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Comparison between different methods of trigger finger treatment – USG assisted steroid injection, USG guided percutaneous pulley release and open surgery: A randomized controlled trial

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Abstract

Introduction: Trigger finger is frequently encountered in outpatient department, mostly idiopathic but seen especially in diabetic, hypothyroid or gout patients, the cause being, stenosing tenosynovitis at the A1 pulley, which is usually progressive. There are various treatment options available for this problem.

Objective: The aim of this study was to compare the efficacy of USG guided corticosteroid injection, USG guided percutaneous pulley release and open surgery for the treatment of trigger finger in view of cure, relapse and complication rates.

Methods: Sixty patients, >20 years of age with a trigger on any finger of the hand (Quinnell Type II - IV) were randomly categorized into one of the 3 treatment groups, each consisting of 20 patients, with one of the 3 treatment modalities allocated equally, from 60 sealed nontransparent envelopes, were studied and followed up for at least 6 months for cure, relapse and failure rates.

Group A (N = 20) – Patients to be treated with conservative steroid injection under USG guidance
Group B (N = 20) – Patients to be treated with percutaneous pulley release under USG guidance and
Group C (N = 20) – Patients to be treated with open surgery as minor OT procedure.

Results: Cure rate for first (steroid inj.) group of patients was 60%, and in some patients second injection was repeated, which escalated the cure rate to 85%.

For USG guided percutaneous release and open surgery groups, there was complete remission in all cases.

Conclusions: The percutaneous release and open surgery methods were equally effective and proved superior to local steroid injections method in terms of trigger cure and relapse rates.

Keywords: Trigger finger, steroid injection, percutaneous release, open surgery, randomized controlled trial

1. Introduction

Trigger finger is an A1 pulley disorder, in which smooth gliding of the tendon is hindered, making it difficult for the tendon to extend of its own and return to its natural position from the flexed state. Synovial proliferation and fibrosis of flexor sheath are considered as triggering factors, there is no consensus in the literature about its true cause and its aetiology remains unfolded [1]. Notta [2] suggested that trigger finger is end result of fibrotic changes in the flexor tendon and its surrounding sheath. In an anatomical analysis, Hueston and Wilson [3] demonstrated that the corkscrew shape of the fibres within the tendon contributes to the formation of nodules distal to the A1 pulley.

This pathology is more common on the dominant side of women in their sixth decade of life. The most affected finger is the thumb; however, the occurrence of the trigger is also common in other fingers [4]. The symptoms are diverse ranging from minimal local discomfort to obstructed tendon motion, experienced especially in the morning, leading to ineffective active extension of the finger, which remains fixed in flexion [5]. Trigger finger is also associated with other ailments like diabetes, rheumatoid arthritis, carpal tunnel syndrome and gout [6, 7]. Quinnell [1] classified trigger fingers into five types, as per movement during flexion and

extension: normal movement (Type 0), uneven movement (Type I), actively correctable (Type II), passively correctable (Type III) and fixed deformity (Type IV).

With regards to treatment, some authors suggest a conservative treatment with steroid injection, while others advise surgery [1, 5, 6, 8-12]. Steroidal injection with local anaesthetic agent below flexor muscle sheath produces good results [1, 6, 8-13]. However, this technique has relapse rate of up to 29% [9]. Open surgery has high rate of success with minimal morbidity and recurrence but complications like painful scarring, infections and nerve lesions do exist in addition to recurrence of the disease [14, 15]. Lorthioir suggested a tenotomy procedure for this disease. Other authors have also reported good outcomes with percutaneous release of A1 pulley [5, 16-24].

We developed this randomized prospective study with the objective of finding the most effective method for this disorder by comparing three treatment techniques of USG guided steroid injection, USG guided percutaneous A 1 pulley release and open surgical release under direct vision in view of their cure rates, relapse rates and complications.

2. Materials and methods

2.1 Inclusion criteria

During the period from AUG 2018 to AUG 2020, this comparative study for the cure rate, relapse and complications of trigger finger treatments with USG guided steroid injection, USG guided percutaneous pulley release and open release of A1 pulley was undertaken.

This research project was analyzed and approved by our institutional Ethical committee. A written informed consent was taken from all the participants.

The inclusion criteria were patients >20 years of age of either sex with symptoms of trigger finger of any hand who had not received any prior treatment ever. They were classified as Quinell's type II-IV [1]. Individuals with Type I trigger finger and those who had received any form of treatment including quack massages and manipulations or prior treatment were excluded. Patients were followed up on outpatient basis for a minimum period of 6 months. Prospective assessment was done after 1 week, 2 weeks, 1 month, 2 months and 6 months after which participants were discharged from this study. Those patients who were given 2nd steroid injection were followed for 6 months after their second dose.

2.2 Analysis

The patients coming to outpatient department of orthopedic section were screened for thorough history and clinical findings to fit in inclusion criteria of our study. A total of 60 patients were offered treatment by resident surgeons and author of this article according to selected methods mentioned above.

Participants were grouped and numbered chronologically. When patients had more than one trigger finger involvement, only one trigger finger was assigned for study purpose.

Calculation of the size of the study sample was as per the convenience.

For randomization purpose, 60 identical, nontransparent treatment envelopes were taken and divided in 3 groups each of 20. A small paper note mentioning method of treatment was kept inside each of these envelopes such that 20 had steroid inj. method, other 20 had percutaneous release method and remaining had open release method mentioned on it. These envelopes were sealed and were devoid of any marking from outside. The envelopes were mixed thoroughly and kept

in a locked cupboard. A draw was carried out by a random person not involved in this study (mostly by a random patient in OPD). A total of 60 draws were conducted. After conducting the draw, the envelope was opened, and the method mentioned in it was disclosed by the resident doctor. The patient was then informed and counselled about the type of treatment he or she is going to receive and was directed for further proceedings. In this manner, at the end of this study 20 patients received USG guided steroid injections, 20 had percutaneous USG guided release and 20 had open release of A1 pulley.

2.3 Treatment methods

The corticosteroid injection used in 1st set of 20 patients was of 2ml of triamcinolone 40 mg/ml just beneath A1 pulley without injuring tendon slip, after confirming the location of needle under USG guidance [10]. USG guided percutaneous release consisted of release of the A1 pulley with a 40 x 12 needle, using longitudinal movements, in the direction of the axis of the flexor tendon, and this release was introduced at the site corresponding to the A1 pulley under USG guidance [5, 25]. Conventional open surgery was done with an incision of 1.5-2 cm in the skin transverse to the axis of the finger near distal palmar skin fold, followed by opening of the A1 pulley along the long axis of the finger [14].

2.4 Methods for comparing

2.4.1 Primary outcomes

Patients were assessed for trigger remission, loss of blocking issue of the finger and reestablishment of smooth gliding motion of the tendon. Those treated patients who sustained remission of trigger finger even on 6th month's follow up were considered cured.

Those patients who had trigger remission after primary treatment but later reexperienced triggering or tendon blockade within first 6 months of treatment were considered to have relapse.

For steroid injection group of patients, failure was considered for those patients whose trigger relapsed or the blocking issue persisted even after second injection dose.

For percutaneous or open pulley release groups, failure was considered if trigger relapsed or blocking issue persisted even after release procedure.

2.4.2 Secondary outcomes

Local pain was defined as pain at the site of release procedure at 1 week, 2 weeks and 1 month, 2 months and 6 months after procedure.

Articular pain was defined as pain at the IP joints at 1 week, 2 weeks and 1 month, 2 months and 6 months after the release procedure.

Complications associated with treatment methods used, infection, rupture of the flexor tendon and digital nerve trauma were measured.

2.5 Statistical analysis

ANOVA i.e. analysis of variance was used to compare averages of the numerical variables.

Pearson's chi square test was utilized for categorical variables.

For all tests, an alpha value of 5% was used, with $p < 0.05$ suggesting statistical significance.

The homogeneity among participants according to gender, age, diabetes onset and chronicity of disease was analyzed at the time of their enrollment in this study.

Pearson’s chi square test was used to check link among the categorical variables, gender and diabetes onset. Also, it was utilized for analysis of the frequency of complaints regarding pain after treatments, both at the site of operation as well as at IP joints of treated fingers.

ANOVA was utilized for comparing the averages of the numeric variables, gender and duration of disease at the time of participant enrollment in this study.

Pearson’s chi square test was used for statistical comparisons for the cure rates with steroid injection, percutaneous and

open pulley release procedures.

3. Results

3.1 Sample

Homogeneity of three groups in view of age, gender, diabetes onset, onset of trigger finger and classification ^[1] (tables 1 and 2) was confirmed. The data showing the analysis of cure rates, relapse and failures observed among steroid injection, percutaneous and open release groups are stocked in Table 3.

Table 1: Epidemiological data including gender, diabetes onset, age and duration of the disease in months.

		Intervention			p- value*
		Group A (injection) n = 20	Group B (percutaneous) n = 20	Group C (open) n = 20	
Gender	Male	6	5	6	0.1642
	Female	14	15	14	
Diabetes	No	17	18	14	0.2352
	Yes	3	2	6	
Age in years		52.3	53.3	54.1	0.84
Disease duration in months		10.5	12.8	11.3	1

*Chi-square test. n= no. of patients in each group.

Table 2: Distribution of patients based on classification ^[1]

		Intervention						p value*		
		Group A (Injection) n = 20			Group B (Percutaneous) n = 20				Group C (Open) n = 20	
Type	II	III	IV	II	III	IV	II	III	IV	
N	12	8	-	11	9	-	5	12	3	0.04

*Chi-square test; n = no. of patients in each group.

Table 3: Distribution of results with intervention

Results	Intervention				p - value
	Group A (Injection) n = 20		Group B (Percutaneous) n = 20	Group C (Open) n = 20	
	One	Two			
Cure	12	17	20	20	<0.001**
Relapse	3	4	-	-	
Failure	7		-	-	

*Chi-square test.

**Statistically significant ($P < 0.05$); n = no. of patients in each group

3.2 Different outcomes

3.2.1 Trigger finger cure

The percutaneous and open release of A1 pulley methods had significantly higher cure rates than steroid injection. ($p = < 0.001$)

3.2.2 Trigger finger relapse

Relapse rate in steroid injection group was 15%. All the relapsed participants were given second injection. The group that received second dose had relapse rate of 20%.

Patients who underwent percutaneous or open release procedure never relapsed again.

3.2.3 Trigger finger failure

There were 7 failed cases in steroid injection group even after their second injection. 3 patients had persisting trigger and 4 had relapse. However, patients treated with percutaneous release or conventional surgery had no failures.

3.2.4 Local pain

The local site pain in percutaneous and open surgery groups was significantly higher than the injection group at the end of

- 1 week ($p = 0.007$)
- 2 weeks ($p = 0.007$)
- 1 month ($p = 0.045$)

At 2 months and 6 months follow up however, local pain was reduced n was felt to similar amounts in patients of all the groups.

3.2.5 Articular pain

The articular pain in percutaneous and open surgery groups was significantly higher than the injection group at the end of

- 1 week ($p = 0.27$)
- 2 weeks ($p = 0.45$)
- 1 month ($p = 0.11$)

At 2 and 6 months follow up, pain was reduced and was felt to similar amounts by patients in all the groups.

Table 4: Distribution of local and articular pain

		Intervention			P value
		Injection n = 20	Percutaneous n = 20	Open n = 20	
1 week	Local pain	4	12	13	0.007*
	Articular pain	2	5	6	0.27
2 weeks	Local pain	4	12	13	0.007*

	Articular pain	2	4	5	0.45
1 month	Local pain	2	7	8	0.045*
	Articular pain	1	6	5	0.11
2 months	Local pain	2	2	4	0.16
	Articular pain	1	4	3	0.36
6 months	Local pain	2	0	0	0.12
	Articular pain	1	1	0	0.59

*Significant difference

3.2.6 Complications

Complications such as infection, rupture of flexor tendon or digital nerve trauma were not recorded among all the groups. The risk reduction was attributed to the rational use of ultrasonography assistance for steroid injection as well as for percutaneous pulley release surgery. Open surgery was done under direct vision with optimal exposure to reduce above mentioned risks.

4. Discussion

There are different methods of treating trigger finger problem ranging from conservative management with medicines to conventional open surgery under direct vision. Recently, use of percutaneous release of problematic A1 pulley under USG guidance is becoming popular as the procedure is less invasive with similar outcomes as with open surgery. Yet, the treatment choice differs from surgeon to surgeon. Corroborating evidence is still not clear. We did this randomized controlled study on a homogenous group of patients to compare the three commonly used approaches for trigger finger treatment.

Our study included patients >20 years of age with trigger issue on any of their finger with single finger taken into the study even if the Bain *et al.*^[26] study showed increased injury chances to the neurovascular sheath with percutaneous release for thumb and little finger.

Quinnell's type II, III and IV classified patients were offered treatment options during study. Type I patients were excluded as the trigger issue was not reproducible every time we observed the patient and blockage free interval in them would have caused false impression of remission of trigger issue. Their inclusion could have proved confounding during our data analysis.

The cure and relapse rates of open surgery under vision and percutaneous USG assisted release surgery were equally comparable and had promising superior results when compared to steroid injections, even when repeated. Steroid injections were repeated only once which augmented the cure rate but still the results were less productive than other two methods. Gilbert *et al.*^[27] had shown remission rates of 100% in patients treated with percutaneous release method and 98% in those treated with open surgical procedure. In our study also, remission rates with either of the surgically treated patients were 100% which were comparable with above mentioned study.

During follow up, patients who were given steroid injection got rid of pain in first month than the surgically treated patients, as the latter two procedures were more invasive and traumatic. Similar results were observed in Chao *et al.*^[28] study which compared percutaneous release with open methods.

Among 60 patients in our study, not a single patient had neurovascular issue after completion of their treatments. Proper marking of tendon axis as well as continuous observation of anatomical structures under USG guidance throughout the percutaneous procedure helped us reduce injury to nearby important structures in open method,

thorough anatomical knowledge and adequate exposures achieved this.

5. Conclusion

Conventional open surgery and USG guided percutaneous release procedure proved to be far superior than steroid injections in terms of cure and relapse rates.

Steroid injections under USG guidance are less painful, less traumatic and can be considered for initial attempt for solving trigger issues.

Open surgery and USG guided percutaneous method show similar efficacy. These are more painful but give promising results as compared to steroid injections.

6. References

1. Quinnell RC. Conservative management of trigger finger. *Practitioner* 1980;224:187-90.
2. Notta A. Research on a particular condition of tendon sheaths of the hand, characterized by the development of a nodule in the path of flexor tendons and blocking their movements. *Arch Ge'n Med* 1850;24:142-61.
3. Hueston JT, Wilson WF. The aetiology of trigger finger. *Hand* 1972;4:257-60.
4. Weilby A. Trigger finger. Incidence in children and adults and the possibility of a predisposition in certain age groups. *Acta Orthop Scand* 1970;41:419-27.
5. Eastwood DM, Gupta KJ, Johnson DP. Percutaneous release of the trigger finger: an office procedure. *J Hand Surg Am* 1992;17:114-7.
6. Freiberg A, Mulholland RS, Levine R. Nonoperative treatment of trigger fingers and thumbs. *J Hand Surg Am* 1989;14:553-8.
7. Ryzewicz M, Wolf JM. Trigger digits: principles, management, and complications. *J Hand Surg Am* 2006;31:135-46.
8. Kolind-Sorensen V. Treatment of trigger fingers. *Acta Orthop. Scand* 1970;41:428-32.
9. Rhoades CE, Gelberman RH, Manjarris JF. Stenosing tenosynovitis of the fingers and thumb. *Clin Orthop Relat Res* 1984;190:236-8.
10. Marks MR, Gunther SF. Efficacy of cortisone injection in treatment of trigger fingers and thumbs. *J Hand Surg Am* 1989;14:722-7.
11. Newport ML, Lane LB, Stuchin SA. Treatment of trigger finger by steroid injection. *J Hand Surg Am* 1990;15:748-50.
12. Benson LS, Ptaszek AJ. Injection versus surgery in the treatment of trigger finger. *J Hand Surg Am* 1997;22:138-44.
13. Ring D, Lozano-Caldero'n S, Shin R *et al.* A prospective randomized controlled trial of injection of dexamethasone versus triamcinolone for idiopathic trigger finger. *J Hand Surg Am* 2008;33:516-22.
14. Turowski GA, Zdankiewicz PD, Thomson JG. The results of surgical treatment of trigger finger. *J Hand Surg Br* 1997;22:145-9.
15. Thorpe AP. Results of surgery for trigger finger. *J Hand*

- Surg Am 1988;13:199-201.
16. Tanaka J, Muraji M, Negoro H, *et al.* Subcutaneous release of trigger thumb and fingers in 210 fingers. J Hand Surg Br 1990;15:463-5.
 17. Lyu SR. Closed division of the flexor tendon sheath for trigger finger. J Bone Joint Surg Br 1992;74:418-20.
 18. Cohen TJ. Percutaneous treatment of trigger finger. Rev Bras Ortop 1996;31:690-2.
 19. Nagoshi M, Hashizume H, Nishida K, *et al.* Percutaneous release for trigger finger in idiopathic and hemodialysis patients. Acta Med Okayama 1997;51:155-8.
 20. Cihantimur B, Akin S, Ozcan M. Percutaneous treatment of trigger finger. Acta Orthop Scand 1998;69:167-8.
 21. Blumberg N, Arbel R, Dekel S. Percutaneous release of trigger digits. J Hand Surg Br 2001;26:256-7.
 22. Ragoowansi R, Acornley A, Khoo CT. Percutaneous trigger finger release: the 'lift-cut' technique. Br J Plast Surg 2005;58:817-21.
 23. Wang HC, Lin GT. Retrospective study of open versus percutaneous trigger thumb in children. Plast Reconstr Surg 2005;115:1963-70.
 24. Fu YC, Huang PJ, Tien YC, *et al.* Revision of incompletely released trigger fingers by percutaneous release: results and complications. J Hand Surg Am 2006;31:1288-91.
 25. Sato ES, Albertoni WM, Leite VM, *et al.* Trigger finger: a prospective analysis of 76 fingers treated surgically by percutaneous release. Rev Bras Ortop 2004;39:309-22.
 26. Bain GI, Turnbull J, Charles MN, *et al.* Percutaneous A1 pulley release: a cadaveric study. J Hand Surg Am 1995;20:781-4.
 27. Gilberts EC, Beekman WH, Stevens HJ, *et al.* Prospective randomized trial of open versus percutaneous surgery for trigger digits. J Hand Surg Am 2001;26:497-500.
 28. Chao M, Wu S, Yan T. The effect of miniscalpel-needle versus steroid injection for trigger thumb release. J Hand Surg Eur 2009;34:522-5.