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Original Research Article

Randomized and double-blinded controlled trial: percutaneous trigger finger release concomitant steroid injection versus percutaneous trigger finger release alone

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ABSTRACT

Background: Corticosteroid injection is a common nonoperative treatment that provides immediate pain relief but carries a risk of recurrence. Percutaneous A1 pulley release is a minimally invasive alternative to open surgery, offering comparable outcomes. However, postoperative pain remains a concern. This study evaluated the effect of combining corticosteroid injection with percutaneous A1 pulley release on postoperative pain control compared to percutaneous release alone. Objective was to compare early postoperative pain control, quality of life, and complications between percutaneous A1 pulley release alone and with corticosteroid injection.
Methods: This was a randomized, double-blinded controlled trial including 76 patients diagnosed with trigger finger. Participants were randomly assigned to group A (percutaneous A1 pulley release with corticosteroid injection, n=36) or group B (percutaneous A1 pulley release alone, n=40). Primary outcome measures included postoperative pain scores (visual analog scale, VAS), while secondary outcomes assessed quality of life (quick disabilities of the arm, shoulder, and hand score, qDASH), patient satisfaction, and complications.
Results: A total of 76 patients were enrolled, with no significant differences in baseline characteristics between groups. Pain scores (VAS) decreased in both groups from day 1 to day 3 (group A: 5.33 to 4.11; group B: 6.90 to 5.00, $p>0.05$). However, group A exhibited significantly lower pain scores from postoperative day 4 to 6 (1.78 versus 4.00, $p<0.05$), a trend that persisted through weeks 1 and 2, as well as at 1 and 2 months postoperatively. Quality of life (qDASH) and patient satisfaction were slightly higher in group A, but differences were not statistically significant ($p>0.05$). No major complications (e.g., infection, nerve injury, tendon rupture, recurrent triggering, or bowstringing) were reported in either group.
Conclusions: The addition of corticosteroid injection to percutaneous A1 pulley release significantly improves early postoperative pain control without affecting functional recovery or patient satisfaction. These findings support the safety and efficacy of corticosteroid injection in reducing postoperative discomfort. Future studies should explore long-term outcomes, recurrence rates, and return-to-work effects.

Keywords: Percutaneous A1 pulley release, Postoperative pain, Steroid injection, Trigger finger

INTRODUCTION

Trigger finger is a prevalent orthopedic condition. The condition causes pain and limited finger motion, significantly affecting quality of life. Corticosteroid injections are commonly used as first-line treatment, reducing inflammation and pain effectively.[1,2] However, recurrent cases often require surgical intervention.

Open A1 pulley release is the conventional surgical approach, demonstrating excellent outcomes.[3,4] However, concerns regarding cost and scar-related complications have led to interest in alternative treatments.[5] Percutaneous A1 pulley release offers a simpler, cost-effective alternative with comparable results and minimal scarring.[6-8] However, studies indicate that postoperative pain scores for this method are similar to those of open A1 pulley release.[9,10]

While combining percutaneous A1 release with corticosteroid injection has shown favorable results, early postoperative pain which emphasized the benefit of minimal invasive procedure has not been specifically studied.[11,12] This study addressed this gap by evaluating early postoperative pain outcomes in patients undergoing percutaneous A1 pulley release with and without corticosteroid injection.

METHODS

This study was a prospective, randomized, double-blinded clinical trial conducted at the orthopedic outpatient department, Police General Hospital, Bangkok, Thailand, between September 2023 and October 2024. The study protocol was approved by the Institutional Review Board of Police General Hospital (IRB No. Dh059-66).

Study population

Eligible participants included adult patients aged 18 years or older, clinically diagnosed with trigger finger grades 2-4 according to Quinell's classification (Table 1). Exclusion criteria comprised prior hand surgery, presence of Dupuytren's contracture, type 1 diabetes mellitus, corticosteroid injection within the past 3 months, and autoimmune disorders.

Table 1: The Quinell's grading.

Grade	Clinical finding
Grade 0	Normal movement, no pain
Grade 1	Uneven movement
Grade 2	Actively correctable
Grade 3	Passively correctable
Grade 4	Fixed deformity

Randomization and blinding

Participants were randomly assigned to either the treatment or control group using computer-generated random numbers sealed in opaque envelopes to ensure allocation concealment. Syringes were prepared by an independent nurse to appear identical in volume and color, maintaining blinding of both patients and clinicians.

Group A: 1% lidocaine (1 ml) + triamcinolone acetonide 40 mg/ml (1 ml). Group B: 1% lidocaine (2 ml)

The operating surgeon and outcome assessors remained blinded to group assignments throughout the study period.

Surgical technique

All procedures employed the Eastwood percutaneous A1 pulley release technique, performed under local anesthesia (1% lidocaine) with the hand in a supinated position. A 19-gauge needle or fine scalpel blade was inserted percutaneously at the A1 pulley. A sweeping motion was used to release the pulley while preserving adjacent neurovascular structures. Completeness of release was confirmed intraoperatively via active flexion and extension by the patient. No sutures were applied; only a sterile dressing was used postoperatively.

Postoperative protocol

All patients were encouraged to begin immediate active range-of-motion exercises to prevent joint stiffness. Postoperative care, medication regimens, and rehabilitation instructions were standardized across both groups.

Outcome measures

Primary Outcomes were pain assessment using the visual analog scale (VAS). Secondary Outcomes were patient-reported quality of life using the QuickDASH score, satisfaction level, and occurrence of surgical complications.

Follow-up evaluations were conducted via telephone (postoperative days 1-6) and in-person clinic visits (weeks 1, 2, and months 1-2).

Statistical analysis

All statistical analyses were performed using Stata version 14.0 (StataCorp LLC, College Station, TX, USA). Descriptive data were expressed as means with standard deviations or medians with interquartile ranges, as appropriate. Comparative analyses between groups were performed using chi-square, t-tests, or Mann-Whitney U tests depending on variable distribution. A p value of <0.05 was considered statistically significant.

RESULTS

Seventy-six patients were enrolled: 36 in group A and 40 in group B. No significant differences in gender, age, or BMI were observed between the groups. Hypertension was the most common comorbidity.

Pain scores (VAS) from postoperative day 1 to day 3 showed no significant difference between the groups ($p>0.05$). However, from day 4 onward, group A demonstrated significantly lower pain scores than group B ($p<0.05$). This trend persisted through the second month (Table 2).

Table 2: Demographic data.

	Group A (n=36)	Group B (n=40)	P value
Gender (male/female)	8/28	4/36	0.28
Dominant hand (left/right)	28/8	40/0	-
Age (years)	56.5±5.72	58.1±6.82	0.55
BMI (body mass index, kg/m^2)	24±3.03	23.4±2.72	0.36
Quinell grading	3.22±0.80	3.33±0.65	0.46
Onset of symptoms (month)	5.33±3.73	6.10±7.01	0.41

Values are expressed as mean±SD unless otherwise indicated. Group A: percutaneous A1 pulley release with steroid injection. Group B: percutaneous A1 pulley release alone.

Table 3: Post-operative pain score.

	Group A (n=36)	Group B (n=40)	P value
Average VAS score			
1day	5.33	6.90	0.22
2 days	4.78	5.90	0.28
3 days	4.11	5.00	0.37
4 days	3.11	5.00	<0.01 (0.0059)
5 days	2.44	4.8	<0.01 (0.0002)
6 days	1.78	4.3	<0.01
1 week	1.88	3.80	0.02
2 weeks	0.78	2.10	0.02
1 month	0.44	1.60	0.04
2 months	0.22	1.00	0.03

Values are expressed as mean±SD unless otherwise indicated. Abbreviation VA: visual analog scale. Group A: percutaneous A1 pulley release with steroid injection. Group B: percutaneous A1 pulley release alone.

Table 4: Post-operative quality of life and satisfaction.

Post-op QuickDASH score	Group A (n=36)	Group B (n=40)	P value
1day	11.33	13.60	0.52
2 days	11.33	13.20	0.58
3 days	9.56	11.60	0.61
4 days	8.44	10.50	0.40
5 days	8.00	9.30	0.56
6 days	6.55	8.60	0.33
1 week	4.78	7.90	0.32
2 weeks	0.88	3.30	0.20
1 month	0.33	0.80	0.49
2 months	0.33	0.30	0.94
Post-op satisfaction			
1day	4.44	4.46	0.67
2 days	4.44	4.46	0.67
3 days	4.67	4.60	0.83
4 days	4.78	4.60	0.33
5 days	4.89	4.80	0.46
6 days	4.89	4.60	0.10
1 week	4.88	4.30	0.32
2 weeks	4.89	4.80	0.20
1 month	0.33	0.80	0.49
2 months	0.33	0.30	0.94

Values are expressed as mean±SD unless otherwise indicated. Abbreviation QuickDASH: quick disabilities of arm, shoulder and hand scale. Group A: percutaneous A1 pulley release with steriod injection. Group B: percutaneous A1 pulley release alone.

Although qDASH scores suggested a slight quality of life improvement in group A, the difference was not statistically significant. Patient satisfaction was consistently higher in group A, but without statistical significance. No major complications (e.g., infection, nerve injury, tendon rupture) were reported in either group. (Table 4).

DISCUSSION

This study represents the first double-blind (patient and assessor-blind) randomized controlled trial comparing percutaneous A1 pulley release alone

versus percutaneous A1 pulley release with corticosteroid injection. The results emphasize that corticosteroid injection significantly improves early postoperative pain control without affecting functional outcomes or overall patient satisfaction.

Demographically, our patient cohort aligns with previous studies, confirming the broader applicability of our findings.[13,14] The effectiveness of percutaneous A1 release is consistent with prior research.[15-19] The observed reduction in early postoperative pain in the corticosteroid group (group A) supports the hypothesis that corticosteroids reduce prostaglandin activity, mitigating inflammation and pain.[20-22] Mechanistically, corticosteroid injection decreases inflammation around the flexor tendon sheath, reducing swelling and enhancing tendon gliding, thereby alleviating pain and triggering sensations. Some patients reported symptom relief as early as three days, consistent with previous literature.[23]

Clinically, the significant reduction in early postoperative pain suggests that patients receiving corticosteroid injections may experience a shorter recovery period and a faster return to daily activities. The ability of corticosteroids to minimize early postoperative discomfort could enhance patient mobility, potentially facilitating rehabilitation and preventing stiffness. The observed improvement in pain control may contribute to reduced reliance on postoperative analgesics, a factor that warrants further investigation.

The absence of major complications, along with similar functional outcomes and patient satisfaction between groups, may be attributed to the relatively small sample size, which could have limited the statistical power to detect differences. Additionally, the minimally invasive nature of the procedure and its inherently low discomfort likely contributed to the comparable results. Although the study's short follow-up duration limits the assessment of long-term recurrence and re-operation rates, these findings provide valuable insights into optimizing early postoperative pain management and recovery. Future research with larger, multicenter cohorts and extended follow-up is essential to further validate these findings and refine clinical guidelines.

CONCLUSION

While both techniques offer effective symptom relief, the addition of corticosteroid may benefit patients seeking enhanced postoperative comfort. Further large-scale studies are recommended to strengthen these findings and establish their long-term impact on recurrence and functional outcomes.

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Ethical approval: The study was approved by the Institutional Ethics Committee of Police General Hospital (IRB No. Dh059-66)

REFERENCES

1. Salim N, Abdullah S, Sapuan J, Haflah NH. Outcome of corticosteroid injection versus physiotherapy in the treatment of mild trigger fingers. J Hand Surg. 2012;37(1):27-34.
2. Shakeel H, Ahmad TS. Steroid injection versus NSAID injection for trigger finger: a comparative study of early outcomes. J Hand Surg Am. 2012;37(7):1319-23.
3. Dahl J, Hammert WC. Overview of injectable corticosteroids. J Hand Surg Am. 2012;37(8):1715-7.
4. Nepple JJ, Matava MJ. Soft tissue injections in the athlete. Sports Health. 2009;1(5):396-404.
5. Gancarczyk SM, Jang ES, Swart EP, Makhni EC, Kadiyala RK. Percutaneous trigger finger release: a cost-effectiveness analysis. J Am Acad Orthop Surg. 2016;24(7):475-82.
6. Gilberts EC, Beekman WH, Stevens HJ, Wereldsma JC. Prospective randomized trial of open versus percutaneous surgery for trigger digits. J Hand Surg. 2001;26(3):497-500.
7. Zhao JG, Kan SL, Zhao L, Wang ZL, Long L, Wang J, et al. Percutaneous first annular pulley release for trigger digits: a systematic review and meta-analysis of current evidence. J Hand Surg. 2014;39(11):2192-202.
8. Lin CJ, Huang HK, Wang ST, Huang YC, Liu CL, Wang JP. Open versus percutaneous release for trigger digits: Reversal between short-term and long-term outcomes. J Chinese Med Assoc. 2016;79(6):340-4.
9. Bamroongshawgasame T. A comparison of open and percutaneous pulley release in trigger digits. J Med Assoc Thai. 2010;93(2):199-204.
10. Nikolaou VS, Malahias MA, Kaseta MK, Sourlas I, Babis GC. Comparative clinical study of ultrasound-guided A1 pulley release versus open surgical intervention in the treatment of trigger finger. World J Orthop. 2017;8(2):163.
11. Patel MR, V.J. Moradia VJ. Percutaneous release of trigger digit with and without cortisone injection. J Hand Surg Am. 1997;22(1):150-5.

12. Jegal M, Woo SJ, Il Lee H, Shim JW, Park MJ. Effects of simultaneous steroid injection after percutaneous trigger finger release: a randomized controlled trial. J Hand Surg. 2019;44(4):372-8.
13. Quinnell RC. Conservative management of trigger finger. Practitioner. 1980;224(1340):187-90.
14. Eastwood DM, Gupta KJ, Johnson DP. Percutaneous release of trigger finger: an office procedure. J Hand Surg. 1992;17:114-7.
15. Lorthioir J Jr. Surgical treatment of trigger-finger by a subcutaneous method. J Bone Joint Surg Am. 1958;40(4):793-5.
16. Pope DF, Wolfe SW. Safety and efficacy of percutaneous trigger finger release. J Hand Surg Am. 1995;20(2):280-3.
17. Huang HK, Wang JP, Lin CJ, Huang YC, Huang TF, Chang MC. Short-term versus long-term outcomes after open or percutaneous release for trigger thumb. Orthopedics. 2017;40(1):e131-5.
18. Sato ES, Gomes dos Santos JB, Belloti JC, Albertoni WM, Faloppa F. Treatment of trigger finger: randomized clinical trial comparing the methods of corticosteroid injection, percutaneous release and open surgery. Rheumatology. 2012;51(1):93-9.
19. Hansen RL, Søndergaard M, Lange J. Open surgery versus ultrasound-guided corticosteroid injection for trigger finger: a randomized controlled trial with 1-year follow-up. J Hand Surg. 2017;42(5):359-66.
20. Anderson B, Kaye S. Treatment of flexor tenosynovitis of the hand ('trigger finger') with corticosteroids. A prospective study of the response to local injection. Arch Intern Med. 1991;151(1):153-6.
21. Peters-Veluthamaningal C, Winters JC, Groenier KH, Meyboom-de Jong B. Corticosteroid injections effective for trigger finger in adults in general practice: a double-blinded randomised placebo controlled trial. Ann Rheum Dis. 2008;67(9):1262-6.
22. Peters-Veluthamaningal C, van der Windt DA, Winters JC, Meyboom-de Jong B. Corticosteroid injection for trigger finger in adults. Cochrane Database Syst Rev. 2009(1).
23. Seigerman D, McEntee RM, Matzon J, Lutsky K, Fletcher D, Rivlin M, et al. Time to improvement after corticosteroid injection for trigger finger. Cureus. 2021;13(8):e16856.

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