

Treatment of Digital Tenosynovitis by Irrigation with Peroxide and Oxytetracycline:

Review of Nine Cases

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WITH the advent of antibiotics suppurative tenosynovitis has become rare. Yet, because of delay or inadequate treatment some cases still require operative intervention. The usual surgical approach for the relief of this condition involves the sacrifice of valuable structures at its periphery. The purpose of this paper is to describe an alternative method whereby peripheral structures are preserved and loss of function of the involved tendon is minimized.

Expansion of tendon sheaths of the index, middle and ring fingers is restricted by an unyielding fibrous sheath. Much pressure is developed which, if unrelieved, will ensure early and total tendon necrosis. In the tendon sheaths of the thumb and little finger, however, pus under pressure is liberated early into the radial and ulnar bursae, thence to the open spaces of the forearm. At the level of all the proximal interphalangeal joints there is a hiatus in the synovial sheath which permits a vulnerable route of access for contamination from penetrating wounds or contiguous pulp infections.

Diagnosis

The diagnosis is usually unmistakable. The finger is swollen on both sides throughout its length and is held semi-flexed and

immobile. Passive motion is intensely painful. Tenderness along the tendon is most severe over the bulb of the sheath. The patient is febrile and characteristically complains of at least one sleepless night. Diagnosis of tenosynovitis of the thumb and little finger is less obvious because of the built-in decompression chambers of the radial and ulnar bursae.

Limitations of Present Treatment

Most physicians advise early incision and drainage.^{2, 4, 7, 8, 9, 11} Furlonge⁶ advocates early operation through a midlateral incision, removing the entire tendon rather than laying open the entire digit in the case of the thumb. In the little finger he incises the entire length of the carpal tunnel to the wrist. Nichols¹⁰ advocates midlateral incisions with a second incision along the distal palmar crease to open the cul-de-sac of the tendon sheath. The wound edges are held apart by rubber dams or petroleum gauze. Clarkson⁵ prescribes antibiotics first and if these fail, he lays open the tendon sheath by mid-lateral incision with a second transverse incision over the proximal synovial bulb. Clarkson and Boyes³ both use mid-lateral incisions and in the latter's revision of Bunnell's book amputation through the festering joint is suggested if both the tendon sheath and the joint are infected.

In acute suppurative tenosynovitis, although the tendon may be necrosing and

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TABLE 1. *Treatment and Results in Nine Patients*

No.	Age, Race, Sex	Nature of Injury	Digit Involved	Organism Cultured	Interval Between Injury and Operation	Treatment	Functional Recovery
1.	26 W, M	Laceration by broken splinter of wood	Right middle finger	Staphylo- coccus aureus, coag. pos.	8 da.	Initial flush with H ₂ O ₂ per indwelling catheter followed by 24 hr. drip of 1,000 cc. N/S con- taining 1 Gm. Terramycin.	Excellent
2.	62 N, M	Puncture by screw driver	Left middle finger	Alpha strepto- coccus	36 hr.	Single flush with H ₂ O ₂ per catheter followed by single flush 100 cc. Terramycin solution.	Excellent
3.	16 N, F	Infected burn	Right middle finger	Staphylo- coccus aureus, coag. pos.	7 da.	Single irrigation with H ₂ O ₂ followed by single flush with Terramycin solution.	Excellent
4.	18 N, F	Puncture with un- known object	Right middle finger	Staphylo- coccus aureus, coag. pos.	Approx. 24 hr. Actual injury unknown	Initial flush with H ₂ O ₂ followed by continuous drip per catheter of 1,000 cc. Terramycin solution.	Poor
5.	17 W, M	Laceration with can opener	Right index finger	Staphylo- coccus aureus, coag. pos.	3 da.	Initial flush with H ₂ O ₂ per catheter followed by continuous drip 1,000 cc. Terramycin solution for 24 hours.	Excellent
6.	29 W, M	Laceration from play- ing bongo drum	Right index finger	Staphylo- coccus aureus, coag. pos.	7 da.	Single flush with H ₂ O ₂ followed by single flush per catheter of 200 cc. Terramycin solution.	Excellent
7.	27 W, M	Puncture with nail	Right middle finger	Beta hemolytic strepto- coccus	2 da.	Initial irrigation with H ₂ O ₂ followed by single irrigation with 200 cc. Terra- mycin solution. Catheter left in situ and single irrigation with 200 cc. Terramycin solution repeated 48 hours later.	Excellent

TABLE 1.—(Continued)

No.	Age, Race, Sex	Nature of Injury	Digit Involved	Organism Cultured	Interval Between Injury and Operation	Treatment	Functional Recovery
8.	22 W, M	Puncture by edge of aluminum from storm window	Right index finger	Staphylococcus aureus, coag. pos.	3 da.	Initial irrigation with H ₂ O ₂ followed by single irrigation of 200 cc. N/S containing 1 million units aqueous penicillin.	Good
9.	33 N, F	Puncture by tine of fork	Right middle finger	Staphylococcus aureus, coag. pos.	2 da.	Single flush with H ₂ O ₂ per catheter followed by flush with 200 cc. Terramycin solution.	Excellent

even the sheath contaminated, the problem is confined to the limited boundaries of the tendon sheath. When a midlateral incision is made, the finger bursts, exposing the neurovascular bundle and the lateral bands to bacteria-laden pus. As a result the joints may be ankylosed, the lateral bands fixed and the finger virtually useless.

Following Dickson Wright's¹² suggestion, we have treated nine cases of acute suppurative tenosynovitis since 1960 by a different technic.

Technic

Under tourniquet control an incision is made near and parallel to the distal crease of the involved finger. The tendon sheath is exposed and inspected. If it is bulging, a transverse incision opens the sheath and allows the escape of the entrapped fluid. If the infection is early this fluid is opalescent, and if late it is purulent. A culture is taken. A counter-incision in the distal palm over the bulb, or sometimes over the proximal flexion crease of the finger, again exposes the tendon sheath. A size 190 polyethylene catheter with holes cut along its length is inserted well into the sheath. The sheath and its contents are flushed with hydrogen peroxide until no more pus returns and this is followed by irrigation with

0.1 per cent solution of oxytetracycline in normal saline. For early infections a single, gentle but copious irrigation is adequate. In doubtful cases, a second catheter irrigation is repeated the following day. When severe infection exists the catheter is inserted well into the tendon sheath, fixed

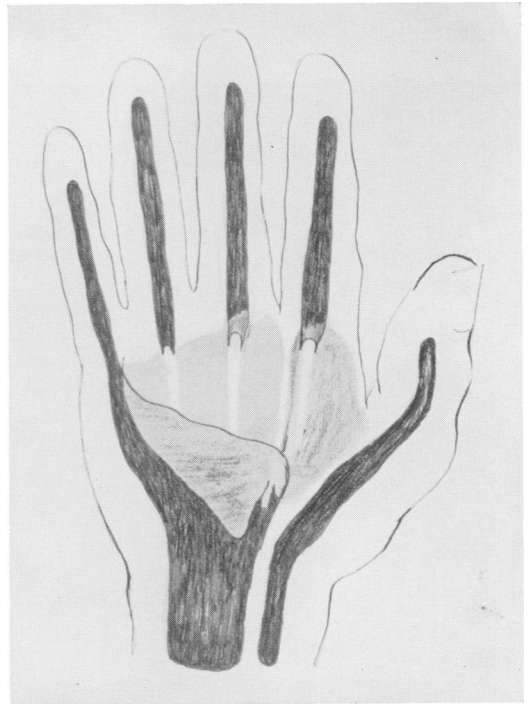


FIG. 1. Anatomy of volar tendon sheaths.

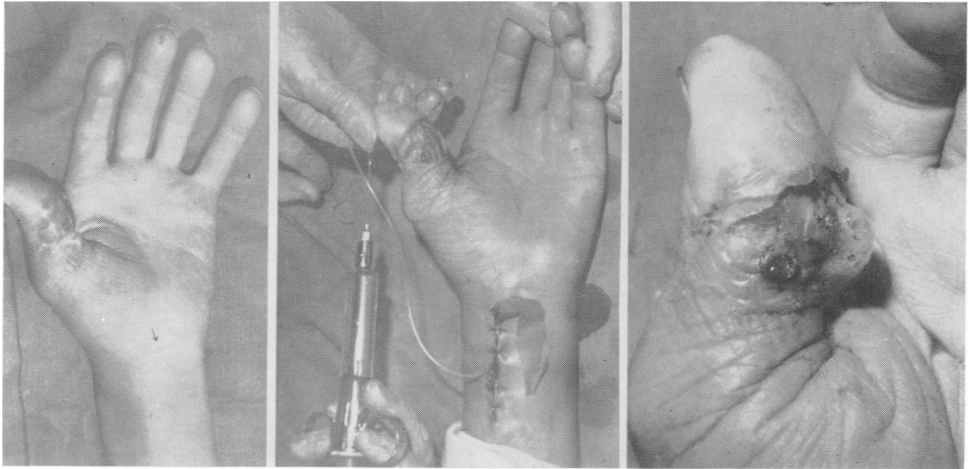


FIG. 2A. Neglected, late suppurative tenosynovitis of thumb with extension into radial bursa. No adjacent swelling in wrist. B. Flexor pollicis longus tendon sheath has been identified and opened in wrist and thumb. Catheter is inserted and irrigation begun. C. Purulent material being flushed out of sheath, from wrist distalward.

into place with a single catgut suture and attached to a continuous drip bottle containing a liter of the antibiotic solution. The height of the bottle is adjusted to permit a rate of one drop per second and this is maintained over a period of from 24 to 48 hours. Systemic antibiotics are given concurrently.

Results

In eight of nine patients all evidence of acute inflammation was gone within 72 hours and the wounds healed within 5 days (Table 1). No tendon necrosis occurred, there was no permanent loss of function and recovery was complete. In the single

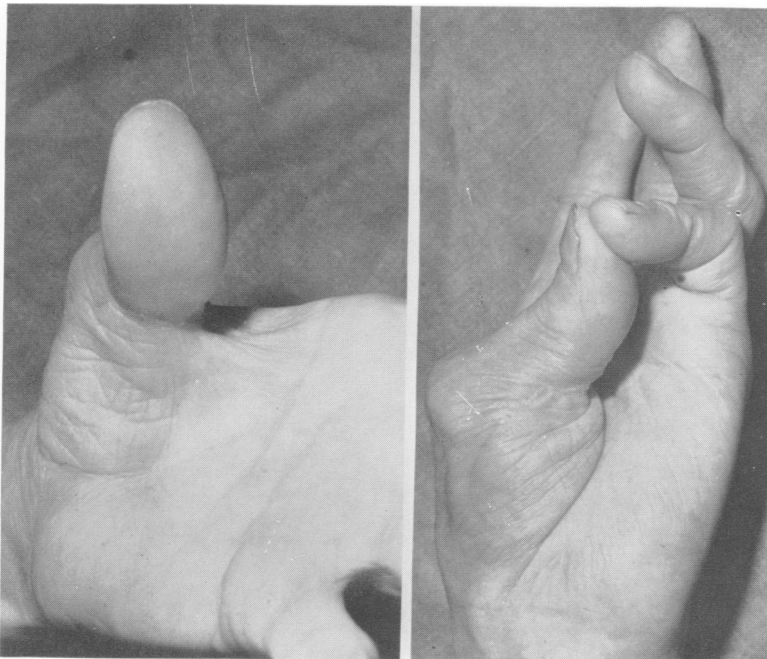


FIG. 2D, E. End results, showing complete healing and recovery of function.

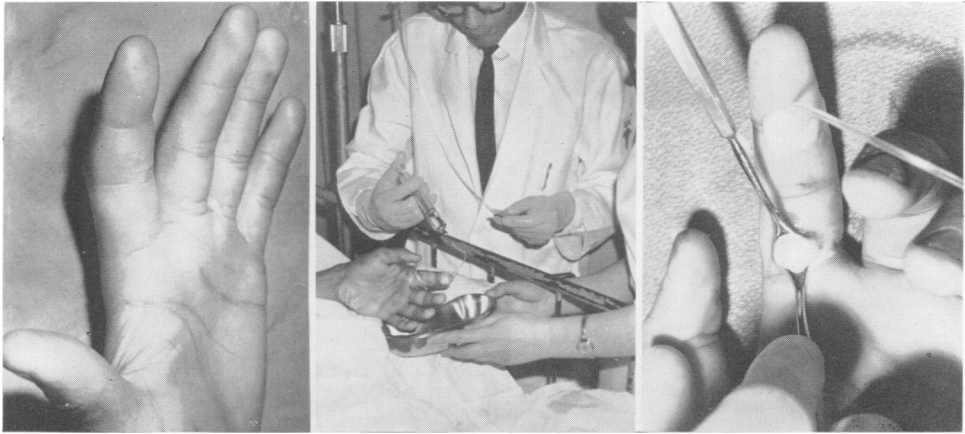


FIG. 3A. Acute suppurative tenosynovitis of index finger. Note wound entry just distal to proximal interphalangeal flexion crease. Digit is held semiflexed and immobile and is symmetrically swollen. B. Initial irrigation with hydrogen peroxide and antibiotic solution through indwelling polyethylene catheter. C. Continuous antibiotic solution drip irrigation for 24 hours. Here final flush performed before removal of catheter.

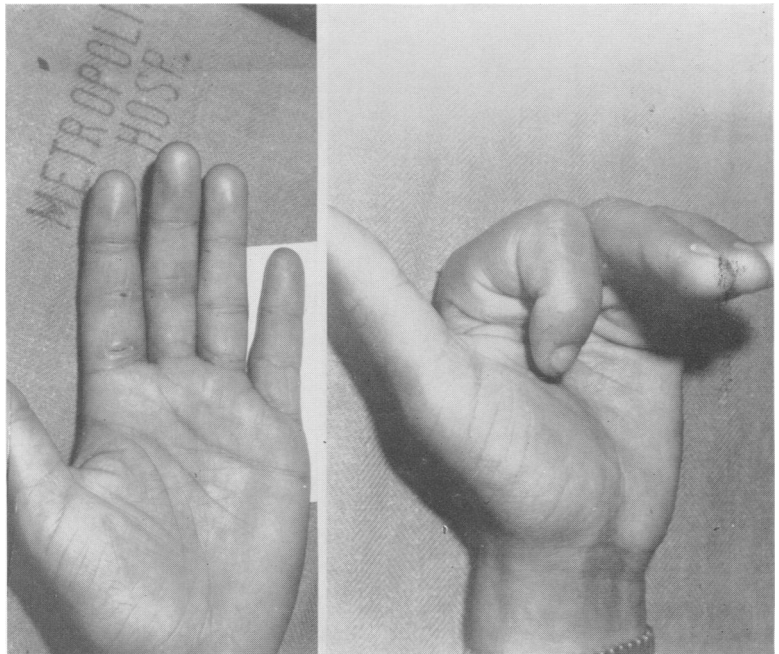
failure, examination of the wound showed that the catheter, which had been improperly placed, was lying outside the tendon sheath, and extensive necrosis and loss of function occurred. Gentleness in irrigating and close attention to the positioning of the catheter have prevented a repetition of this error.

Summary

The mid-lateral incision generally used for treatment of acute suppurative digital tenosynovitis is unsatisfactory since it exposes surrounding delicate structures to infection and subsequent fibrosis with serious loss of function.

Nine patients have been treated by flush-

FIG. 3D. Five days later, all inflammation has subsided. Note wound entry and two transverse incisions. E. Shows excellent functional result in 5 days.



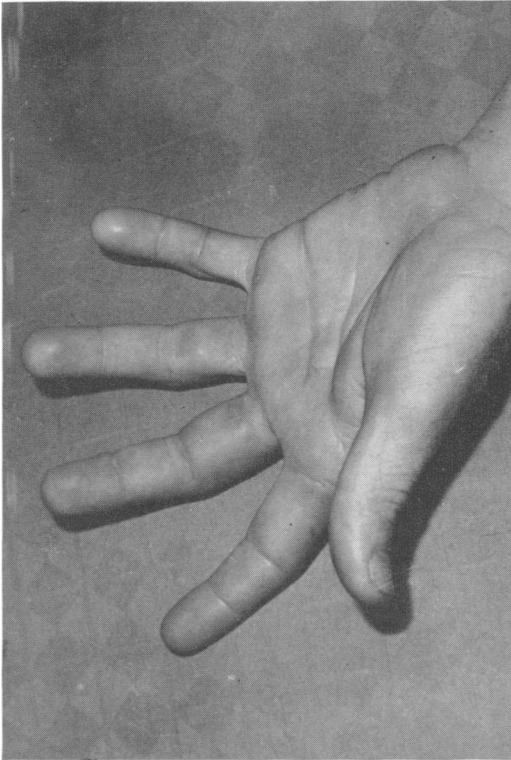


FIG. 4A. Acute suppurative tenosynovitis of middle finger.

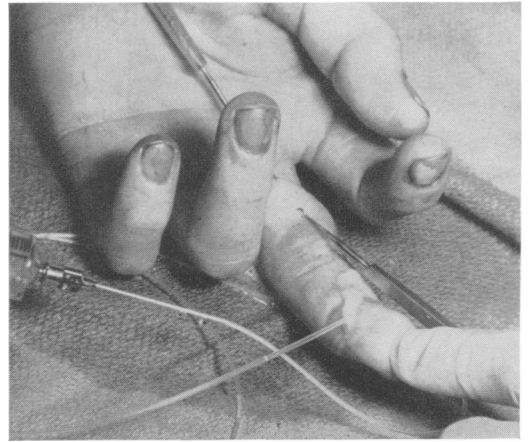


FIG. 4B. Single copious catheter irrigation of tendon sheath.

ing of the tendon sheath contents with hydrogen peroxide and oxytetracycline via a catheter.

Healing has been rapid, hospitalization brief and functional recovery excellent or good with one exception. Since this manuscript was submitted 5 additional cases have been similarly treated with excellent functional recovery.

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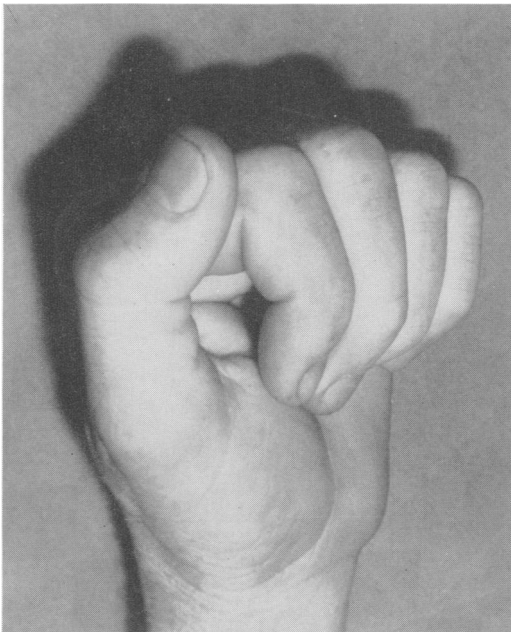


FIG. 4C. Complete healing and excellent functional result 7 days later.