observed in triggering.[15]

Out of the 3 diabetic subjects we had a repeat injection case of 1 while the remaining with pre-arthritis condition had no resulting complication. Some of the patients went through the conservative treatment however as they visited outpatient clinic late, they fell in grade-III category and had to take the surgical treatment.

Finally we believe that surgical treatment is a gold level therapy in spite of all conservative methods including steroid injections.

CONCLUSION

Overall our treatment aims to reinstate the full range of motion and to decrease the pain of the digit .Considering the success rate, open release of A1 pulley is an effective intervention however it results in various post-procedural complications which are very infrequent.

Author's Contribution:

Concept & Design of Study:	Muhammad Arif
Drafting:	Muhammad Asif, Nasreen Hamid
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Revisiting Critically:	Muhammad Arif, Muhammad Asif
Final Approval of version:	Muhammad Arif

Conflict of Interest: The study has no conflict of interest to declare by any author.

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