Injection Versus Surgery in the Treatment of Trigger Finger

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One hundred nine trigger fingers in 102 patients were reviewed with respect to management plan and response to treatment. Thirty-four digits eventually underwent surgical release of the A1 pulley, while the other 75 digits were treated with local steroid injection only. All patients were evaluated with respect to clinical resolution of symptoms, dollar cost of treatment, and general satisfaction as measured with a post-treatment questionnaire. These data suggest that surgical management may be the next best option in patients with trigger finger who continue to be symptomatic after a single injection. Although surgical release of the A1 pulley cost our Medicare patients $250.00 more than a second injection, this additional cost may be offset by the benefit conferred through permanency of relief. Subjective data from the patient questionnaire responses also support surgery as a reasonable choice after one injection failure. The information from this study better delineates differences between injection and surgery as treatment choices and may aid the patient and physician in choosing an individually optimal care plan. (J Hand Surg 1997;22A:138–144.)

Stenosing tenosynovitis of the fingers and thumb is one of the most common upper-extremity problems seen in the orthopedic surgeon's office. The mainstay of conservative treatment has been steroid injection into the tendon sheath, which provides symptomatic relief for a variable period of time. Surgical release of the A1 pulley is also highly effective and usually produces permanent resolution of triggering. The best features of injection therapy include its simplicity, applicability in an office setting, and low cost. The most attractive aspect of operative management may be its ability to secure a permanent cure. Operative management has traditionally been reserved for those patients who fail conservative measures, although the exact number of injections that constitute an adequate trial of conservative treatment has never been clearly defined.

It is our hypothesis that some patients who have received multiple injections for stenosing tenosynovitis may have, in retrospect, been better served by undergoing operative release of the A1 pulley earlier in their treatment course. While steroid injection has been quite helpful for our patients, its temporary character often mandates multiple injections. Furthermore, healthcare reform debate has focused attention on cost reduction in the outpatient surgical environment, and operative treatment of trigger finger at our medical campus is significantly less expensive now than it has been in the past. This study compares injection and surgery in the management of stenosing tenosynovitis with respect to symptom resolution, cost in dollars, and elements of patient satisfaction.

Material and Methods

One hundred nine trigger fingers in 102 patients were included in this study. Average age of this patient population was 61 years (range, 33–96). The most commonly involved digit on either hand was the thumb, accounting for 32% of the trigger fingers.

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Twenty-two patients (22%) presented with associated medical conditions, including insulin-dependent diabetes (9 patients), inflammatory arthritis or gout (8 patients), and carpal tunnel syndrome (5 patients).

Thirty-four of the 109 trigger fingers ultimately underwent surgical release of the A1 pulley. The other 75 cases were managed with steroid injections only. Average follow-up time for the entire population was 18 months. The minimum follow-up period for those digits treated nonoperatively was 12 months; for surgically managed digits, the minimum period was 6 months.

Steroid injection involved office administration of 2 cc of 6 mg/mL betamethasone sodium phosphate acetate (celestone). Surgery was performed in an outpatient surgery center, using local anesthesia and a wrist tourniquet. Average tourniquet time for the surgical procedure per finger was 15 minutes.

Comparison of injection and surgery as treatment modalities was first assessed by retrospectively reviewing each patient's clinical course. Clinical follow-up findings were also confirmed by contacting the patients to complete a satisfaction questionnaire. The assessment scheme of Frieberg et al.[1] was used to evaluate efficacy of treatment by injection. A successful result was defined as a period of 3 months free from triggering or pain after injection. An injection failure was defined as persistence or recurrence of clicking and/or pain within the same time period. A recurrence was defined as the return of clicking, triggering, or pain after a symptom-free period of 3 months following injection.

The second focus of comparison involved detailed cost analysis (in dollars) for both treatment programs. Accrued patient charges were calculated for initial office visit (Evaluation and Management service code 99203), office injection of a tendon sheath, anteroposterior (AP) and lateral radiographs of the hand, follow-up office visit (Evaluation and Management service code 99212), surgical release of the A1 pulley (*Current Procedural Terminology* [CPT] code 26055), operating room time and equipment charges, and postoperative office care. Additional expense related to the treatment of any postoperative complications was also tabulated.

The third method of comparing injection and surgery centered upon issues relating to patient satisfaction. A 15-item questionnaire (Fig. 1) was created for the purpose of this study and was completed by interviewing the patients directly. The questionnaire was intended to highlight differences between injection and surgery by identifying the patients' perceptions of their particular treatment course with respect to discomfort, inconvenience, duration of relief, and overall satisfaction.

Results

Clinical Course

Ninety-three of 109 digits underwent injection at the first office visit. Of the remaining 16 digits, 5 were scheduled for surgery because they had been injected several times elsewhere, and 11 digits were treated with observation only at the first office visit (according to the patient's preference), although later, all 11 underwent at least 1 injection. Twenty-two digits that had been originally injected at the first office visit were injected a second time at a subsequent office visit. Of these 22 digits that were injected twice, 6 underwent a third injection.

For those patients requiring more than 1 injection, average duration of relief from injection was 14 weeks (range, 4–40 weeks). Treatment with a single injection was successful in 65 of 109 digits (60%). Of the remaining digits (that failed a single injection), 26 (60%) qualified as treatment failures (per the scheme of Frieberg et al.) and 18 (40%) could be characterized as recurrences.

Forty-four digits required intervention beyond a single administration of steroid in the tendon sheath. Twenty-two digits underwent surgery as the next treatment, and 22 digits underwent a second injection. Of those 22 fingers injected twice, 8 remained asymptomatic at follow-up evaluation, 8 underwent subsequent surgery, and 6 later were given a third injection. Of the 6 digits treated with 3 injections, 4 were ultimately treated with surgery, and 2 were not, at the patients' request. At follow-up evaluation, these 2 patients reported some continued symptomatology.

Surgical release of the A1 pulley was performed in 34 digits (30 patients). All digits had been injected at least once; 12 (35%) had been injected 2 times or more. All patients achieved complete resolution of symptoms without recurrence when followed an average of 20 months. There were no perioperative complications.

The nine patients with insulin-dependent diabetes mellitus were assessed as a separate subgroup. Six of these 9 patients (representing 11 digits) required surgery for definitive treatment. For these 6 patients, the period of relief following a single injection averaged 11 weeks. For the diabetic group as a whole, the duration of symptoms prior to any treatment averaged 35 weeks.

Symptom severity

1. Do you have difficulty with the grasping and use of small objects, such as keys or pens?
   1 No difficulty
   2 Mild difficulty
   3 Moderate difficulty
   4 Severe difficulty
   5 Very severe difficulty
2. How often do you use medication to relieve your symptoms?
   1 Never
   2 Once per week
   3 Twice per week
   4 Once per day
   5 More than once per day
3. In the past week, how often have you awakened in the morning with a painful snapping finger?
   1 Never
   2 Once
   3 Twice
   4 Many times
   5 Every morning
4. How severe is the pain in the finger in the morning when you wake up?
   1 No pain
   2 Mild
   3 Moderate
   4 Severe
   5 Very severe
5. How severe is the discomfort when the finger locks or snaps?
   1 No pain
   2 Mild
   3 Moderate
   4 Severe
   5 Very severe
6. How often do you experience triggering during the daytime?
   1 Never
   2 Once every few weeks
   3 Once or twice per week
   4 Daily
   5 Several times per day
7. How long, on average, does pain or locking in your finger last?
   1 My finger never locks
   2 Less than 10 minutes
   3 Ten minutes to an hour
   4 More than 1 hour
   5 Pretty much whenever I use my hand
8. How long would your finger bother you before you went to the doctor's office?
   1 One week
   2 Two weeks
   3 One month
   4 Two months
   5 Three months or more

Patient satisfaction

9. Overall how satisfied are you with the treatment for your trigger finger?
   1 Not satisfied
   2 Slightly satisfied
   3 Mildly satisfied
   4 Moderately satisfied
   5 Very satisfied
10. How would you rate the discomfort associated with injection?
    1 Minimal
    2 Mild
    3 Moderate
    4 Severe
    5 Very severe
11. How would you rate the discomfort associated with surgery?
    1 Minimal
    2 Mild
    3 Moderate
    4 Severe
    5 Very severe
12. If you developed another trigger finger, would you elect injection for treatment?
    1 Would try another single injection
    2 Would try multiple injections
    3 Would pursue surgery if relief from injection wasn't long lasting
    4 Would be interested in surgery right away
13. In retrospect, would you have wanted to pursue surgery sooner than you did?
    1 Yes
    2 No
    3 Unsure
14. What is the length of time that you have been symptom-free since your last injection?
    1 Less than 1 month
    2 Three months
    3 Six months
    4 One year
    5 No return of symptoms since last injection
15. What is the length of time that you have been symptom-free since surgery?
    1 Less than 1 month
    2 Three months
    3 Six months
    4 One year
    5 No return of symptoms since surgery

Figure 1. Trigger finger outcome questionnaire.

Cost Analysis

Dollar charges for office management and surgery are shown in Table 1. The surgical fee (CPT code 26055) includes all postoperative care and supplies. Patients were typically seen three times after surgery, on postoperative days 3, 10, and 30. One elderly patient incurred an additional cost ($50.00 total: Medicare) because a limited amount of hand therapy was required to help her quickly regain full digital flexion after surgery.

Subjective Issues

A 15-item questionnaire was developed to help assess subjective results of treatment (Fig. 1). A total of 74 completed questionnaires (representing 73% of the total patient population) were obtained by contacting and interviewing the patients directly. The remaining patients were unavailable to complete the outcome questionnaire, usually owing to a change in address or illness.

The data reflecting these subjective issues is shown in Table 2. In order to clarify subjective data and restrict focus to information that was most likely to be meaningful, the following issues are highlighted:

1. Eight percent of patients who ostensibly were injection successes according to office records actually were still symptomatic. These patients were still experiencing tenderness and intermittent clicking and locking but had decided to tolerate these symptoms in lieu of pursuing any other intervention, either injection or surgery.
2. The pain of injection was recalled by the patients to be at least as severe or more severe than that of surgical management. Negative comments about surgical treatment were related to the general anxiety and inconvenience of traveling to a hospital for a procedure. Twenty-four of the 30 surgical patients (representing 26 of 34 surgical digits) noted that the discomfort of injection was more severe than the administration of subcutaneous local anesthesia required to perform surgery and that the postoperative pain was usually managed with acetaminophen. Six of the surgical patients (representing 8 of 34 operated fingers) noted that injection and operative discomfort were equivalent. Operative discomfort was defined during the outcome interview to include both the pain of the procedure as well as any postoperative pain.
3. Twenty of the 30 surgical patients noted that they would consider pursuing surgical care sooner if they developed another triggering finger.
4. Surgical patients were additionally queried as to what single feature of operative care they valued most. All patients characterized permanent resolution of symptoms the most important benefit of surgical management.

Discussion

One conclusion that can be drawn from our data is that a single steroid injection is remarkably effective in treating trigger digits in adults. Although we did not characterize patients as having nodular or diffuse tendinitis, many had quite severe symptoms upon initial presentation, and the average duration of symptoms prior to any treatment was 4 months. Nonetheless, approximately 60% of patients required no further intervention beyond a single injection. None of our patients presented with a digit completely locked in flexion, and this might be the only scenario in which immediate surgery is justified. While Patel and Bassini[2] have used splinting as a nonoperative modality, this method requires considerable effort on the part of both patient and physician, confers some degree of inconvenience to the patient, and risks pro-

Table 1. Cost* Analysis

	First Office Visit and One Injection	*Cost of Each Subsequent Injection*	*Treatment With Surgery After One Injection*
New patient exam	$56.50 ($95.00)	N/A	N/A
Tendon sheath injection	$41.39 ($70.00)	$41.39 ($70.00)	N/A
Hand radiographs	$26.59 ($52.00)	N/A	N/A
Follow-up office visit	N/A	$23.84 ($45.00)	N/A
Surgical release of A1 pulley	N/A	N/A	$268.42 ($755.00)
Surgery center charges	N/A	N/A	$51.04 ($110.00)
Total	$124.48 ($217.00)	$65.23 ($115.00)	$319.46 ($865.00)

*Amounts shown are Medicare rates; full fee equivalents are noted in parentheses.
N/A, not applicable.

Table 2. Summary of Trigger

Response of 44 Patients Treated

	Quest 1	*Quest 2*	*Quest 3*	*Quest 4*	*Quest 5*	*Quest 6*	*Quest 7*
Ans 1	40	43	39	35	32	35	35
Ans 2	3	1	0	3	2	5	5
Ans 3	1	0	3	5	7	1	0
Ans 4	0	0	1	0	2	2	1
Ans 5	0	0	1	1	1	1	3

Responses of 30 Patients

	Quest 1	*Quest 2*	*Quest 3*	*Quest 4*	*Quest 5*	*Quest 6*	*Quest 7*
Ans 1	30	30	30	30	0	30	30
Ans 2	0	0	0	0	2	0	0
Ans 3	0	0	0	0	24	0	0
Ans 4	0	0	0	0	4	0	0
Ans 5	0	0	0	0	0	0	0

Ans, answer; N/A, not applicable; Quest, question.

ducing stiffened interphalangeal joints. We believe that steroid injection is the simplest and most practical choice for initial management.

The results of our surgically treated group would suggest that A1 pulley release is reliably successful. For all 34 digits that underwent surgery, complete and permanent relief was obtained. Although digital nerve injury, infection, scarring, bowstringing, and recurrence have all been recognized as complications of A1 pulley release,[3–6] none of our surgical patients experienced any perioperative complications. It should be noted that while the surgery can be performed under local anesthesia in an outpatient environment, meticulous attention to sterility, careful soft tissue technique, hemostasis, and identification of anatomy are of paramount importance.

Previous work[7] has noted that patients with insulin-dependent diabetes respond less well than other patients to injection therapy. The small subpopulation of diabetics in this study would support that conclusion, since two-thirds of our diabetic patients required surgery for definitive care.

The work of Rhoades et al.[8] has suggested that 4 months of symptoms prior to treatment correlates with poorer response to intervention; in a study by Newport et al.,[9] patients who had symptoms for more than 6 months were more likely to require surgery (13% vs 29%). Although we attempted to correlate duration of symptoms prior to treatment with response to treatment, no significant relationship between these two variables existed in our study population. Symptom duration figures supplied by our patients were typically rough estimates, usually because symptoms were intermittent, of variable intensity, or bothersome only at a particular time of day. Furthermore, the spouse and other family members of any given patient frequently gave widely disparate times—that often varied from the patient's estimates by many months—when queried about the patient's symptom duration. Perhaps this explains why our data did not support a clear relationship between length of pretreatment symptoms and outcome.

We believe that the specific cost information in this study is meaningful but must be very carefully interpreted. First, it should be noted that our operating room charges are extraordinarily low. We have collaborated with our institution in designing a lower-cost operating environment specifically for outpatient hand procedures, and it is this fact that makes it possible to keep the total procedure bill under $900.00 for the full fee patient. The hospital portion of the surgical bill amounted to only $110.00, and we recognize that more typical hospital charges in various parts of the country may be in excess of $1,000.00. It is not our intention to propose a treatment algorithm based partially upon a cost structure that cannot be easily reproduced elsewhere. However, as hospitals and surgery centers continue to compete, the average operating room cost will

Finger Questionnaire Data

With Injection Only

Quest 8	*Quest 9*	*Quest 10*	*Quest 11*	*Quest 12*	*Quest 13*	*Quest 14*	*Quest 15*
3	1	9	N/A	16	N/A	2	N/A
3	2	9	N/A	15	N/A	9	N/A
10	2	12	N/A	13	N/A	7	N/A
11	5	11	N/A	N/A	N/A	3	N/A
17	34	3	N/A	—	N/A	23	N/A

Treated With Surgery

Quest 8	*Quest 9*	*Quest 10*	*Quest 11*	*Quest 12*	*Quest 13*	*Quest 14*	*Quest 15*
1	0	0	10	20	20	N/A	30
5	0	0	14	1	8	N/A	0
7	0	6	6	7	2	N/A	0
14	2	20	0	2	—	N/A	0
3	28	4	0	—	—	N/A	0

likely decrease and the typical national experience may more closely approximate figures at our location. Therefore, we do not believe that our institution's cost structure is truly an isolated phenomenon; it could well be commonplace in the next few years.

Second, it is important to note that none of our surgery patients experienced any major complications. Certainly, the expense of caring for a single serious wound infection might easily obliterate any potential long-term savings represented by surgical care. While surgical complications or the need for hand therapy would add to total expense, our experience suggests that a catastrophically expensive complication in trigger finger surgery occurs quite infrequently. Probably the more common postoperative problems for a trigger finger patient would be the presence of stiffness or scar induration, both of which usually respond to two or three visits with a hand therapist (adding about $125.00 for the Medicare patient).

Perhaps the most meaningful aspect of our cost data is that it allows the surgeon to clarify the specific differences between surgical and nonsurgical treatment for trigger finger. In particular, the numbers suggest that surgical care may not always represent *unacceptably high* relative expense. The figures in this study show that proceeding to A1 pulley release after one failed injection adds approximately $250.00 (Medicare) to the total bill. Are the results worth the cost? It will depend upon the preferences and circumstances of each individual patient. In favor of surgery, subjective data from our questionnaire would suggest that the majority of patients placed high value placed upon permanency of relief, a feature inherent in surgical care. Furthermore, questionnaire responses noted that operation was not much more painful than an injection. Should surgery then be proposed for everyone whose finger continues to trigger after one injection? We think not. Some patients may never want to pursue an operation. However, this study yields specific information with respect to clinical outcome, cost, and some qualitative observations of patients who have been treated by both methods. Providing this information to patients comparing treatment choices will better enable the physician to help each patient choose an individually optimal care plan.

Newport et al.[9] noted that that the efficacy of steroid administration decreased with each subsequent injection (49% success after first injection, 23% after second, 5% after third). Our data also suggest that the likelihood of success diminishes with each subsequent injection and that the greatest probability of lasting success is after the first injection (60% success after first injection, 36% after second, 33% after third). Although our study population (109 trigger fingers) is relatively small, the trend of decreased efficacy beyond the first injection is in agreement with the work of Newport et al. This trend suggests that if injection is to be replaced by

surgery in the treatment course, perhaps the key opportunity to most efficiently use surgery would be when the patient represents after the first injection has failed.

Modification of both the injection and surgical technique might have an impact upon how these methods fare in our comparison. For example if subcutaneous injection is indeed efficacious, it might make nonoperative management more attractive, since we presume that a large part of the discomfort associated with traditional injection is related to distention of the tendon sheath. On the other hand, simplification of the operative procedure, such as subcutaneous or percutaneous pulley release, may make surgery even less expensive and consequently more attractive than injection. Tanaka et al.[10] reported a 74% good or excellent result with subcutaneous release, and Eastwood et al.[11] have reported a 94% success rate with a percutaneous procedure. If these methods prove to be safe and reliable, it ultimately might be possible to perform them in the physician's office; this would significantly reduce the cost associated with operative care. However, we have no experience with subcutaneous or percutaneous A1 pulley release. Furthermore, we believe that issues of safety and efficacy must be carefully scrutinized.

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