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Treating Trigger Finger in Diabetics using Excision of the Ulnar Slip of the Flexor Digitorum Superficialis with or without A1 Pulley Release

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Abstract The purpose of this study was to evaluate the results of excision of the ulnar slip of the flexor digitorum superficialis tendon, with or without A1 pulley release, for the treatment of trigger finger in diabetic patients. We performed a retrospective review with long-term follow-up examinations. Short-term data was obtained on 18 consecutive patients (37 fingers). Long-term information was collected on 14 of these patients (24 fingers) at an average of 48 months after surgery. Short-term follow-up revealed average proximal interphalangeal joint (PIP) flexion of 81°. One patient had slight residual triggering. At long-term follow-up, 93% of patients were completely or very satisfied with the procedure. Total active finger motion averaged 218°, and PIP extension deficit averaged less than 5°. Pinch strength was equal to the contralateral corresponding finger. There were no significant complications. One finger had minimal residual triggering. In conclusion, this procedure is a safe and effective treatment for the often-difficult problem of stenosing flexor tenosynovitis in the diabetic patient.

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Trigger finger is a common disorder as a result of a disproportion in size between the digital flexor tendons and the A1 pulley. Several authors have noted that, in patients with diabetes mellitus, trigger finger is more common [3, 4, 10–13, 17], often occurring in multiple digits [4, 6, 11] and is considered part of the diabetic hand syndrome [1, 4, 7, 12, 15]. In the general patient population, steroid injection into the tendon sheath or around the A1 pulley and surgical release of the A1 pulley have high success rates [2, 8, 14, 16]. In patients with diabetes mellitus, simple incision of the A1 pulley is less successful, particularly for insulin-dependent diabetics [1, 8]. The reason for the increased incidence of trigger finger in diabetic patients and the reduced efficacy of A1 pulley release is not known [6, 10, 12].

The senior author (JEC) noted that after release of the A1 pulley and resolution of digital triggering, some diabetic patients had a significant residual proximal interphalangeal (PIP) joint flexion contracture. It was hypothesized that a reduction in the tendon mass passing through the retinacular system might lessen the contracture. Ferlic and Clayton [5] had recommended excision of the ulnar slip of the flexor digitorum superficialis (FDS) tendon for treatment of trigger finger in patients with rheumatoid arthritis when tenosynovectomy alone was inadequate to relieve the triggering. Borrowing in part from Ferlic and Clayton's work, the practice of excising the ulnar slip of the FDS, with or without A1 pulley release, was begun for diabetic patients undergoing surgery for a trigger finger. This study was designed to document the efficacy and safety of this procedure in the diabetic population.

Materials and Methods

Either A1 pulley release with resection of the ulnar slip of the FDS (A1+FDS group) or resection of the ulnar slip of the FDS alone (FDS-only group) was performed by the senior author on all of his diabetic patients that required trigger finger release between 1991 and 1999. If resection of the ulnar slip of the FDS alone was chosen, and there was any doubt after the excision that it would be sufficient, he added an A1 release. These decisions were based on the senior author's experience; there were no formal criteria that can be outlined. All patients had failed conservative treatment including steroid injection or splinting and occupational therapy. Eighteen diabetic patients (37 fingers), 11 (30 fingers) of whom were insulin dependent, underwent this procedure, and all were included in this study. Data was collected from the medical chart documenting their preoperative symptoms, previous treatments, diagnoses involving the hand, diabetic condition, and their physical examination at the time of presentation. The operative note was used to gather information about the procedure performed and the anesthesia used. Review of postoperative notes from both the surgeon and hand therapist provided short-term follow-up data.

Eleven patients (24 fingers) agreed to a long-term follow-up averaging 48 months after surgery (range 11–101 months). Three patients consented to a telephone interview only. Three patients had died, and one could not be located. Approval for this project was obtained from the Institutional Review Board of The Cleveland Clinic Foundation. Informed consent was obtained from each participating patient.

Long-term follow-up data was obtained through interview and physical examination. Patients were questioned about complications, subjective weakness, and their return to work or avocations after surgery. They were queried regarding other hand symptoms, diagnoses, and treatments since surgery, including other trigger fingers. Patient satisfaction was graded as complete, very, somewhat, or not satisfied. A comprehensive hand examination was performed, including measurement of range of motion, two-point discrimination, and pinch strength. The digits were evaluated for recurrent triggering.

Thirty digits were treated in patients with insulin-dependent diabetes mellitus (IDDM), six digits in patients who utilized oral hypoglycemic medications, and one digit in a patient with diet-controlled diabetes. The latter two categories were grouped together for analysis as noninsulin-dependent diabetes mellitus (NIDDM).

Twenty-five fingers in 12 patients were treated with A1 pulley release and resection of the ulnar slip of the FDS (A1+FDS group). In one small finger, the entire FDS was resected. This finger was included in the A1+FDS group. Twelve fingers in six patients underwent resection of the ulnar slip of the FDS without A1 pulley release (FDS-only group). Patient demographics, as well as data about their diabetes, trigger finger symptoms, and anesthesia, are in Table 1.

Statistical comparisons between the A1+FDS group and the FDS-only group were not performed because only three fingers in the latter group were available for long-term follow-up examination. Likewise, only five fingers in the NIDDM group were available at long-term follow-up, so no statistical comparisons could be made between the IDDM and NIDDM patient groups.

Operative Procedure

A1 pulley release was performed using an oblique skin incision just distal to the transverse crease in line with the involved digit. The A1 pulley was exposed and split longitudinally. A local synovectomy was performed. Resection of the ulnar slip of the FDS tendon was accomplished through a "V-shaped" incision over the proximal phalanx. The flexor sheath distal to the A2 pulley was opened and the FDS tendon exposed. This slip was incised

Table 1 Demographic data.

	Number
Patients	18 (22 hands, 11 dominant, 11 nondominant)
IDDM	11 patients, 30 digits
NIDDM	Seven patients, seven digits
Age	58 years (31–72)
Gender	Ten men, eight women
Years since diabetes diagnosed	13.7 (4 months–25 years)
Known diabetic complications	one (average)
Other diabetic hand conditions (history of/current)	
Carpal tunnel syndrome	7
Other trigger digit(s)	7
Severity of symptoms	
Triggering	9
Locking	8
Not enough flexion to lock	12
A1+FDS Group	12 patients, 25 digits (one complete FDS)
	Anesthesia: general, one; wrist block, eight; bier block, one; intravenous regional, two
FDS-only group	Six patients, 12 fingers
	Anesthesia: general, one; wrist block, four; bier block, zero; intravenous regional, one

distally then delivered into the proximal wound where the excision was completed. The ability of the flexor tendons to pass freely through the digital theca was confirmed.

Results

At the first postoperative visit (average 14 days), PIP range of motion was recorded for 24 digits. Seven of the 24 fingers had full range of motion, 4 of 12 in the A1+FDS group, and 3 of 12 in the FDS-only group. There were no significant differences between IDDM and NIDDM patients or between those with triggering and locked digits. Average PIP flexion contracture at first follow-up measured 10°.

At each patient's last regularly scheduled follow-up visit (at least 2 weeks postoperatively, average 60 days), 13 of the 22 fingers, for which there were data, had full range of motion. Average PIP ROM was 76° with a 5° flexion contracture. All but one patient had at least 60° of PIP ROM. One finger in the A1+FDS group had some residual triggering, but the patient died before long-term follow-up. Two minor complications were recorded. One patient had a stitch abscess lanced on postoperative day number 23 without any further problems. One patient had a small region of skin flap necrosis that healed uneventfully.

As long-term follow-up (48 months after surgery [range 11–101 months]), 11 patients (24 fingers) had an interview and examination, whereas three patients consented to a telephone interview only. Three patients had died, and one could not be located (Tables 2 and 3).

Nine of 14 patients currently had a history of carpal tunnel syndrome. Nine of the 14 patients had experienced another trigger digit at some time, and one patient had DeQuervain's disease. Although return to full activities averaged 39 days, two patients resumed work or full activity the day after surgery. Two of the patients changed their employment or activities because of their hands but not because of their trigger finger surgery. No patient recalled any complications or wound problems. One patient reported symptoms of weakness, one reported weakness only with exertion, one reported some weakness but less than before surgery, and one reported bilateral weakness (although the finger on only one side had been treated).

Table 2 Long-term results.

Satisfaction	Completely	Very	Somewhat	Not
A1+FDS	4	4	0	0
FDS only	5	0	0	1
IDDM	4	3	0	1
NIDDM	5	1	0	0
Total	9	4	0	1

Table 3 Long-term results (2).

Results	
Total active range of motion (degrees)	
A1+FDS	217
FDS only	221
IDDM	216
NIDDM	224
Total	218
Full active PIP extension	
A1+FDS	15/21
FDS only	2/3
IDDM	14/19
NIDDM	3/5
Total	17/24

Three of the 11 patients examined had reduced sensation. In two patients, sensation was reduced in all digits, two-point discrimination averaging 9 and 14 mm. One patient had reduced sensation on the ulnar side of one of the two treated fingers (two-point discrimination of 10 vs 6 mm on radial side of same digit and 7 mm on the ulnar side of the corresponding contralateral digit). Total active range of motion (TAM) averaged 218°. PIP flexion averaged 88°. Seventeen of 24 fingers had full active PIP extension. PIP flexion contractures occurred in three patients. Partial FDS resection did not result in any swan neck deformities. Independent sublimis power was 5+ in 19 fingers, 4+ in four fingers, and 0 in the one small finger, from which both the ulnar and radial sublimis tendons had been resected.

None of the 24 fingers locked. One had minimal triggering (one of three in the FDS-only group). Pinch strength was consistently equal to the pinch strength in the corresponding contralateral finger. Among the subset of 12 fingers (in three patients) that did not have enough flexion to lock preoperatively, eight fingers (in one patient) had a long-term follow-up exam. Seven of her eight fingers exhibited full range of motion, and one lacked 5° of extension. This patient was completely satisfied. The two other patients, who had four out of eight operated fingers that did not have enough flexion to lock preoperatively (between them, these fingers included four of their eight treated digits), were interviewed but not examined: one was very satisfied, and one was not satisfied.

Discussion

Restoration of motion and elimination of triggering can be challenging in diabetic patients with stenosing flexor tenosynovitis, especially in those severe diabetics with thick, stiff hands characteristic of the diabetic hand syndrome. Despite the high frequency of trigger finger in

the diabetic patient population, there is only a limited body of literature discussing its surgical treatment. Stahl et al. [11] reported a surgical success rate of 78% in NIDDM patients and 77% in IDDM patients treated by A1 pulley incision. Griggs et al. [6], following a similar method of surgical treatment, found PIP flexion contractures in 11 of 60 patients, averaging 18±11°.

Since the completion of our treatments, Le Viet et al. [9] described a similar procedure of ulnar superficialis slip resection also with good results. Their technique involved proximal sectioning of the tendon slip followed by retrieval and distal sectioning. This paper describes distal sectioning followed by proximal retrieval and sectioning. These results confirm and expand on their work.

The senior author's (JEC) experience mirrored that reported by Stahl and Griggs. Even after release of the A1 pulley and resolution of triggering, some diabetic patients had significant residual flexion contractures of the PIP joint. Feeling that diabetes causes enlargement of the flexor tendons [15], he postulated that reducing the bulk passing through the retinacular system would facilitate glide and lessen the magnitude and frequency of these PIP joint contractures. Ferlic and Clayton [5] had recommended excision of the ulnar slip of the FDS for treatment of trigger fingers in patients with rheumatoid arthritis when tenosynovectomy alone was inadequate to relieve the triggering. Limited further by the need to maintain the integrity of the A1 pulley in these patients, their reasoning was much the same, decrease bulk and improve flexor tendon glide. Borrowing in part from Ferlic and Clayton's experience, resection of the ulnar half of the FDS with or without A1 pulley release was initiated for all diabetic patients undergoing surgical treatment for trigger finger using the decision algorithm and technique described above.

Short-term results of this treatment were determined using each patient's medical record. Interviews and standardized physical examinations were utilized to assess long-term results at an average of 48 months after surgery. Fourteen of the 15 patients living at the time of the study were interviewed, and 11 were examined. Unfortunately, the small group sizes made it impossible to make statistically meaningful comparisons between the two types of treatment or the two groups being treated. The number of physical examinations performed on patients in the FDS-only group and on the NIDDM patients was very low. In addition, other manifestations of the diabetic hand syndrome resulted in group heterogeneity. With these limitations in mind, no obvious differences were seen between the A1+FDS and FDS-only groups or between the IDDM and NIDDM subsets.

Conclusions can be made regarding the treatment population as a whole. Patient satisfaction was very high. Ninety-three percent of patients were either completely or very satisfied with the procedure. Two of the three patients who had fingers that did not have enough flexion to lock preoperatively, which may represent a more severe form of the problem [16], were either completely or very satisfied. Objective results were also very good. Two months after surgery, all but one patient had at least 60° of PIP motion. On average, TAM at final follow-up was 218° with a 3° extension deficit. There were neither significant recurrences nor were further surgeries required. Patients returned to work or full activity in a timely fashion. Whereas a comparison group is not available, these results compare favorably to data from the literature on A1 pulley release alone in diabetics including Stahl et al. [11] and Griggs et al. [6].

Despite performing additional surgery on this population of diabetics, adverse effects were minimal. Only two minor wound complications occurred. They were noted early and resolved quickly with no long-term effect. Resection of half of the FDS caused no objective sublimis weakness (except in the one case where both slips were resected because of their small size), and swan-neck deformity was not seen. In two patients (two fingers), subjective weakness was attributable to the procedure. Finally, the additional incision puts the neurovascular structures at increased risk. Despite this, only two fingers in one patient demonstrated increased two-point discrimination distal to the digital incision.

This study suffers from all the limitations inherent in a retrospective review. Incomplete medical records, small group sizes, and the lack of a control group consisting of diabetic patients treated with A1 pulley release alone make it difficult to formulate conclusions and make comparisons. In addition, preoperative ROM was inconsistently recorded, and preoperative status may have affected postoperative ROM. Nevertheless, this examination of the results of one surgeon's consistent approach to the surgical treatment of stenosing flexor tenosynovitis in the diabetic patient over a 9-year period reveals the procedure to be safe and effective.

The diabetic patient with trigger finger, especially one with thick, stiff hands, poses a challenge to the hand surgeon. If surgery is required, the options include either A1 pulley release and/or some method to reduce tendon bulk. We have shown that, in diabetic patients, excision of the ulnar slip of the FDS, with or without A1 pulley release, is both safe and effective. Surgeons who routinely perform A1 pulley release can feel comfortable adding excision of the ulnar slip of the FDS when they feel intraoperatively, after A1 release, that the flexor tendons may still not glide freely through a full arc of motion. Although the indications are yet to be defined, excision of the ulnar slip of the FDS may be useful even without A1 pulley release in this patient population. However, if this procedure is chosen, and there is any doubt after the excision that it will be sufficient, the surgeon should add an A1 release.

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