Closed tendon sheath irrigation for pyogenic flexor tenosynovitis

Twenty patients with pyogenic flexor tenosynovitis were treated by through-and-through saline irrigation using an indwelling catheter and small Penrose drain. The treatment lasted for 48 hours. All patients were discharged from the hospital within 4 days. Eighteen patients had regained complete active and passive motion by 1 week after operation. One patient had a slight residual flexor tendon adherence and one gained motion after operation. This technique provides rapid, complete return of function with minimal inconvenience to the patient.

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Pyogenic flexor tenosynovitis is an uncommon but potentially devastating condition in the hand. Since the development of antibiotic therapy and the widespread use of these agents, infection of a tendon sheath is more uncommon than it once was.

Despite the apparent decrease in frequency of this entity, the problem does occur sufficiently often to warrant emphasizing its treatment. Ideally, the management should provide rapid, complete return of function with minimal inconvenience to the patient.

Many techniques have been advocated for treating tendon sheath infections. Most surgeons recommend splinting and administration of antibiotics for early cases.[1, 2] If this fails, then surgical drainage is advocated.[1, 2] Others suggest early open drainage through a mid-axial incision, irrigating the sheath at operation, and leaving drains in the wounds.[3] Some use additional palmar or thenar crease incisions to drain the *cul-de-sac* of the sheath or the radial and ulnar bursae.[3] Dickson-Wright,[4] in 1943, first suggested postoperative sheath irrigation. In 1966, Carter, Burman and Mersheimer[5] reported nine cases in which they had irrigated the sheath with hydrogen peroxide followed by oxytetracycline solution through transverse incisions at the palmar crease and the distal digital crease over a 24 to 48 hour period. Despite their success in treating ten-

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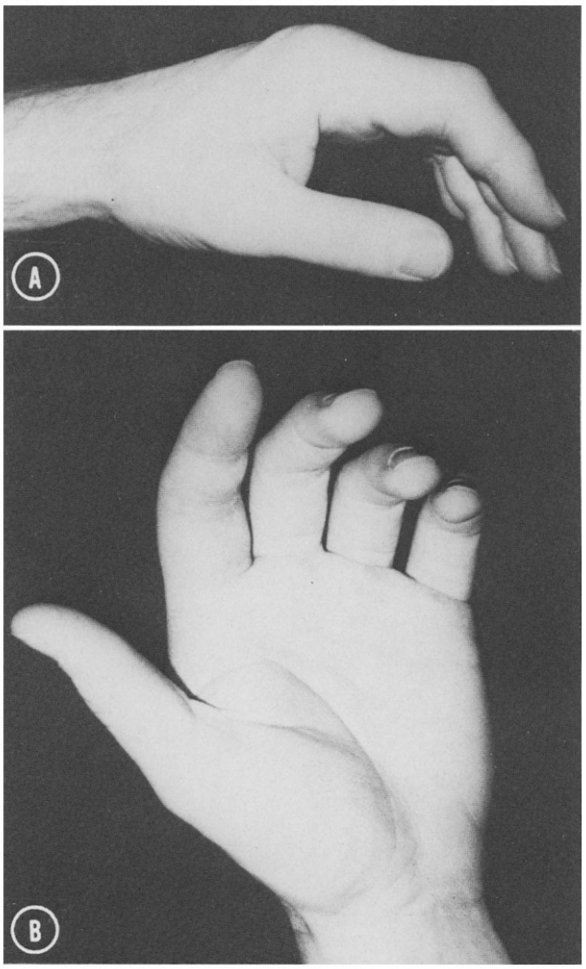

Fig. 1. A, Tendon sheath infection of the index finger demonstrating semiflexed position. **B,** The same finger has symmetrical swelling of the digit.

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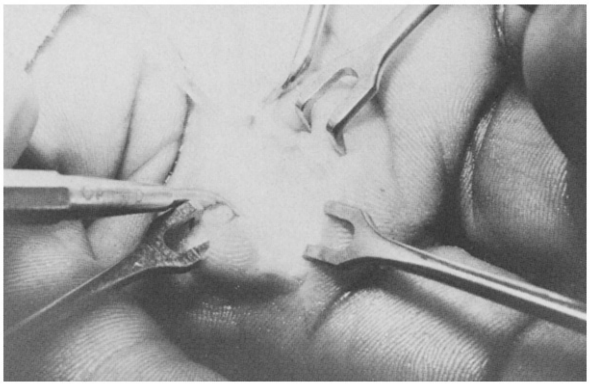

Fig. 2. A 16-gauge polyethylene catheter is inserted under the proximal pulley whose edge is marked by the angled probe.

don sheath infections, the concept of tendon sheath irrigation has not been widely accepted as the most efficient method.

The purpose of this report is to describe a tendon sheath irrigation technique which has been used successfully in 20 patients with pyogenic tenosynovitis and to illustrate its advantages over other methods.

Materials and methods

Twenty patients have been seen with the classical signs of tendon sheath infection, as described by Kanavel.[6] These include exquisite tenderness over the course of the sheath, a semiflexed position of the finger (Fig. 1, *A*), marked pain on passive extension of the finger, and symmetrical swelling of the finger (Fig. 1, *B*).

The age of the patients varied from 15 months to 59 years. All of the patients were right-handed; the right hand was implicated in 15 cases, while the left hand was involved in five. The pattern of specific digital involvement showed one case in the thumb, five in the index, six each in the middle and ring fingers, and two in the little finger.

The origin of infection was a penetrating wound in 60% of the cases, including two postoperative infections. Another four of these 12 patients had sustained animal bites. The remaining eight cases were of hematogenous origin, although the original source of infection was not determined.

The infecting organism was *Staphylococcus aureus* in 12 patients and *Pseudomonas aeruginosa* in two other patients. The remaining six patients had received antibiotics prior to operation and no growth was present on final operative cultures. Two of these six patients had shown gram-negative growth on preliminary cultures.

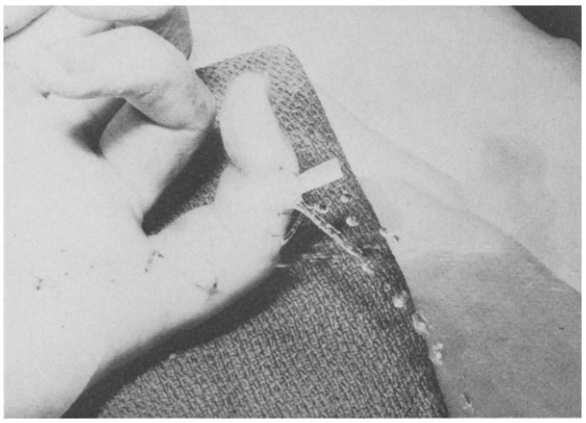

Fig. 3. The sheath is irrigated from proximal to distal with saline.

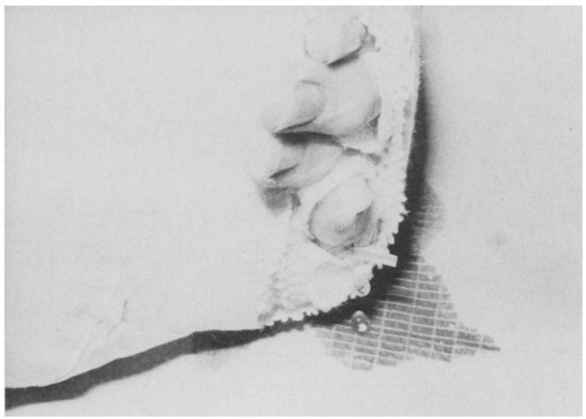

Fig. 4. Visualization of the drain in the postoperative dressing allows for the supervision of the manual irrigation.

Surgical technique

The procedure is carried out under tourniquet control, although the hand is not exsanguinated. The tendons of any finger are first exposed through a small zigzag incision over the proximal margin of the annular ligament at the metacarpal neck. When the sheath is visualized, one usually sees a slightly cloudy, serosanguinous fluid, but on occasion obvious purulence is encountered. The sheath is incised transversely at the proximal edge of the pulley, and the fluid is cultured. A 16-gauge polyethylene catheter with a connector then is inserted under the pulley into the sheath for a distance of approximately 1.5 to 2.0 cm (Fig. 2). The distal edge of the sheath is exposed through a short mid-axial incision in the ulnar side of the distal and middle segments of the finger. The sheath is resected beyond the last pulley. A small rubber drain is inserted into the

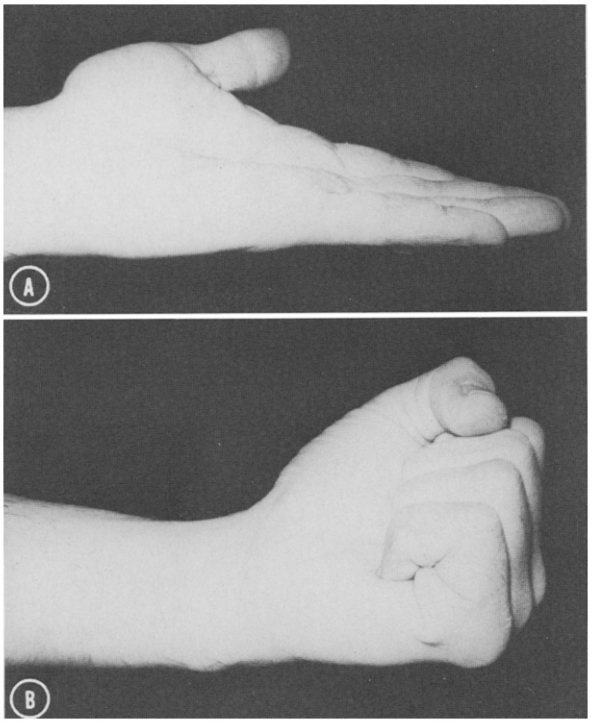

Fig. 5. A, One week after drainage and irrigation, the patient has complete extension of the involved small finger. **B,** Complete flexion is also present.

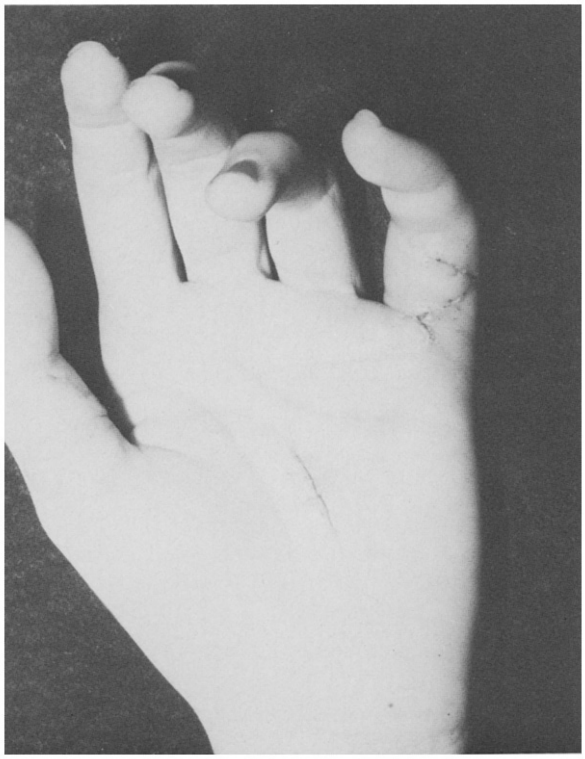

Fig. 6. A few days after flexor tendolysis, the patient developed a tendon sheath infection.

distal wound, and the respective incisions are closed around the indwelling materials. Saline then is flushed from the proximal to the distal end (Fig. 3). After testing the system, the surgeon applies a compressive dressing with a dorsal plaster splint. The catheter is brought out of the dressing which, in turn, is arranged to allow visualization of the rubber drain (Fig. 4). Before the patient leaves the operating suite, the sheath is flushed again.

Over the next 48 hours, the sheath is flushed manually with 50 cc of sterile saline every 2 hours. Because of the small space within the sheath, gravity drip from a hanging bottle does not work well.

After 2 days the wounds and finger are inspected. If tenderness over the sheath is gone, the catheter and drain are removed, the incisions are dressed lightly so that motion will be unimpaired, and active exercises are begun. In rare instances tenderness may persist, requiring an additional 24 hours of irrigation. The patient is discharged from the hospital on the fourth day after operation.

Slight modifications are needed for the thumb and little finger. The irrigating catheter in the thumb is placed into the sheath of the flexor pollicis longus as it leaves the carpal canal. In the little finger, if the ulnar bursa is not involved, the catheter is placed as already described. If the bursa is involved, a second catheter is directed retrograde from the proximal pulley and a rubber drain exits at the wrist. After 7 days the patient can be expected to have complete active extension (Fig. 5, *A*) and active flexion with no residual signs of infection (Fig. 5, *B*).

Results

At 1 week following operation, 18 of 20 patients demonstrated complete ranges of total active and total passive motion. No patient had a recurrence of the infection.

Of the two remaining patients, one demonstrated minimal residual flexor tendon adherence. This patient developed a tendon sheath infection following the surgical release of a trigger finger by another surgeon. After being treated by the method described here, the patient was followed for 1 year. He demonstrated total passive motion of 265° with total active motion of 255°. He was able to bring the pulp of the finger to within 6 mm of touching the palm.

The remaining patient was another case of postoperative infection with an increase in motion over that present before the tenosynovitis. This unique situation

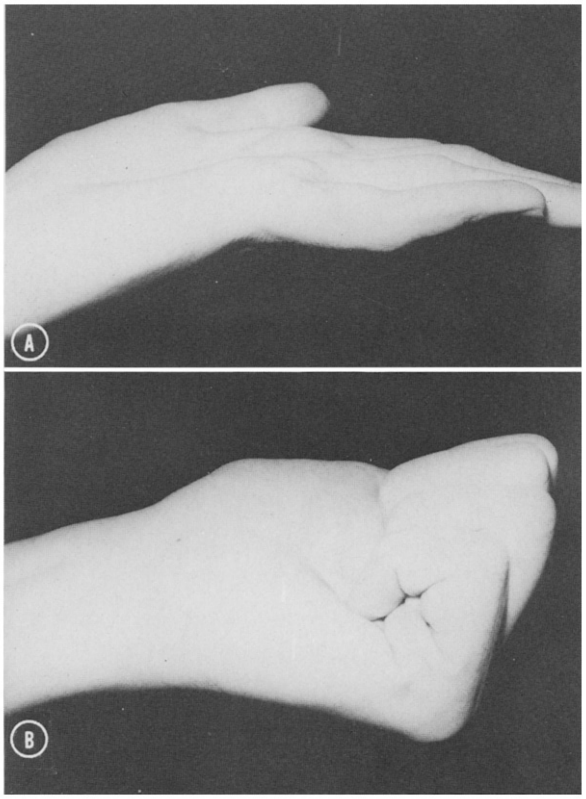

Fig. 7. A, Six months after drainage, the patient has a 10° flexion deformity of the proximal interphalangeal joint. **B,** Complete flexion now is present.

occurred in a patient who underwent flexor tendolysis 6 months after a delayed primary repair of the flexor profundus to the little finger. Just prior to the tendolysis, her total passive motion was 245°, and her total active motion was 190°. A few days later, after starting exercises, she developed a tendon sheath infection (Fig. 6), which was treated by catheter irrigation. Within 1 week of drainage her motion was improved over the pretendolysis state, and at 6 months her total passive motion was 255° and total active motion was 245° (Fig. 7).

Discussion

The success of this form of treatment for pyogenic flexor tenosynovitis is apparent. Other techniques—such as open drainage with secondary wound closure—require secondary procedures, prolong the hospital stay, and run the risk of tendon necrosis (Fig. 8).

Through-and-through irrigation, as described, provides better drainage than merely irrigating the sheath via one incision. The latter does not permit adequate evacuation of necrotic debris and purulence and may lead to tendon necrosis and osteomyelitis (Fig. 9).

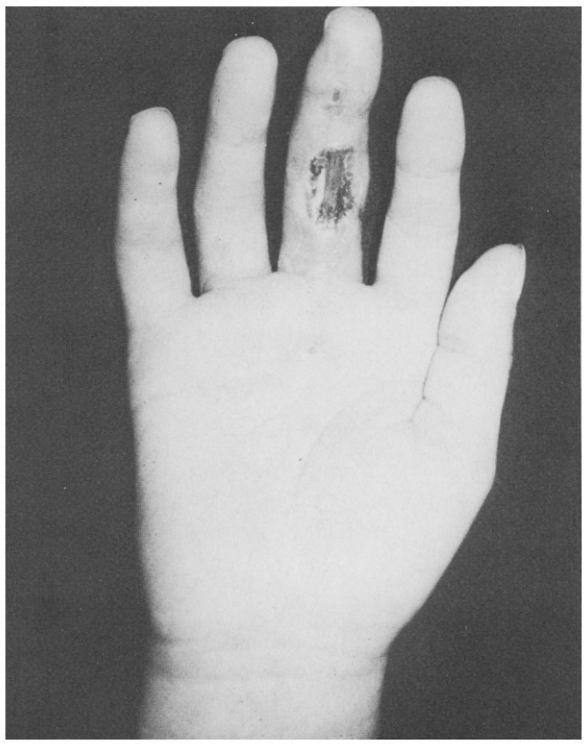

Fig. 8. Tendon necrosis occurred in this finger which underwent drainage with the wounds left open, resulting in skin flap loss as well as the death of the tendon.

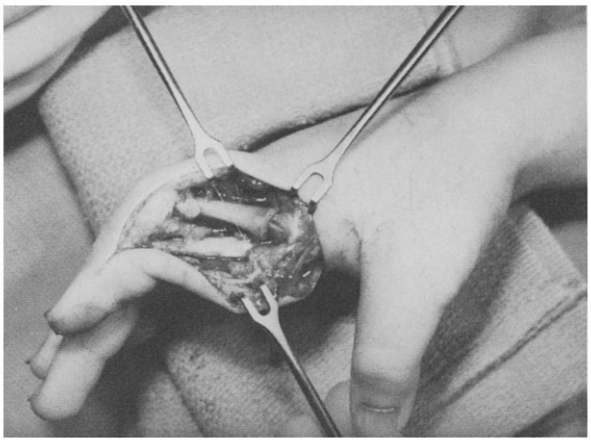

Fig. 9. Tendon necrosis and osteomyelitis were the results in this child whose tenosynovitis was irrigated through a single, small incision.

The use of antibiotics in the irrigating fluids has been debated for many years. Since neither cultures nor sensitivities are available at the time of operation, the correct antibiotic often is not selected. Therefore it seems that the effect of the mechanical lavage is the more

important one in this system. The repeated success in this series, using only saline, supports this theory.

Thus this technique satisfies the criteria set forth earlier, i.e., providing rapid, complete return of function with minimal inconvience to the patient. It should be considered the treatment of choice for pyogenic flexor tenosynovitis.

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