

# Long-Term Effectiveness of Corticosteroid Injections for Trigger Finger and Thumb

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**Purpose** To analyze the long-term response to corticosteroid injection in the management of trigger digit.

**Methods** This was an observational study of a prospectively recruited series of patients with first-time diagnosis of trigger finger. Efficacy of the injections, comorbidities, digit injected, and related complications were compared and statistically analyzed.

**Results** A total of 71 digits were included in the study. The median (interquartile range) duration of follow-up was 8 years (range, 7.0–8.3 y). At final follow-up, complete remission of symptoms was obtained in 69% of cases. There were 37 trigger thumbs (52%), with a success rate of 81% compared with 56% in the other the digits. There were 11 patients with diabetes mellitus, and 16 fingers developed trigger finger after carpal tunnel syndrome surgery. We found no complications.

**Conclusions** Steroid injections were an effective first-line intervention for the treatment of trigger finger. At long-term follow-up, the success incidence may be as high as 69%. In this study, the efficacy of this treatment increases when treating the thumb compared with other digits. (*J Hand Surg Am.* 2015;40(1):121–126. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)

**Type of study/level of evidence** Therapeutic IV.

**Key words** Thumb, digit, injection, trigger finger, corticosteroid.

**T**RIGGER FINGER IS A COMMON pathology in adults. It has a prevalence of up to 3%<sup>1</sup> and is more frequent in women.<sup>2</sup> In the vast majority of trigger fingers and thumbs, the site of obstruction is A1 pulley.

The goal of treatment is to reestablish smooth, painless, and full range of motion in the affected digit. Treatment options include orthoses,<sup>3,4</sup> corticosteroid injection,<sup>5–13</sup> percutaneous surgery,<sup>4,14,15</sup>

and open surgery.<sup>16,17</sup> Operative therapies are effective but are associated with higher cost, longer absence from work, and the possibility of surgical complications.<sup>18,19</sup> Corticosteroid injection provides relief of symptoms in 47% to 92% of affected digits.<sup>5,7–13,15</sup> However, duration of follow-up is highly variable among the published studies, mainly ranging from 1 to 27 months.<sup>20</sup> The purpose of this study was to analyze the long-term response to corticosteroid injection in the management of trigger finger.

## MATERIALS AND METHODS

This was an observational study of a prospectively recruited series of patients with first-time diagnosis of trigger finger between April, 1998 and October, 2000. The inclusion criteria included age of 18 years or older, diagnosis of trigger finger of at least grade 2 according to the Quinnell classification,<sup>21</sup> duration

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of symptoms of at least 3 months, and absence of previous treatment of the affected finger. All patients presenting with an allergy to any component of the injections or refusing treatment were excluded from the study. The diagnosis of trigger finger was made after we obtained a history of triggering and physical examination (pain over the flexor tendon, tenderness or nodule over the A1 pulley, stiffness, and reproducible locking or triggering).

All patients' fingers were infiltrated by the same surgeon following the same technique. Patients were injected with a mixture of 1.0 mL (20 mg) paramethasone acetate (derivate from dexamethasone) and 1.0 mL mepivacaine chlorhydrate 2%. The cost of a phial currently costs the hospital \$0.92. Injections were performed through a palmar approach with a needle inserted parallel to the tendon fibers at the A1 pulley level. The needle was introduced directly into the flexor tendon sheath only until slight resistance was felt. Then the patient was asked to wiggle the finger and slight grating could be felt at the end of the needle to ascertain its correct position. A paradoxical motion of the needle could be noticed if it was in the tendon. Then we injected the preparation, aspiring to place at least some portion of the solution within the sheath. No ultrasound or sonographic monitoring was used to confirm intrathecal placement. No adjuvant therapy or orthoses were applied and patients were instructed to resume normal activity. After the first injection, patients were reevaluated 2 weeks later to determine whether the injection had been successful for each individually treated finger. If they were asymptomatic, no further corticosteroid injections were applied. If trigger finger symptoms were still present, patients were offered a second corticosteroid injection. Patients who refused the second injection were referred for surgical release of the A1 pulley and were classified as failures. Two weeks after the second infiltration, patients were again evaluated. Those with trigger finger symptoms were referred for surgical release of the A1 pulley. Afterward, patients were reevaluated at 3, 12, and 36 months and at the final follow-up. Patients who did not attend final follow-up were contacted by telephone.

Variables recorded were age, sex, affected side and finger, comorbidities (including diabetes mellitus, carpal tunnel syndrome, hypothyroidism, and Dupuytren disease), number of injections performed, and follow-up. Success was defined as complete resolution of symptoms for the entirety of the follow-up period such that surgical intervention was not

required. Failure was defined when the patient was referred for surgical release of the A1 pulley. Recurrence was defined when symptoms reappeared after a minimum of a 3-month symptom-free period or required additional injections, which were offered to this group of patients. Those who refuse the additional injection were also recorded as failures.

Continuous variables are expressed as mean and SD or median and interquartile range. We analyzed final outcome, defined as success or failure, according to the following variables: affected finger, diabetes mellitus, carpal tunnel syndrome, hypothyroidism, and Dupuytren disease. We compared variables using chi-square test or Fisher exact test when necessary. Statistical significance was set at the 95% confidence level ( $P < .05$ ).

All patients signed informed consent agreeing to accept infiltration of corticosteroids. Because of the observational nature of the study, our institution did not require approval by the institutional review board.

## RESULTS

A total of 72 patients met the inclusion criteria, 11 of whom were lost to follow-up (3 died and 8 did not attend the follow-up and could not be located via telephone). Thus, 61 patients (71 digits) were included in the study. [Table 1](#) lists patients' age and sex, involved digit, and comorbidities.

At the 3-, 12-, and 36-month and final follow-up, complete remission of symptoms was obtained in 55 (77%), 52 (73%), 51 (72%), and 49 (69%) digits, respectively. Median (interquartile range) duration of the follow-up was 8 years (range, 7.0–8 y).

Forty-three digits were treated with a single injection and 28 with 2 injections. In the first group, the success incidence was 70%, whereas in the group that needed 2 injections the success incidence was 68%. There were no statistically significant differences between groups.

In 10 cases, symptoms recurred after a period ranging from the fourth to the 62nd month (mean, 17 mo) after treatment ([Table 2](#)). Of these 10 cases, 6 patients accepted an additional re-injection, 4 of whom achieved full remission of symptoms and 2 required surgery. In the other 4 cases that rejected a new infiltration, surgical release of the A1 pulley was performed. In all, the success incidence in the group of recurred trigger finger was 40%. Recurrences were more frequent in the group needing 2 injections (8 cases) compared with the group that received a single injection (2 cases).

**TABLE 1. Main Demographics of Patients Included in the Study (n = 71)**

<b>Age, y (mean [SD])</b>	51.7 (13.4)
<b>Sex</b>	
Male	12 (20%)
Female	49 (80%)
<b>Side</b>	
Left	25 (35%)
Right	46 (65%)
<b>Involved digit</b>	
Thumb	37 (52%)
Index finger	0
Middle finger	22 (31%)
Ring finger	10 (14%)
Little finger	2 (3%)
<b>Comorbidities</b>	
Insulin-dependent diabetes mellitus	8 (11%)
Non-insulin-dependent diabetes mellitus	6 (8%)
Dupuytren disease	1 (1%)
Prior carpal tunnel syndrome surgery	16 (22%)
Hypothyroidism	2 (3%)

Values are expressed as the number of involved digits (except for age).

There were 16 cases of trigger finger after carpal tunnel release; the success incidence was 75%. In the group of patients with trigger finger not related to carpal tunnel syndrome surgery (55 cases), the success incidence was 67%. This difference was not statistically significant.

There were 14 cases of trigger finger in patients with diabetes; the success incidence of injection was 57%. In the non-diabetic group (57 cases) the success incidence was 72%. There were no statistically significant differences between groups. Of the 14 patients with diabetes mellitus, 8 had type 1 diabetes mellitus and 6 had type 2 diabetes mellitus, and presented a success incidence of 50% (4 fingers) and 67% (4 fingers), respectively. This difference was not statistically significant.

There were 37 trigger thumbs (both locked and triggering) and 34 cases of trigger finger not involving the thumb (Table 3). In the first group the success incidence was 81% whereas in the second group the success incidence was 56%. This difference was statistically significant ( $P = .039$ ). When differentiating between patients with and without diabetes mellitus, among those with diabetes ( $n = 14$ ) there were 5 thumbs and 9 digits with a success

incidence of 60% and 56%, respectively ( $P = 1$ ). However, among the group of non-diabetic patients ( $n = 57$ ), there were 32 thumbs and 25 digits with a success incidence of 84% and 56%, respectively ( $P = .036$ ).

No adverse events or complications were associated with corticosteroid injections during the study period.

## DISCUSSION

Several studies have demonstrated that trigger digits can be successfully treated with steroid injections, with a success incidence ranging from 47% to 92% according to the published series.<sup>1,22,23</sup> Murphy et al<sup>9</sup> reported a success incidence of 64% with a single injection of steroid compared with 10% in the control group. Similarly, Lambert et al<sup>10</sup> reported resolution of symptoms in 60% of treated digits with only one steroid injection against 16% for the control group. Peters-Veluthamalingal et al<sup>13</sup> published a double-blinded randomized controlled trial and concluded that treatment with 1 to 2 injections of triamcinolone acetate was more effective than placebo in adults after 1 week. They reported that 88% of cases perceived improvement of symptoms and observed that the positive effect of the corticosteroid remained during a follow-up of 12 months. In our series, 72% of patients remained free of symptoms after 12 months. In our opinion, a treatment protocol with one injection and a staged second injection at 2 weeks when symptoms recur could be related to a higher incidence of success. Some authors suggested that a third injection does not substantially increase the efficacy of the treatment. The efficacy of a third steroid injection would need to be investigated in a larger study.

Duration of follow-up after injection is highly variable among the published studies, ranging from 1 to 27 months.<sup>20</sup> Therefore, these studies do not demonstrate whether the effectiveness of the corticosteroid injection persists over years. The longest follow-up we found had a mean follow-up of 5 years<sup>11</sup> and showed an incidence of success of 61% after a single corticosteroid injection and an incidence of recurrence of 27%. Our results are slightly better, with an incidence of success of 69% after a median 8 years of follow-up. We had only 3 cases of recurrence after 10 months of follow-up (at 20, 42, and 62 mo), eventually requiring surgery. It seems that the probability of recurrence once a digit has been asymptomatic for 10 months to 1 year after injection is low, and patients experiencing

**TABLE 2. Patients With Recurrence of Symptoms**

n	Age (y), Sex	Comorbidities	Involved Digit and Side	Time Since Last Injection Until Recurrence, mo	Treatment	Final Outcome (Final Follow-Up), y
1	61, F	Dupuytren disease	Ring, R	6	Injection	Asymptomatic (7.8)
2	47, F		Thumb, R	5	Injection	Asymptomatic (7.5)
3	64, F		Thumb, R	62	Surgery	Failure
4	75, M	Non—insulin-dependent diabetes mellitus	Middle, R	20	Surgery	Failure
5	19, F		Middle, R	8	Injection	Asymptomatic (8.0)
6	32, M		Little, R	6	Surgery	Failure
7	51, F		Middle, R	4	Injection	Asymptomatic (8.5)
8	64, F	Non—insulin-dependent diabetes mellitus	Middle, R	42	Surgery	Failure
9	52, F		Thumb, R	5	Injection plus surgery	Failure
10	40, F	Carpal tunnel surgery	Middle, R	9	Injection plus surgery	Failure

**TABLE 3. Main Demographics of Trigger Thumbs and Other Fingers**

	Trigger Thumbs	Trigger Fingers
<b>n</b>	37	34
<b>Mean age, y (SD)</b>	51.5 (11.2)	53.3 (14.6)
<b>Sex ratio (F:M)</b>	32:5	26:8
<b>Side (R:L)</b>	24:13	22:12
<b>Comorbidities</b>		
Diabetes mellitus	5	9
Carpal tunnel surgery	11	5
Dupuytren disease	0	1
<b>Success rate</b>	81%	60%

recurrence after 10 months are likely to require surgery. However, the number of cases is too small to draw a firm conclusion. The long follow-up of the study and the low number of recurrences seen after 10 months question the added value of such a long-term follow-up.

We followed a staged protocol supporting a 2-week interval between injections. According to the literature, it seems that no standard protocol has been established or adopted as best practice for trigger fingers. Some studies propose weekly intervals between injections,<sup>13</sup> whereas some others propose waiting 4 weeks,<sup>24</sup> 6 weeks,<sup>25,26</sup> 8 weeks,<sup>19</sup> or even 3 months.<sup>12</sup> However, most studies do not specify how long the researchers waited between the first and

the second injection. We decided to follow an algorithm in which all patients were evaluated after 2 and 4 weeks and then offered another injection if they were symptomatic, or surgery if they refused another injection. Nonetheless, we are aware that some patients might have resolved symptoms if more time had been allowed to elapse between injections. In fact, patients who were deemed early failures at the 2-week follow-up and underwent surgery were not included in this article. By using this protocol, a subset of patients (early responders) who may be prone to have longer duration of response to injection was selected, which may have posed a selection bias.

Several studies report better results with steroid injections for trigger thumbs than trigger fingers. Marks and Gunther<sup>8</sup> reported a success incidence of 92% and 84% regarding the thumbs and other fingers, respectively, with an average follow-up of 4 years. Similarly, Freiberg et al<sup>5</sup> published a success incidence of 77% for thumbs and 67% for other fingers. Recently, Dala-Ali et al<sup>27</sup> found that the thumb responded better to steroid injections, with a success incidence of 92% compared with 66% in the other digits. We found a statistically significant difference when comparing the thumbs and other fingers, with a success incidence of 81% and 60%, respectively. This difference was also significant when we analyzed only patients without diabetes (84% vs 56%) but it seemed to disappear when we considered only patients with diabetes (60% vs 56%, respectively). The anatomical differences between the flexors of

the thumb and the rest of the fingers might be the reason for better results related to the trigger thumbs.

Some studies have demonstrated that the prevalence of trigger digit is substantially higher in patients with diabetes than those in the general population.<sup>1,6</sup> In these cases related to diabetes, it seems that treatment with steroid injections is less effective.<sup>27</sup> In our series, the success incidence in patients with and without diabetes was 57% and 72%, respectively. These results are comparable to those published by Griggs et al,<sup>28</sup> who showed a recurrence incidence of 50% in patients with diabetes. A prospective, double-blinded, randomized, controlled trial<sup>12</sup> compared results of steroid injections in diabetic and non-diabetic patients with 1 year of follow-up. The authors observed that the success incidence was 86% and 63% in the patients without and with diabetes, respectively. As in our study, those results suggest that the effectiveness of steroid injections seems to be lower in patients with diabetes than in patients without. Therefore, the presence of diabetes mellitus might be associated with a poorer response to corticosteroid injections.

The appearance of trigger finger after carpal tunnel release without a preexisting symptom has been reported.<sup>29–31</sup> Indeed, the onset of the trigger finger usually occurs within a few months of open carpal tunnel release.<sup>32</sup> In our study, we found 16 cases of trigger finger after carpal tunnel surgery. In those cases, the success incidence was 75%, whereas in the group of patients with trigger finger not related to carpal tunnel surgery (55 cases), the success incidence was 67%. This difference was not statistically significant.

Although uncommon, some studies have reported complications after the administration of steroid injection for trigger digit: for instance, hypopigmentation of the skin,<sup>33</sup> digital necrosis,<sup>34</sup> tendon rupture,<sup>35,36</sup> stiffness,<sup>15</sup> or cellulitis.<sup>15</sup> No complications were found in our series after long-term follow-up.

This study has several limitations. The lack of a control group affects the extent to which the findings can be generalized. We decided not to use a control group because the previous data had widely demonstrated a higher effectiveness of corticosteroid injection compared with controls treated with placebo.<sup>9,13</sup> Another important limitation may be seen when comparing our protocol of treatment with studies that followed a different algorithm. Indeed, further prospective randomized studies comparing different algorithms are necessary. Nevertheless, our results were similar to those previously published. Another drawback of the study is that some

patients were contacted by telephone. A physical examination by treating physicians might have been useful to validate patients' symptoms. Another possible limitation is that 11 patients were lost to follow-up. In addition, sample size was not determined before the beginning of the study and some differences might have been unperceived. These drawbacks might pose a bias and underpower the study. Furthermore, the study included a large number of trigger thumbs and trigger fingers related to carpal tunnel syndrome and patients with diabetes. Any of these digits may behave differently from idiopathic trigger fingers. A strength of the study is that all patients were treated by the same surgeon following the same technique. Further evaluations are needed to replicate the findings in different contexts and surroundings.

## REFERENCES

1. Strom L. Trigger finger in diabetes. *J Med Soc NJ*. 1977;74(11):951–954.
2. Kasdan ML, Leis VM, Lewis K, et al. Trigger finger: not always work related. *J Ky Med Assoc*. 1996;94(11):498–499.
3. Colbourn J, Heath N, Manary S, et al. Effectiveness of splinting for the treatment of trigger finger. *J Hand Ther*. 2008;21(4):336–343.
4. Patel MR, Bassini L. Trigger fingers and thumb: when to splint, inject, or operate. *J Hand Surg Am*. 1992;17(1):110–113.
5. Freiberg A, Mulholland RS, Levine R. Nonoperative treatment of trigger fingers and thumbs. *J Hand Surg Am*. 1989;14(3):553–558.
6. Howard LDJ, Pratt DR, Bunnell S. The use of compound F (hydrocortone) in operative and non-operative conditions of the hand. *J Bone Joint Surg Am*. 1953;35(4):994–1002.
7. Fauno P, Andersen HJ, Simonsen O. A long-term follow-up of the effect of repeated corticosteroid injections for stenosing tenosynovitis. *J Hand Surg Br*. 1989;14(2):242–243.
8. Marks MR, Gunther SF. Efficacy of cortisone injection in treatment of trigger fingers and thumbs. *J Hand Surg Am*. 1989;14(4):722–727.
9. Murphy D, Failla JM, Koniuch MP. Steroid versus placebo injection for trigger finger. *J Hand Surg Am*. 1995;20(4):628–631.
10. Lambert MA, Morton RJ, Sloan JP. Controlled study of the use of local steroid injection in the treatment of trigger finger and thumb. *J Hand Surg Br*. 1992;17(1):69–70.
11. 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):153–156.
12. Baumgarten KM, Gerlach D, Boyer MI. Corticosteroid injection in diabetic patients with trigger finger: a prospective, randomized, controlled double-blinded study. *J Bone Joint Surg*. 2007;89(12):2604–2611.
13. Peters-Veluthamaningal C, Winters JC, Groenier KH, et al. Randomised controlled trial of local corticosteroid injections for carpal tunnel syndrome in general practice. *BMC Fam Pract*. 2010;11:54.
14. Eastwood DM, Gupta KJ, Johnson DP. Percutaneous release of the trigger finger: an office procedure. *J Hand Surg Am*. 1992;17(1):114–117.
15. Maneerit J, Sriworakun C, Budhraj N, et al. Trigger thumb: results of a prospective randomised study of percutaneous release with steroid injection versus steroid injection alone. *J Hand Surg Br*. 2003;28(6):586–589.
16. Benson LS, Ptaszek AJ. Injection versus surgery in the treatment of trigger finger. *J Hand Surg Am*. 1997;22(1):138–144.

17. Lange-Riess D, Schuh R, Honle W, et al. Long-term results of surgical release of trigger finger and trigger thumb in adults. *Arch Orthop Trauma Surg.* 2009;129(12):1617–1619.
18. Turowski GA, Zdankiewicz PD, Thomson JG. The results of surgical treatment of trigger finger. *J Hand Surg Am.* 1997;22(1):145–149.
19. Kerrigan CL, Stanwix MG. Using evidence to minimize the cost of trigger finger care. *J Hand Surg Am.* 2009;34(6):997–1005.
20. Fleisch SB, Spindler KP, Lee DH. Corticosteroid injections in the treatment of trigger finger: a level I and II systematic review. *J Am Acad Orthop Surg.* 2007;15(3):166–171.
21. Quinnell RC. Conservative management of trigger finger. *Practitioner.* 1980;224(1340):187–190.
22. Brito JL, Rozental TD. Corticosteroid injection for idiopathic trigger finger. *J Hand Surg Am.* 2010;35(5):831–833.
23. Newport ML, Lane LB, Stuchin SA. Treatment of trigger finger by steroid injection. *J Hand Surg Am.* 1990;15(5):748–750.
24. Saldana MJ. Trigger digits: diagnosis and treatment. *J Am Acad Orthop Surg.* 2001;9(4):246–252.
25. Rozental TD, Zurakowski D, Blazar PE. Trigger finger: prognostic indicators of recurrence following corticosteroid injection. *J Bone Joint Surg Am.* 2008;90(8):1665–1672.
26. Nimigan AS, Ross DC, Gan BS. Steroid injections in the management of trigger fingers. *Am J Phys Med Rehabil.* 2006; 85(1):36–43.
27. Dala-Ali BM, Nakhdjevani A, Lloyd MA, Schreuder FB. The efficacy of steroid injection in the treatment of trigger finger. *Clin Orthop Surg.* 2012;4(4):263–268.
28. Griggs SM, Weiss AP, Lane LB, et al. Treatment of trigger finger in patients with diabetes mellitus. *J Hand Surg Am.* 1995;20(5):787–789.
29. Karalezli N, Kutahya H, Gulec A, et al. Transverse carpal ligament and forearm fascia release for the treatment of carpal tunnel syndrome change the entrance angle of flexor tendons to the A1 pulley: the relationship between carpal tunnel surgery and trigger finger occurrence. *ScientificWorldJournal.* 2013:630617.
30. Assmus H. Tendovaginitis stenosans: a frequent complication of carpal tunnel syndrome. *Nervenarzt.* 2000;71(6):474–476.
31. Harada K, Nakashima H, Teramoto K, et al. Trigger digits-associated carpal tunnel syndrome: relationship between carpal tunnel release and trigger digits. *Hand Surg.* 2005;10(2-3):205–208.
32. Tetsuya S, Akimasa M, Kozo F, et al. Carpal tunnel release does not have a bowstring effect of the flexor tendons. *Journal of Japanese Society for Surgery of the Hand.* 2005;22:206–209.
33. Sampson SP, Wisch D, Badalamente MA. Complications of conservative and surgical treatment of de Quervain's disease and trigger fingers. *Hand Clin.* 1994;10(1):73–82.
34. Park J, Dumanian GA. Shower emboli and digital necrosis after a single corticosteroid injection for trigger thumb: case report. *J Hand Surg Am.* 2009;34(2):313–316.
35. Taras JS, Iiams GJ, Gibbons M, et al. Flexor pollicis longus rupture in a trigger thumb: a case report. *J Hand Surg Am.* 1995;20(2): 276–277.
36. Fitzgerald BT, Hofmeister EP, Fan RA, et al. Delayed flexor digitorum superficialis and profundus ruptures in a trigger finger after a steroid injection: a case report. *J Hand Surg Am.* 2005;30(3):479–482.