ORIGINAL RESEARCH

Functional outcome of percutaneous trigger finger release-our experience in a tertiary care centre

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ABSTRACT

Background and Objectives: Stenosing Tenosynovitis commonly known as Trigger finger is one of the most common conditions encountered in orthopaedic practice, accounting for roughly 2-4% of all cases.It is characterised by painful, debilitating extension of the digits,presenting with painful "triggering" or "snapping". It frequently affects adults aged 40-60 years. The technique of percutaneous release of the annular pulley for trigger finger is usually performed by using either a hypodermic needle, tenotome or specially designed knives.The objective of our study was to assess the safety and efficacy of percutaneous release of trigger finger.

Methods:The study was conducted as a prospective study from October 2019 to March 2022,at Karwar Institute of Medical Sciences,Karwar.Percutaneous release using an 18G needle was performed on 50 patients with a total of 62 trigger digits,who did not respond to conservative treatment given for a period of minimum 3 months were included.Patients' triggering severity was assessed using Quinell's grading and pain was assessed using VAS score pre and post operatively.Patients were evaluated based on these two parameters at timely interval and final outcome was assessed at the end of one year.

Results:45 patients with 57 trigger digits were included for the final analysis.29 were female and 16 male.Mean age was 49 yrs.12 had triggering in 2 digits.Thumb was the most common digit followed by ring finger.Grade 3(65%) trigger was the most common followed by Grade 2(17.5%).6 patients developed stiffness at 1st postop week,managed conservatively with physiotherapy and NSAIDs. 92% of our patients had Quinell's grade 0 at 1 year follow up.

Conclusion: Percutaneous release of trigger finger with hypodermic needle is a simple outpatient procedure with easy learning curve. It has a high success rate with very few complications and negligible recurrence.

Key words: Functional outcome, percutaneous trigger finger release,quinell's grade

Introduction

Trigger finger or trigger digit is a very common stenosing tenosynovitis causing disability of the fingers characterized by pain, snapping, catching, locking or even flexion contracture of the involved digit[1].First described by Alphonse Nota in 1850[2],the condition usually presents with painful "triggering" or "snapping" which is severe in morning but can occur throughout the day.It frequently affects adults aged 40-60 years with repetitive gripping and grasping activity and is more common among females[3,4,5].

The primary pathology of triggering is the discordance between the diameter of the flexor tendons of the finger and the fibro-osseous canals in which those tendons lie, which will lead to limitation of the tendon function necessary for hand movement[6].Inflammation causes fibrocartilage metaplasia results in thickening of the annular pulley (most commonly A1 pulley). Forceful flexion or gripping causes bunching of the flexor tendon making them stuck proximal to the thickened annular pulleys[7].According to Freiberg *et al*, the stenosing tenosynovitis can be either nodular or diffuse[8].The

exact pathobiology of trigger finger is unknown, and most of the cases are idiopathic in nature, but is significantly associated with a number of conditions, including direct tendon trauma, diabetes mellitus, carpal tunnel syndrome, De quervain's tenosynovitis, Rheumatoid arthritis, Hypothyroidism, Mucopolysaccharidosis, amyloidosis, gout, hypertension, various tumours and neoplasms[3].

This condition can be treated either by conservative methods or by surgical methods. Surgical options include percutaneous release or open release in case of failure of conservative methods.Percutaneous release is increasingly becoming popular and the method of choice among orthopaedic surgeons for being cost effective, convenient, day care surgery with no need for hospitalization. It has no significant complications and post op morbidity with high patient satisfaction and early return to work[9,10,11].

In the present study, we performed percutaneous release of A1 pulley as described by Eastwood *et al*[12],with an 18 G needle under local anaesthetic in aseptic conditions in minor OT and followed the patient at least for a period of 1 year.The surgical outcome was assessed using pre and post operativeQuinell's grading[13](Table 1),and functional outcome,with Visual Analogue Scale.(VAS)

Table 1: Quinell's Grading of Trigger Finger

• Quinell's grading

Grade	Clinical Findings
Grade 0	Normal movements, no Pain
Grade 1	Uneven Movements.
Grade 2	Actively correctable
Grade 3	Passively correctable
Grade 4	Fixed deformity

Methodology

We performed a prospective cohort study of the patients who presented with triggering of the fingers.Only those patients clinically diagnosed to have idiopathic triggering of the digits who did not respond to conservative treatment given for a period of minimum 3 months were included in the study.Patients with secondary triggering as a result of hypothyroidism, rheumatoid arthritis or direct trauma were excluded.All the patients were explained about the details of the procedure and its expected complications, and a proper informed consent taken from every patient.A proper ethical clearance was also taken from the institution before commencing the study.The triggering severity was assessed pre and post operatively using Quinell's grading and pain in the affected digits,by VAS.The preoperative grading,VAS score and the procedure was done by a single consultant,whereas the postoperative grading and VAS score was done by another consultant to prevent bias.The patients were followed up post operatively at 1st,6th and 12 months respectively.Pain-related disability was evaluated using a ten-point VAS (VAS 0: no pain or disability; VAS 10:extreme pain or disability). The following hand functions were evaluated for pre and post release VAS

1. Writing with a pen
2. Opening a jar
3. Carrying a 3 kg stone block
4. Torquing a screw using a screw driver
5. Opening a lock with a key

The overall evaluation was done over a maximum of 50 points and a VAS <5 was accepted
as an excellent result,5–10 as good,10–15 as moderate and >15 as poor.

The procedure for all the patients was performed in the minor OT strictly as a daycare surgery.Under strict aseptic precautions,2ml of 2% plain lignocaine injected around the site of nodule, over the metacarpal head.The thickened pulley is palpated by hyperextending the finger and an 18G hypodermic needle inserted over the nodule with the bevel of the needle oriented along the line of the finger(Fig.1).Proper position of the needle inside tendon sheath is confirmed by paradoxical movement of the needle on active flexion of the digit(Fig.2).The needle is then withdrawn slightly and the A1 pulley is cut by moving bevel of the needle longitudinally from proximal to distal.Sudden loss of resistance or "grating" sensation indicates release of the pulley.A sterile adhesive bandage was applied to puncture site.

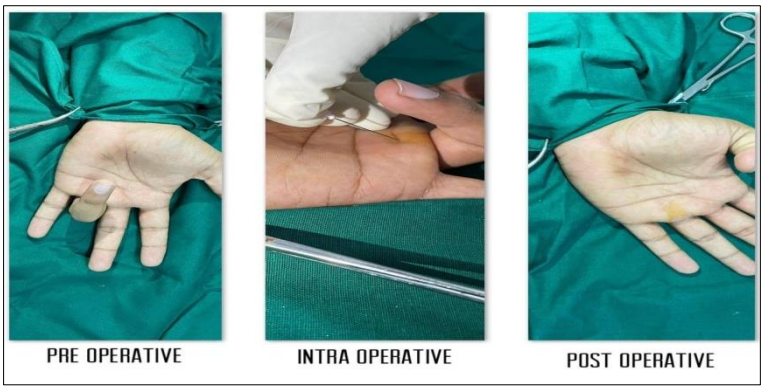

Fig 1: Clinical photo showing percutaneous release using 18G Needle

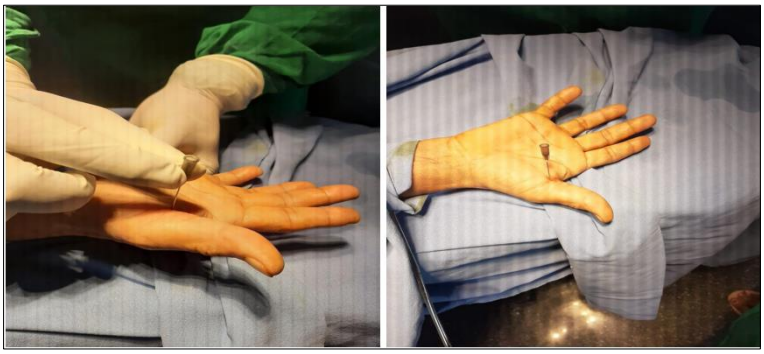

Fig2: Clinical photo of Trigger Thumb Release under hyperextension

Results

50 patients who suffered idiopathic triggering were included in our study.33 were females and 17 males.12 patients had triggering in 2 digits,and 38 patients in 1 digit, giving a total of 62 affected digits.5 patients with single trigger digit (4 female,1 male) were lost to follow up,resulting in 45 patients and a total of 57 digits,being followed up at regular time intervals.

The patients' basic demographic details (Table 2), distribution of the cases according to the digits affected (Table 3), pre and postoperative Quinell's grading(Table 4,Charts 1&2) were meticulously tabulated and analysed with SPSS version 10 statistical software program.Student T- test was used to compare paired variables, and Categorical variables analysed using Chi Square test.64% of the patients were females, and persons between ages 40-50 years were the most affected.Almost 76% of them had trigger digits in the dominant hand.Preoperatively,65% of the patients had Quinell's grade 3,whereas 86% had improved to grade 0 immediate post release,and 92% grade 0 at 1 year follow up.Mean pre operative VAS score was 8.24 which improved to 0.86 at the end of 1 year.

4 patients had mild erythema and stiffness at end of 1st postop week, which was relieved by physiotherapy and NSAID's.However,5 patients(3 patients with grade 4,and 2 patients with grade 3 trigger pre procedure) exhibited residual trigger at 1 year follow up.These patients were treated with an open release procedure, following which all 5 patients improved to Quinell's grade 0 at the end of postop week 1.

Table 2: Patient and Demographic Details

Patient characteristic	Number (%)
Male/female	16/29 (35.6%/64.4%)
Dominant/non dominant	34/11 (75.6%/24.4%)
Mean age	49(SD - 9.78)
Age group	
30-40	05 (11.1%)
40-50	27 (60%)
50-60	10 (22.2%)
60-70	03 (6.7%)

Table 3:Distribution of cases by digits

DIGIT	Frequency	Percentage
Thumb	35	61.4

Index	2	3.5
Middle	8	14.1
Ring	12	21
Little	0	0
Total	57	100

Table 4:Pre and Post operativeQuinell'sGrading.

Grade	Pre release		Post release		1 month		6 months		1 year	
	No.	%	No.	%	No.	%	No.	%	No.	%
Grade 0	0	0	49	86	49	86	51	90	52	92.2
Grade 1	02	3.5	08	14	08	14	06	10	03	4.3
Grade 2	10	17.5	0	0	0	0	0	0	02	3.5
Grade 3	37	65	0	0	0	0	0	0	0	0
Grade 4	08	14	0	0	0	0	0	0	0	0

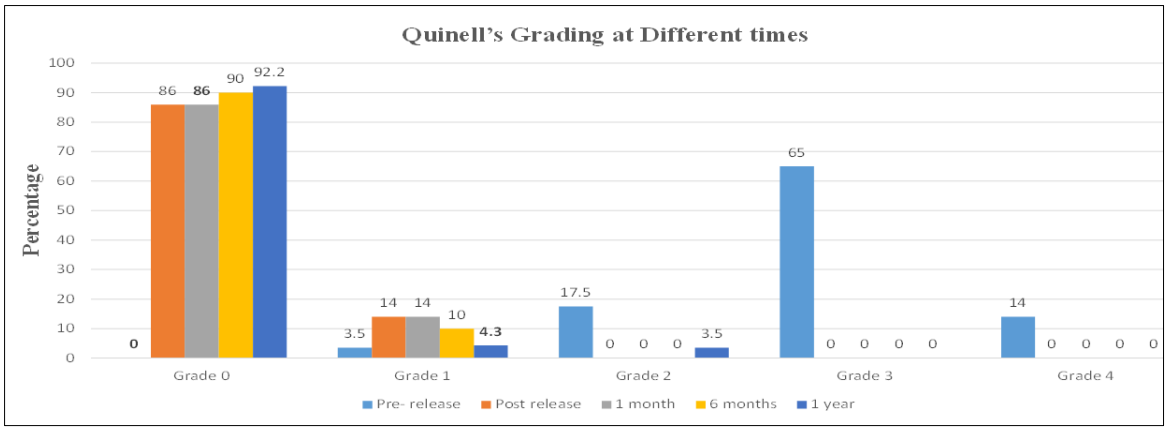

Chart 1: Quinell'sGrading at different time intervals

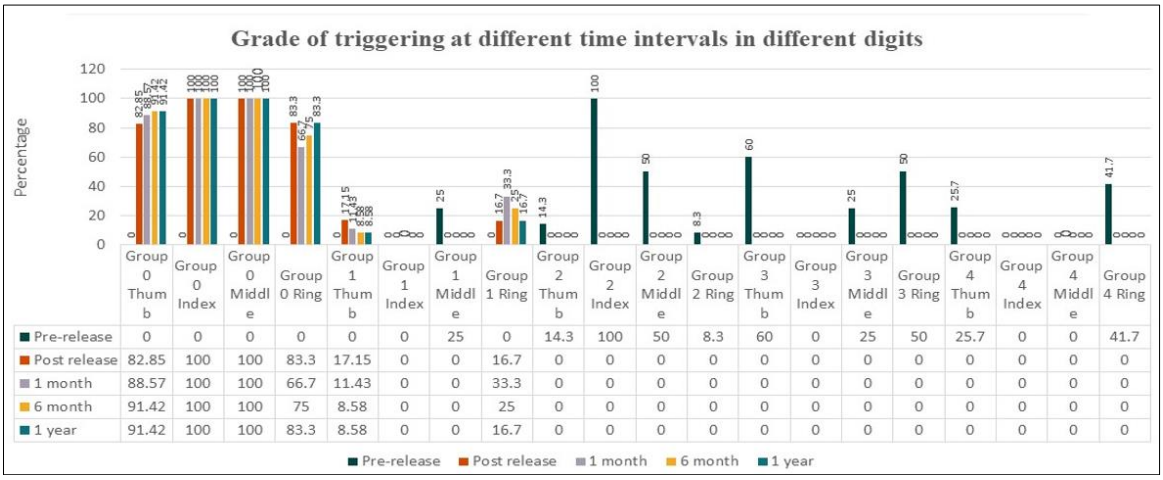

Chart 2: Quinell grading for each digit at different time intervals

Table 5: Mean pre release and post release VAS scores

VAS	PRE RELEASE	POST RELEASE	1 MONTH	6 MONTHS	1 YEAR
	8.24	3.45	2.78	1.98	0.86
SD	1.08	1.35	1.28	0.98	0.90

Discussion

Trigger finger is an inflammatory condition of the flexor tendon sheaths.Triggering commonly involves the dominant hand. A nodule develops at the A1 pulley which produces pain, swelling and locking at flexed position[14,15].First described by Notta in

1850[2],treatmentoptions include physiotherapy, splinting, corticosteroid injection, failure of which, open or percutaneous release of the A1 pulley is recommended[16].In the literature, the success rate of the single-dose administration of a steroid is reported to be 50%, which further decreases in the presence of Diabetes[17].The percutaneous technique is fairly gaining popularity and becoming method of choice for trigger finger release over open release. It is convenient, cost effective with low or no complications such as infection, joint stiffness or weakness, painful scar, bowstringing, nerve damage as encountered in open release of trigger digits[18].

Primary trigger finger occurs most commonly in fifth to sixth decades of life and up to 6 times more frequently in women than men[19].Our study also demonstrated that 82% of the patients belonged to 40-60 year age group, predominantly affected females(65%).All digits can be affected, but the ring finger is most often involved, followed by the thumb and the middle,index, and little fingers, in that order. However, in our study,thumb was the most affected(61%),followed by the ring finger(21%).

Gilberts *et al.* in their prospective study of 100 patients compared percutaneous and open release of trigger digits and showed 100% relief of symptoms in patients who had undergone percutaneous release and 98% with open release[20].

Lange-Riess*et al* in their study of 305 patients, reported complications only in 9(2.95%) patients and those too temporary complications[21].Eastwood *et al*. used a 21-gauge hypodermic needle on 35 trigger digits and post operatively 94% had relief of symptoms without any complications[12].Our study showed a similar functional outcomes in 92% of our patients.

Pandey BK *et al*.2 had done percutaneous release of 58 fingers with 18 G needle and had 2 digits with persistence of triggering[4]. Ha CW*et al*.[3] had 185 percutaneous trigger fingers release using specially designed HAKI knife and had 12 (6.48%) digits with persistent triggering[5].Our study also involved 5 patients with residual trigger (8%) at the end of 1 year follow up,and underwent a second open release procedure,and have complete relief of symptoms thereon.

Ramy*et al*, in his study of 42 patients reported success rate of 95.4% with complications such as incomplete release of A1 pulley in 3(6.97%), and superficial flexor tendon laceration in 6(13.95%) cases[22]. The complete release is to be confirmed by loss of grating sensation and catching. Laceration of the tendon was avoided by withdrawing the needle just out of the tendon into fibro-osseous sheath and keeping the bevel of the needle parallel to the tendon.

Will *et al* reported 3% major complications such as synovial fistula and arthrofibrosis, 28% minor complications such as erythema, scar tissue, stiffness and loss of range of motion[23].Rawat,in his study of 58 patients with 64 trigger digits,reported erythema and swelling in 14.7% of patients at the end of 1st postoperative week[11]. Our study also had similar results,with 6 patients (13.3%) exhibiting erythema at the operated site.All these patients had either Quinell's grade 3 or 4 trigger pre operatively.

Panghate,in his study of 80 trigger digits,demonstrated a healthy patient satisfaction in 95% cases, with a mean preoperative and postoperative VAS scores at 1 year, of 8.16 and 0.44 respectively[3]. Our study also had comparatively similar outcomes, with 92% patients experiencing no symptoms, and mean VAS scores of 8.24 and 0.90 pre and post release respectively.

Percutaneous release of the A1 pulley using tenotome was described by Lorthoir[24] in 1958 and many studies have described about using needle for percutaneous release. Various authors have reported neurological injury during percutaneous release for trigger thumb.This is because of the anatomic variation of the digital nerve which courses obliquely proximal to the A1 pulley.

Cadaveric study by Pope and Wolfe suggested that radial digital nerve was as close as within 2-3mm of needle site in percutaneous release in 3 of 5 thumb and 5 of 5 index fingers[25]. Ferhat-Guler*et al*,in their comparative study of open vs percutaneous release of 87 trigger thumbs,reported digital nerve injury in 5.7% patients[26].However,none of the patients in our study had postoperative injury of the digital nerve.

Conclusion

Percutaneous release of trigger finger using a sterile 18G needle is a simple and a safe method. Localization of A1 pulley using anatomical landmarks during percutaneous release can prevent neurological injury to thumb. The complications like digital nerve injury and bow stringing of flexor tendons which was relatively common in open release was not observed in this technique. It is superior to open release in terms of ease of doing, cost effectiveness, lesser invasive, fewer complications, patient satisfaction, lesser morbidity and early resumption of work and hence,justifiable to be considered the treatment of choice for trigger digits that are non responsive to conservative management.

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Ethical approval: Obtained from Institution Ethics Committee.

References

1. Wolfe SW. Tenosynovitis. In: Green DP, Hotchkiss RN, Pederson WC, Wolfe SW, editors. Green's operative hand surgery. 5th ed. Vol. 2. Philadelphia: Elsevier Churchill Livingstone; c2005. p. 2137-58.

2. Philip J, Clapham BS, Chung Kevin C, Md MS. A historical perspective of the notta's node in trigger fingers. J Hand Surg Am. 2009 Oct 34;(8):1518e1522.
3. Panghate A, Panchal S, Prabhakar A,*et al*.Outcome of percutaneous trigger finger release technique using a 20-gauge hypodermic needle.Journal of Clinical Orthopaedics and Trauma.2021;15:55e59.
4. Pandey BK, Sharma S, Manandhar RR, Pradhan RL, Lakhey S, Rijal KP. Percutaneous trigger finger release. Nepal OrthopAssoc J. 2010Jan;1. Number one.
5. Ha KI, Park MJ, CW. Ha from sungkyunkwan university school of medicine. In:Percutaneous Release of Trigger Digits. 2001Jan83-B(1).
6. Uçar BY. Percutaneous surgery: A safe procedure for trigger finger?.North Am J Med Sci. 2012;4:401-3.
7. Littler JW. Stenosing digital tendovaginitis. In: Converse JM, Littler JW, eds.Reconstructive Plastic Surgery. New York: WB Saunders; 1977:3440e3443.The Hand and Upper Extremity; vol.6.
8. Freiberg A, Mulholland RS, Levine R. Non-operative treatment of trigger fingers and thumbs. J Hand Surg [Am]. 1989;14:553e558.
9. Webb J, Stothard J. Cost minimisation using clinic-based treatment for common hand conditions a prospective economic analysis. Ann R CollSurg.Engl. 2009;91(2):135-139. [PMC free article] [PubMed].
10. Kerrigan C, Stanwix M. Using Evidence to Minimize the Cost of Trigger Finger Care. J Hand Surg. 2009;34(6):997–1005. [PubMed].
11. Rawat P *et al*. Percutaneous release of trigger finger: An easy and safe procedure.Indian Journal of Orthopaedics Surgery, April-June, 2018;4(2):137-140.
12. Eastwood DM, Gupta KJ, Johnson DP. Percutaneous release of the trigger finger:an office procedure. J Hand Surg [Am]. 1992;17:114e117.
13. Quinnell RC. Conservative management of trigger finger. Practitioner. 1980 Feb;224(1340):187-90. PMID: 7367373.
14. Hazani R, Elston J, Whitney RD, Redstone J, Chowdhry S, Wilhelmi BJ. Safe treatment of trigger thumb with longitudinal anatomic landmarks. Eplasty. 2010;10:57.
15. Saravanan G, Thiyagarajan U, Senthil L, Pradeep JP, Gokul Raj D. Percutaneous trigger thumb release: a safe push-pull technique. Int J Res Orthop. 2019;5:1166-70.
16. Peterson William W, Manske Paul R, Bollinger Bruce A, Lesker Peggy A,McCarthy John A. Effect of pulley excision on flexor tendon biomechanics.J Orthop Res. 1986;4(No.1).
17. Nimigan AS, Ross DC, Gan BS. Steroid injections in the management of trigger fingers. Am J Phys Med Rehabil.2006;85(1):36-43.
18. Cebesoy O *etal*.Percutaneous release of the trigger thumb: is it safe, cheap and effective?International Orthopaedics (SICOT). 2007;31:345-349.
19. Malviya VK, Soni RK. Percutaneous release of trigger finger without local anaesthesia as an outpatient procedure.Surgical Update: Int J surg Orthopedics. 2019;5(4):259-265.DOI:10.17511/ijoso.2019.i04.05.
20. Gilberts EC, Beekman WH, Stevens HJ, Wereldsma JC. Prospective randomized trial of open versus percutaneous release for trigger digits. J Hand Surg.2001;26A:497e500.
21. Lange-Riess D, Schuh R, Hönle W, Schuh A. Long-term results of surgical release of trigger finger and trigger thumb in adults. Arch Orthop Trauma Surg. [PubMed].2009:1617-9.
22. Diab RA. Percutaneous release of trigger finger. J OrthopSurg (Hong Kong) [PubMed].2015;23(2):241-242.
23. Will R, Lubahn J. Complications of open trigger finger release. J Hand Surg Am.[PubMed].2010;35:594-6.
24. Lorthioir J. Surgical treatment of trigger finger by a subcutaneous method.J Bone Joint Surg [Am]. 1959;40-A:793e795.
25. Pope DF, Wolfe SW. Safety and efficacy of percutaneous trigger finger release. J Hand Surg Am. 1995;20:280-3. [PubMed].
26. Guler F, Kose O, Ercan EC, Turan A, Canbora K. Open versus percutaneous release for the treatment of trigger thumb. Orthopedics. 2013;36(10):e1290-e4. [PubMed].