ORIGINAL ARTICLE

Effectiveness of Percutaneous Hypodermic Needle Release of Trigger Finger: A Prospective Study

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Abstract

Background: Trigger finger, also known as stenosing tenosynovitis, is a common cause of hand pain and dysfunction, with symptoms of pain, swelling, limited finger motion, and triggering sensation. When conservative treatments are not effective, the percutaneous release of the A1 pulley can be performed, which has high clinical outcomes and patient satisfaction with low complication rates. Our aim of the study is to assess the pain and functional outcome following the percutaneous release of the trigger finger by using the visual analog scale (VAS), quick disabilities of the arm, shoulder, and hand (Q-DASH) score, and Quinnell's criteria, respectively, at regular follow-up intervals of 1, 3, 6 months, and 1 year.

Material and methods: This is a prospective study conducted between March 2021 and February 2023. A total of 25 patients of both sexes who were not responding to conservative management with trigger-finger were included. Patients with grades III, IV, and V of modified Quinnell's grading were included, and patients who did not respond to conservative management were included in the study. Patients with congenital triggering were excluded.

Results: In our present study, the clinical assessment was done by using modified Quinnell grading of trigger finger at the interval of preprocedure, 1, 3, 6 months, and 1 year. Which showed that 21 patients (84%) had excellent results, three patients (12%) had good results, and one patient (4%) had poor results. Only one patient (4%) developed digital nerve injury.

Conclusion: Percutaneous hypodermic needle release for the trigger finger is a safe, effective, convenient, and inexpensive day-care procedure without any significant complications in the management of the trigger finger. It is a safe alternative to open surgery. Percutaneous release of the trigger finger has excellent to good results and improves the overall functional outcome. Hence, percutaneous hypodermic needle release can be considered a preferable treatment option for trigger finger.

Keywords: Modified Quinnells grading, Quick disabilities of the arm, shoulder, and hand score, Trigger finger, Visual analog scale score.

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Introduction

Trigger finger, also known as stenosing tenosynovitis, is a common cause of hand pain and dysfunction, with symptoms of pain, swelling, limited finger motion, and triggering sensation.[1] The main pathology is the thickening of the A1-pulley, which causes the flexor tendon to get entrapped. Inflammation and enlargement of the retinacular sheath gradually limit flexor tendon mobility.[2] Although it can happen to any digit, the ring, thumb, and index fingers are the most frequently affected. Patients with diabetes, gout, renal disorders, rheumatoid arthritis, and other autoimmune conditions may experience secondary trigger fingers.[3] This may result in flexion contracture of the proximal interphalangeal joints if left untreated.

Annular pulleys are thickenings of the tendon sheath along the flexor tendons of the second to fifth fingers and are numbered A1–A5, whereas the thumb has only two annular pulleys (A1 and A2). Both the membrane synovial portion and the retinacular pulley section make up the tendon sheath. The visceral layer of the synovial part links to the tendon, while the outer layer protects the synovial pouch. The trigger finger is frequently related to the A1 pulley. It derives two-thirds of its origins from the palmar plate of the metacarpophalangeal joint and two to three times as much hypertrophy as the normal size.[4]

Trigger fingers are typically idiopathic. It has also been linked to a number of diseases, various tumors, and neoplasms. It is most frequently reported in middle-aged women. Numerous forms of conservative treatment, such as splint immobilization, nonsteroid anti-inflammatory drugs, and steroid injection with good outcomes in single-digit involvement as well as early cases, have been advised.

When nonsurgical treatment is unsuccessful, surgery to release the A1 pulley is recommended. Percutaneous release of the A1 pulley can be done when conservative treatments are ineffective. This procedure has a high clinical success rate, high patient satisfaction, and minimal complication rates. The safe and economical percutaneous release of the trigger finger has been demonstrated. The purpose of this study is to analyze the pain as well as functional results after percutaneous release of the trigger finger using the visual analog scale (VAS) score, quick disabilities of the arm, shoulder, and hand (Q-DASH) score, and modified Quinnell grading at 1, 3, 6 months, and 1 year intervals.

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Materials and Methods

This prospective study was carried out between March 2021 and February 2023 at the Sree Mookambika Institute of Medical Sciences, Kanniyakumari, Tamil Nadu, India, in the Orthopedics outpatient department. There were a total of 25 patients of both sexes who did not respond to trigger finger conservative therapy. The modified Quinnell grading of the trigger finger[5] is used to grade severity (Table 1). The study comprised patients with grades III, IV, and V who did not improve with conservative therapy. The study excluded those with congenital triggering.

Technique

Under strict aseptic precautions, the skin was painted and draped. Around 2cc of 2% lignocaine was applied to the A1 pulley's skin. To feel the A1 pulley, the affected finger was extended beyond its normal range. The flexor tendon was punctured with an 18-G needle *via* the metacarpophalangeal crease. To observe the needle motions, the distal phalanx was flexed and extended, and the needle was gently withdrawn. The release was accomplished by adjusting the longitudinal axis of pulley A1 by moving the needle's sharp edge up and down (Fig. 1). A sufficient release was guaranteed by the abrupt reduction of resistance at the needle tip. Free finger movements and a loss of triggering were seen. After the treatment, a soft dressing was placed on the wound. Patients were advised to move their fingers immediately after the procedure and do daily mobilization according to their tolerance.

At 1, 3, 6 months, and 1 year after treatment, all patients were monitored and evaluated using the VAS score. Quinnell's trigger finger grading is adjusted for clinical evaluation. The finger's functionality was assessed using the Q-DASH score. A 10-point VAS was used to assess the impairment caused by pain.

Table 1: Modified Quinnell grading system for trigger finger

Grade	*Clinical findings*
I	Normal movement, no pain
II	Normal movement, occasional pain
III	Uneven movement (involving crepitus or clicking without locking)
IV	Intermittent locking, actively correctable
V	Locking, only passively correctable

Grade I, excellent; grade II, good; grade III–V, poor

Statistical Analysis

The resultant data were entered into a Statistical Package for the Social Sciences version 10 statistical software program. Data were analyzed using a paired samples *t*-test. The results were considered significant if $p < 0.05$.

Results

A total of 25 individuals underwent clinical evaluation. A clinical evaluation was conducted using modified Quinnell grading of the trigger finger. The study's mean age was 47.9 years. The majority of the trigger finger patients were between the age-group of 40 and 50 years. Patients of both genders were included in our study, with 15 (60%) female patients and 10 (40%) male patients (Fig. 2).

Out of 25 patients, 11 (44%) had ring finger triggering, eight (32%) had thumb triggering, and six (24%) had index finger triggering. The modified Quinnell grading of the trigger finger was used to grade the patients. Three (12%) individuals had a grade III, 13 (52%) had a grade IV, and nine (36%) had a grade V (Table 2).

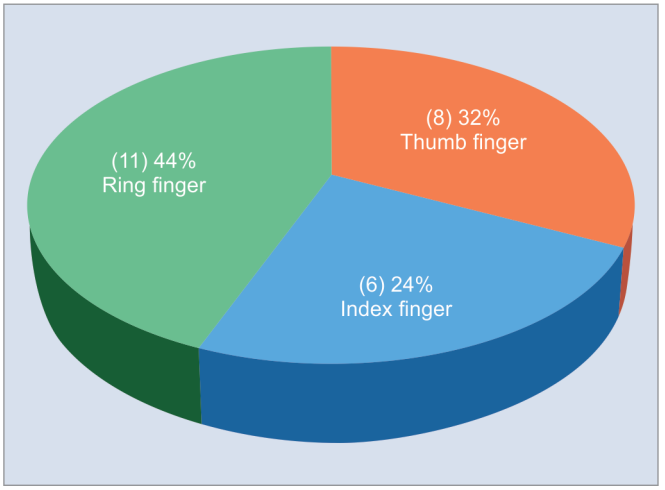
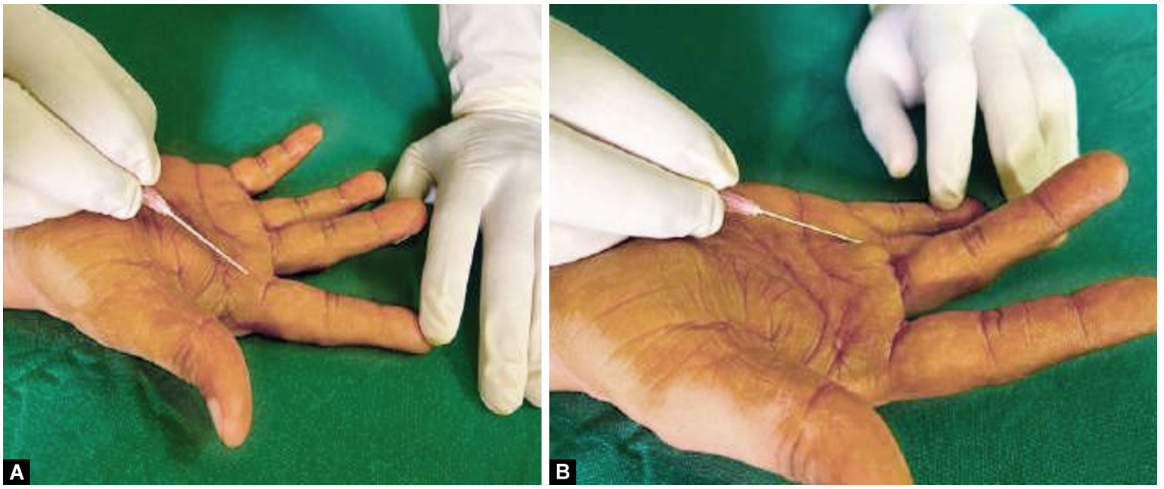


Fig. 2: Distribution of digits (trigger finger)



Figs 1A and B: Percutaneous release of trigger finger (index and ring finger) using 18G needle

Among the total of 25 patients, 16 (64%) patients were affected with the right hand, whereas nine (36%) patients were affected with the left hand (Fig. 3).

All patients were monitored at regular intervals of 1, 3, 6 months, and 1 year. The baseline mean VAS score was 7.72 ± 0.6. At the end of one month, the mean VAS was 1.5 ± 0.4; at 3 months, 1.2 ± 0.7; at 6 months, 1.0 ± 0.8; and at 1 year, 0.32 ± 0.70. At the time of follow-up, all patients displayed improvement that was statistically significant with a *p*-value < 0.005 (Fig. 4).

In 25 patients with trigger fingers, the mean Q-DASH was evaluated prior to the procedure and at the end of 1 year's follow-up.

Table 2: Distribution of cases with clinical findings according to modified Quinnells's grading

Grade	*Clinical findings*	*Number of cases*
I	Normal movement, no pain	–
II	Normal movement, occasional pain	–
III	Uneven movement (Involving crepitus or clicking without locking)	3 (12%)
IV	Intermittent locking, actively correctable	13 (52%)
V	Locking, only passively correctable	9 (36%)

The results reveal a mean of 31.2 ± 1.67–1.96 ± 2.40, which is statistically significant with a *p*-value < 0.004 (Fig. 5).

Among 25 patients with trigger fingers, patients were clinically assessed with modified Quinnell's grading and showed significant improvement in 1 year of follow-up, which is statistically significant (Fig. 6).

Modified Quinnell grading of the trigger finger was used for clinical evaluation at preprocedure, 1, 3, 6 months, and 1 year intervals. It revealed that three patients (12%) had good results, one patient (4%) had poor results, and 21 patients (84%) had great results (Fig. 7).

Only one patient (4%) developed digital nerve injury. No other complications, such as digital nerve injury or intrinsic muscle wasting, were observed.

Discussion

Trigger finger is one of the most prevalent hand disabilities as well as a frequent cause for patients being referred to the orthopedic department; studies have shown that percutaneous release has good cure rates for trigger fingers. In our study, the percentage of female patients 15 (60%) was greater than males 10 (40%), and the prevalence of trigger fingers was similarly higher in females. Our study had a mean age of 47.9 years. Most patients were in the

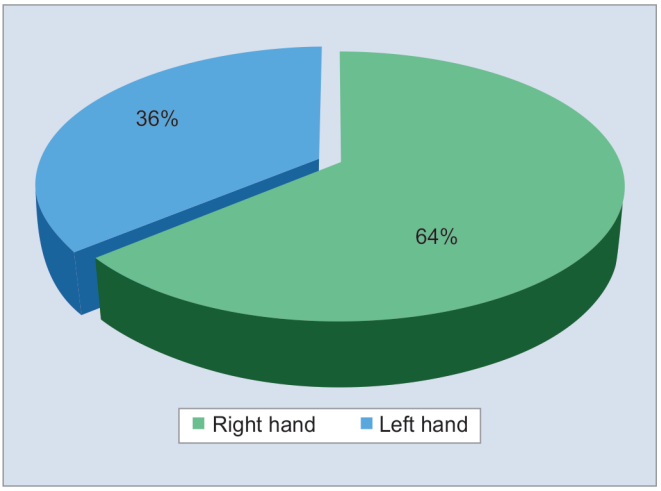


Fig. 3: Distribution of affected hand

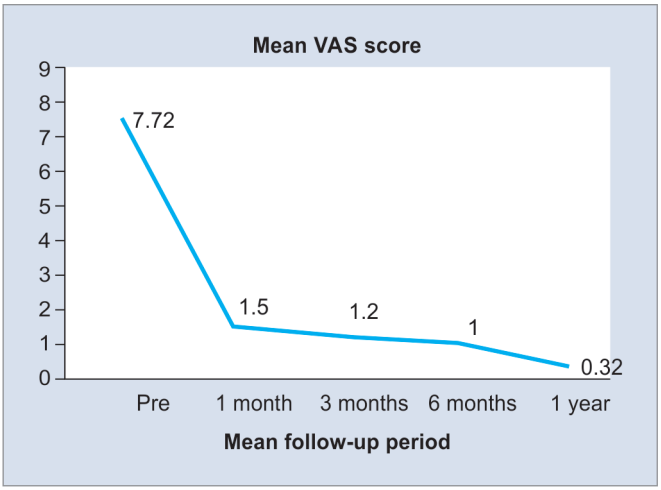


Fig. 4: Distribution of mean VAS score

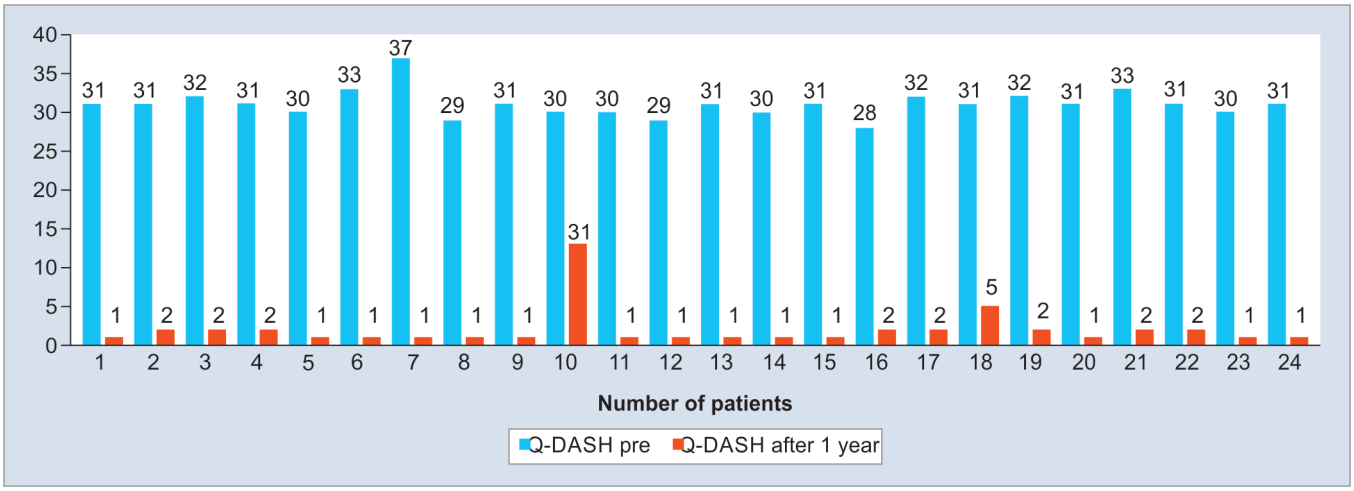


Fig. 5: Quick disabilities of the arm, shoulder, and hand (Q-DASH) score of preprocedure with Q-DASH score after 1 year of follow-up

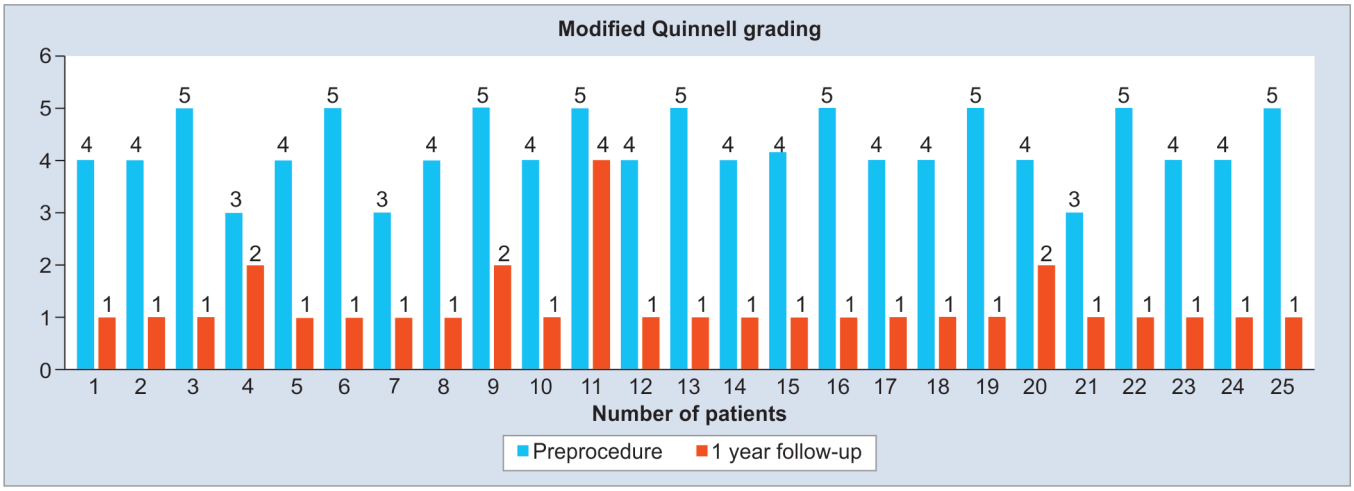


Fig. 6: Modified Quinnell grading of preprocedure and 1-year follow-up

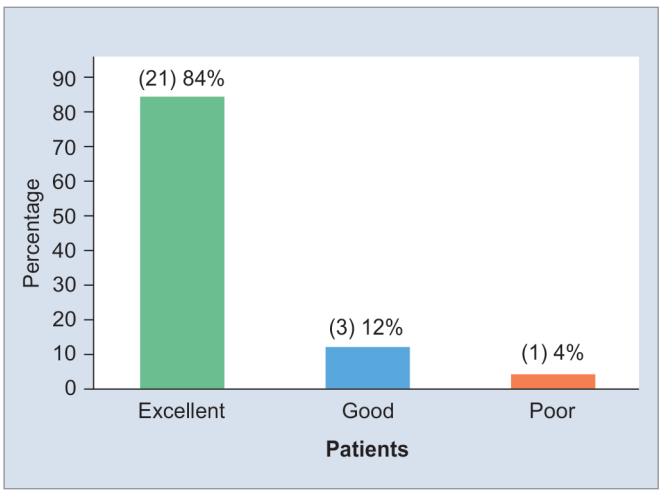


Fig. 7: Distribution of clinical assessment with modified Quinnell's grading

40–50-year-old age range. In a study by Uçar[6] involving 48 trigger finger patients, 36 (60%) of the patients were female, and 12 (40%) were males. Individuals with trigger fingers were mostly between the ages of 40 and 60.

In our study, out of 25 trigger finger patients, 16 (64%) had a dominant right hand, whereas nine (36%) had a dominant left hand. Similar to our study, a study by Rosenbaum et al.[7] that included 39 patients with trigger fingers found that 21 (53%) of the patients had right-hand dominance and 18 (47%) had left-hand dominance (Table 3).

All of the patients were monitored at regular intervals of 1, 3, 6 months, and 1 year. The baseline mean VAS score was 7.72 ± 0.6. All of the patients demonstrated improvement at follow-up with statistical significance with *p*-value < 0.005 at 1, 3, 6 months, and 1 year. The mean VAS at these time points was 1.5 ± 0.4, 1.2 ± 0.7, 1.0 ± 0.8, and 0.32 ± 0.7, respectively. The average VAS at preprocedure was 9.0 ± 1.45 in a study by Onta et al.[8] among 28 participants with trigger fingers, but this value was reduced to 0.5 ± 0.63 at the end of a 6-month follow-up. The mean VAS at preprocedure was 8.03 ± 0.97 in a study by Panghate et al.[4] among 67 patients with trigger fingers. This value improved to 0.44 ± 0.95 at the conclusion of a 1-year follow-up, which is statistically significant and was comparable to our current study (Table 4).

Table 3: Comparison of affected hand with previous

Affected hand	*Rosenbaum et al.*[7]	*Our study*
Right	21 (53%)	16 (64%)
Left	18 (47%)	9 (36%)

Table 4: Comparison of VAS score with previous studies

Mean VAS	*Onta et al.*[8]	*Panghate et al.*[4]	*Our study*
Initial (pre)	9.0 ± 1.45	8.03 ± 0.97	7.72 ± 0.6
1 month	1.14 ± 0.65	1.21 ± 1.48	1.5 ± 0.4
6 months	0.5 ± 0.63	1.79 ± 0.65	1.0 ± 0.8
1 year	–	0.44 ± 0.95	0.32 ± 0.70

Table 5: Comparison of clinical assessment results with previous studies based on modified Quinnell grading

Functional results	*Abe*[9]	*Pandey et al.*[10]	*Present study*
Excellent	41 (78%)	42 (73%)	21 (84%)
Good	8 (15%)	14 (24%)	3 (12%)
Poor	3 (7%)	2 (3%)	1 (4%)

In 25 trigger finger patients, the mean Q-DASH was evaluated prior to the procedure and at the conclusion of 1 year's follow-up. The results reveal a mean of 31.2 ± 1.67–1.88 ± 2.55 at the end of the year's follow-up, which showed statistical significance with a *p*-value < 0.004. At the end of a 6-month follow-up, research by Abe[9] conducted among 52 patients revealed a pretreatment mean Q-DASH score of 33.1 ± 10.9–1.5 ±2.2, which is comparable to our findings and statistically significant with a *p*-value of 0.001.

Modified Quinnell grading of the trigger finger was used for clinical evaluation at preprocedure, 1, 3, 6 months, and 1 year intervals. Results revealed that three patients (12%) had good results, one patient (4%) had poor results, and 21 patients (84%) had great results. Abe[9] conducted a study with 52 patients and found that 41 (78%) had outstanding outcomes, eight (15%) had good results, and three (7%) had bad results. These results are comparable to our study. Similarly, Pandey et al.,[10] in their study involving 58 trigger finger patients, revealed great results in 42 (73%) patients, followed by good results in 14 (24%) patients, and poor results in two (3%) individuals (Table 5).

In a study conducted by Singh et al.[11] involving 26 individuals with trigger fingers, sequelae like MCP stiffness, as well as bowstringing of flexor tendons, were seen in two patients. One patient with digital nerve injury was identified in a study by Tawfik et al.[12] on 21 patients with trigger fingers. One tendon rupture was identified in a study by Toprak et al.[13] among 33 patients who underwent percutaneous release for trigger finger. In contrast, one patient (4%) in the current study experienced digital nerve damage in the left thumb along with hypoesthesia. There were no additional issues with this percutaneous method, such as intrinsic muscle atrophy, MCP stiffness, scar soreness, or bowstringing of flexor tendons, which are seen with open surgery. Therefore, the present study suggested that percutaneous needle release is the treatment of choice for trigger fingers because it has a very minimal risk of complications and great clinical results.

Conclusion

The management of the trigger finger is made easier by the percutaneous hypodermic needle release method, which is a day-care procedure that is safe, efficient, practical, and affordable. It is a risk-free substitute for open surgery. When compared to open surgical release, the only problem we experienced was digital nerve injury.

Modified Quinnell grading, VAS, and Q-DASH Scores are excellent tools for evaluating the pain and functional results following percutaneous trigger finger release. Percutaneous trigger finger release produces excellent to good outcomes and enhances overall functional performance. Therefore, percutaneous hypodermic needle release can be considered as a preferred option for the trigger finger.

Limitation

A smaller number of sample sizes.

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