Predictors of Recurrence After Corticosteroid Injection for Trigger Digits

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Abstract

Background: We aimed to identify risk factors for recurrence of trigger digit following corticosteroid injection. **Methods:** A retrospective review identified patients 18 years and older who presented to a single fellowship-trained hand surgeon with a symptomatic trigger digit during a 1-year period. Baseline demographic data were recorded. Patients with persistent trigger digit after a single injection were offered a second injection. Patients refusing a second injection were excluded from our analysis. Patients with persistent symptoms after 2 injections were offered surgery. For patients with diabetes mellitus, additional information regarding method of disease control and hemoglobin A_{1c} level was recorded. **Results:** The overall success of corticosteroid injection was 84% with 16% of patients requiring surgical release. Of the 240 patients successfully treated with injection, 99 (41%) required a second injection. Injections resulted in persistent triggering in 15% of patients with diabetes and 17% of patients without diabetes. A multivariate regression analysis revealed that the 2 strongest risk factors for requiring surgical release were patient age and patients whose fourth digit of the right hand was injected. Diabetes was not a risk factor for persistent triggering after corticosteroid injection. **Conclusions:** Our findings can be used to counsel patients prior to their initial injection and suggest that patients with diabetes can be managed with corticosteroid injection with equal efficacy compared with patients without diabetes.

Keywords: trigger digit, corticosteroid injection, trigger digit release, diabetes

Background

Trigger digit is a common diagnosis found in nearly 3% of the general population.¹⁸ Although activity modification, nonsteroidal anti-inflammatory medications and splinting have been proposed as noninvasive treatment modalities, the mainstay of conservative management is injection with a corticosteroid solution.^{5,13} Complete resolution of symptoms has been reported in 40% to 90% of patients receiving corticosteroid injection.^{1,3,8,9,11}

The literature pertaining to risk factors for trigger digit recurrence after corticosteroid injection provides conflicting results. Previous studies have noted poorer outcomes with corticosteroid injection for patients with symptom duration greater than 4 months and patients presenting with multiple trigger digits.¹⁴ Diabetes mellitus (DM) has been demonstrated to be a risk factor for the development of trigger digit with some series reporting DM as a risk for failure of treatment with corticosteroid injection.^{2,7} Other authors have found no statistical correlation between DM and trigger digit recurrence after injection.⁴

We aimed to identify risk factors for recurrence of trigger digit following corticosteroid injection. In light of recent

investigations demonstrating a statistical correlation between higher hemoglobin A_{1c} (HbA_{1c}) and the development of trigger digit, we further sought to determine if elevated HbA_{1c} was an independent risk factor for failure of corticosteroid injection.¹⁹

Materials and Methods

Institutional review board approval was obtained. All patients 18 years and older presenting to a single fellowship-trained hand surgeon with a symptomatic trigger digit from September 2011 through September 2012 were included. Patients with a history of trigger digit within 1 year were excluded. To standardize our analysis, patients who had persistent trigger digit after a single injection and refused a second injection were excluded from our

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analysis. We identified 286 consecutive patients who met inclusion criteria.

Retrospective data collection included age, sex, hand dominance, the digit involved, presence of a palpable nodule, symptom duration, presence of DM, medical comorbidities, and tobacco use. Failure following injection was defined as the need for surgical release of the A1 pulley. Patients were followed for a minimum of 1 year following the initiation of treatment. For patients with DM, method of disease control (diet-controlled, oral medications, or insulin dependence) and disease severity (HbA_{1c} level) within 3 months of initial presentation were recorded.

Despite the retrospective nature of our analysis, patients presenting to our hand surgery clinic were treated by a single fellowship-trained hand surgeon using a standardized protocol. After an initial history and physical examination, patients diagnosed with a trigger digit and without a contraindication to corticosteroids received a single 1 mL injection containing equal volumes of dexamethasone, depomedrol, and lidocaine. Contraindications included an allergy to any component of the injection. Injections were performed directly into the A1 pulley without ultrasound guidance. After injection, patients returned for follow-up evaluation in 6 weeks. At the 6-week visit, patients with symptom resolution received no further injections unless their symptoms recurred within 1 year.

Patients with persistent trigger digit were offered a second corticosteroid injection. Patients refusing a second injection were excluded from our analysis. Patients who received a second injection were reevaluated in 6 weeks (12-week visit). Patients with persistent symptoms at the 12-week visit were offered surgery. No patient received 3 injections and no patient underwent additional conservative treatment such as splinting, casting, or occupational therapy.

We used chi-square, Fisher exact, or Student *t* testing to compare the means or percentages of patients with each potential risk factor between the 2 groups: surgical versus nonsurgical. We used a multivariable linear regression model using potential risk factors (age, affected digit, dominant hand affected, insulin use, and oral diabetic agents) as predictors of the need for surgical release. Results are presented as odds ratios with 95% confidence intervals expressing the increase in odds of requiring surgery associated with each factor in the combined model.

Results

Of the 308 patients identified in our series, 286 met inclusion criteria. We excluded 22 who underwent a single corticosteroid injection and refused a second injection, choosing instead to undergo surgery for persistent trigger digit. The overall success of corticosteroid injection was 84% with 16% of patients requiring surgical release of the A1 pulley.

Follow-up averaged 18.2 months (range, 12-24 months). No patients with persistent symptoms after 2 injections refused surgery. The most common digit affected was the long finger (53% of patients) followed by the thumb (48% of patients).

Additional patient characteristics, stratified into patients requiring surgical release versus those who did not require surgery, are presented in Table 1. Patients requiring surgery were younger (58.3 years vs. 62.9 years) and were more likely to have multiple trigger digits at the time of presentation (54% vs 40%).

Of the 240 patients successfully treated with corticosteroid injection, 99 (41%) required a second injection. For patients requiring surgery, the time from initial injection to surgery averaged 180 days. Twenty-nine percent of the patients in our series had DM. Corticosteroid injections failed in 15% of patients with DM and 17% of patients without DM ($P = .67$).

The overall success of corticosteroid injection was 84%. Table 2 illustrates our single and second injection efficacy for patients with and without DM. Our single injection efficacy was 49% and our second injection efficacy was 68% for the 99 patients who required a second injection. There was no statistically significant difference with respect to single or second injection efficacy when comparing patients with and without DM ($P = .68, .78$).

Table 3 illustrates the results of the multivariable regression model examining the association between 6 potential risk factors and the need for surgical release of the A1 pulley. The 2 strongest risk factors for requiring surgical release were patient age and patients whose fourth digit of the right hand was injected. DM, regardless of method of disease control, was not associated with an increased need for surgical release in our multivariable regression model.

Discussion

Trigger digit can be successfully managed with corticosteroid injection in 40% to 90% of patients.^{1,3,6,8,9,11} The literature analyzing risk factors for persistent trigger digit following corticosteroid injection has provided conflicting results. Our single injection efficacy across all patient comorbidities was 49% (141 of 286 patients) improving to 84% (240 of 286 patients) with repeat injection. Sears et al recently performed a database study that included 102,778 patients with trigger digit. Of patients that received 2 corticosteroid injections, 26% required surgery, compared with 16% in our series.¹⁶

Previous studies of nodular versus synovitic variants of trigger digit indicated increased injection efficacy with corticosteroid for nodular trigger digits.³ Other studies have failed to demonstrate a difference.⁴ In the 138 patients where a clear determination between nodular and synovitic forms of trigger digit was able to be made, we found

Table 1. Patient Characteristics, Stratified Into Patients Requiring Surgical Release Versus Those Not Requiring Surgery.

	Not requiring surgery (n = 240)	Requiring surgery (n = 46)	P value
Age in years, mean (SD)	62.9 (12.5)	58.3 (10.7)	.02
Males, n (%)	86 (36)	15 (33)	.68
Any prior injection, n (%)	46 (19)	8 (17)	.78
Patients with multiple digits affected, n (%)	96 (40)	25 (54)	.07
Patients with dominant hand affected, n (%) ^a	144 (60)	34 (74)	.07
Patients requiring bilateral injections, n (%)	44 (18)	13 (28)	.12
Nodular, n (%) ^b	115 (62)	23 (62)	.94
Current smokers, n (%) ^c	35 (15)	7 (15)	.91
Duration of prior symptoms in weeks, median (interquartile range)	17.2 (8.7-30.3)	21.6 (12.9-34.6)	.50
Patients with comorbidities, n (%)			
Rheumatoid arthritis	5 (2)	0 (0)	.99
Hyperthyroid	2 (1)	0 (0)	.99
Hypothyroid	38 (16)	8 (17)	.79
Gout	7 (3)	2 (4)	.64
Patients with diabetes, n (%)	70 (29)	12 (26)	.67
Patients on insulin, n (%)	25 (36)	7 (58)	.20
Patients on oral antidiabetics, n (%)	50 (71)	6 (50)	.18
Patients on diet control, n (%)	4 (6)	2 (17)	.21
HbA _{1c} value at surgery, mean (SD)	7.4 (1.3)	7.4 (0.9)	.89
Patients with additional procedures done, n (%)	20 (8)	2 (4)	.55
Patients with multiple digits released, n (%)	13 (5)	1 (2)	.70
Patients with digit affected by trigger, n (%)			
L1	45 (19)	5 (11)	.20
L2	15 (6)	3 (7)	.99
L3	51 (21)	10 (22)	.94
L4	29 (12)	7 (15)	.56
L5	6 (3)	1 (2)	.99
R1	71 (30)	16 (35)	.48
R2	23 (10)	5 (11)	.79
R3	75 (31)	17 (37)	.45
R4	45 (19)	17 (37)	.006
R5	12 (5)	2 (4)	.99
Patients with digit receiving injection, n (%)			
L1	40 (17)	5 (11)	.32
L2	15 (6)	1 (2)	.48
L3	47 (20)	8 (17)	.73
L4	26 (11)	7 (15)	.39
L5	6 (3)	1 (2)	.99
R1	59 (25)	15 (33)	.27
R2	16 (7)	2 (4)	.75
R3	64 (27)	11 (24)	.70
R4	38 (16)	15 (33)	.007
R5	11 (5)	1 (2)	.70

^an = 1 record does not indicate whether the dominant hand was affected or not.

^bn = 62 records do not indicate the "nodular" status.

^cn = 3 records do not indicate whether the patient was a smoker.

no statistically significant difference with respect to symptom resolution with corticosteroid injection.

A number of previous authors have reported a higher incidence of trigger digit recurrence after corticosteroid injection

in patients with DM compared with those without DM.^{3,7,12,16,17}

In contrast, Dala-Ali et al retrospectively reviewed a small series of 90 trigger digits and found no statistically significant difference for corticosteroid injection efficacy in patients

Table 2. Single Injection and Second Injection Efficacy for Patients With and Without DM.

	Required no further treatment	Required second injection	P value
Patients receiving single injection, n (%)	141 (49)	145 (51)	.68
Patients with DM, n (%)	42 (30)	40 (28)	
Patients without DM, n (%)	99 (70)	105 (72)	
	Required no further treatment	Required surgery	P value
Patients receiving 2nd injection, n (%)	99 (68)	46 (32)	.78
Patients with DM, n (%)	28 (28)	12 (26)	
Patients without DM, n (%)	71 (71)	34 (74)	

Note. DM = diabetes mellitus.

Table 3. Results of Multivariable Regression Model Examining Association Between 6 Potential Risk Factors and the Need for Surgical Release.

	Odds ratio ^a (95% confidence interval)	P value
Age (per increasing decade)	0.74 (0.56-0.98)	.04
Multiple digits affected (Y vs. N)	0.35 (0.04-2.86)	.32
Dominant hand affected (Y vs. N)	1.60 (0.77-3.32)	.21
Right hand, 4 th digit, injected (Y vs. N)	2.91 (1.38-6.14)	.005
Diabetic taking insulin (Y vs. N)	1.41 (0.53-3.80)	.49
Diabetic taking oral antidiabetic (Y vs. N)	0.55 (0.20-1.48)	.24

^aOdds ratios, 95% confidence intervals, and P values reflect the increase in odds of requiring surgery associated with each factor, when considered simultaneously.

with and without DM.⁴ Our data support the findings of Dala-Ali et al as our multivariable analysis found that DM was not a risk factor for trigger digit recurrence after corticosteroid injection in patients with DM.⁴ While diabetic patients are at a greater risk for the development of trigger digit, corticosteroid injection should still be offered as a first line treatment. Furthermore, the efficacy of repeat injection in patients with DM appears to be equal when compared with patients without DM. There is concern regarding disturbances in blood glucose levels in diabetic patients after corticosteroid injection. However, diabetic patients in our series were counseled in clinic regarding this risk.

Mol et al performed a multivariate analysis of 878 trigger digits and found that the ring finger, in addition to the index and long fingers, was an independent predictor for trigger digit recurrence.¹⁰ We found that only the ring finger for the right hand was a risk factor for recurrence, even when hand dominance was accounted for in our multivariate analysis. Most series have included only the involved

digit and not digit laterality. Perhaps further study would elucidate why the right ring finger is more likely to fail injection.

A prospective series by Rhoades et al found that symptom duration greater than 4 months and multiple digit involvement were risk factors for failure of corticosteroid injection. We found no statistical correlation between either of these factors.¹⁴ Rozental et al, in a prospective series of 119 patients, found that younger patient age was associated with a higher rate of treatment failure with corticosteroid injection.¹⁵ Our data reflect their findings and we agree with their conclusion that younger patients may be less likely to tolerate persistent symptoms compared with an older, less active patient population. However, while patient age in our series was statistically significant, the 5 years separating the 2 groups may not be clinically significant.

Limitations of this study include its retrospective nature which relied on the accuracy of documentation. Second, all treatment was performed by a single surgeon, and the results may not generalize to all surgeons. Third, a minimum follow-up period of only 1 year may underestimate the percentage of patients that fail injection and require surgery. Strengths of our analysis include a large cohort of patients treated with a standard methodology and followed for a minimum of 1 year. In addition, these data were from an institution with a detailed electronic medical record system, which made them easily verifiable. We acknowledge that there could be small differences in diabetes prevalence among patient groups that our cohort size was too small to detect as statistically significant; however, we observed only a 3% difference in diabetes between patients requiring and not requiring surgery. Based on our sample size and power calculations, if this difference had been 12% or more we would have deemed it statistically significant. These findings reinforce that, if differences in diabetics exist, the differences in risk are likely to be small.

For patients with symptomatic trigger digits, risk factors for persistent triggering after corticosteroid injection included younger patient age and involvement of the ring finger of the right hand. DM, regardless of method

of disease control or HbA_{1c} value, was not a risk factor for persistent triggering after corticosteroid injection. Our findings can be used to counsel patients prior to their initial injection and suggest that patients with DM can be managed with corticosteroid injection with equal efficacy compared with patients without DM.

Ethical Approval

This study was approved by the Geisinger Health System IRB (reference #2012-0433).

Statement of Human and Animal Rights

This article does not contain any studies with human or animal subjects. This retrospective study was approved by the Geisinger Health System IRB.

Statement of Informed Consent

Informed consent was obtained when necessary.

Declaration of Conflicting Interests

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