TECHNICAL NOTE

Dynamic injection of the digital flexor tendon sheaths

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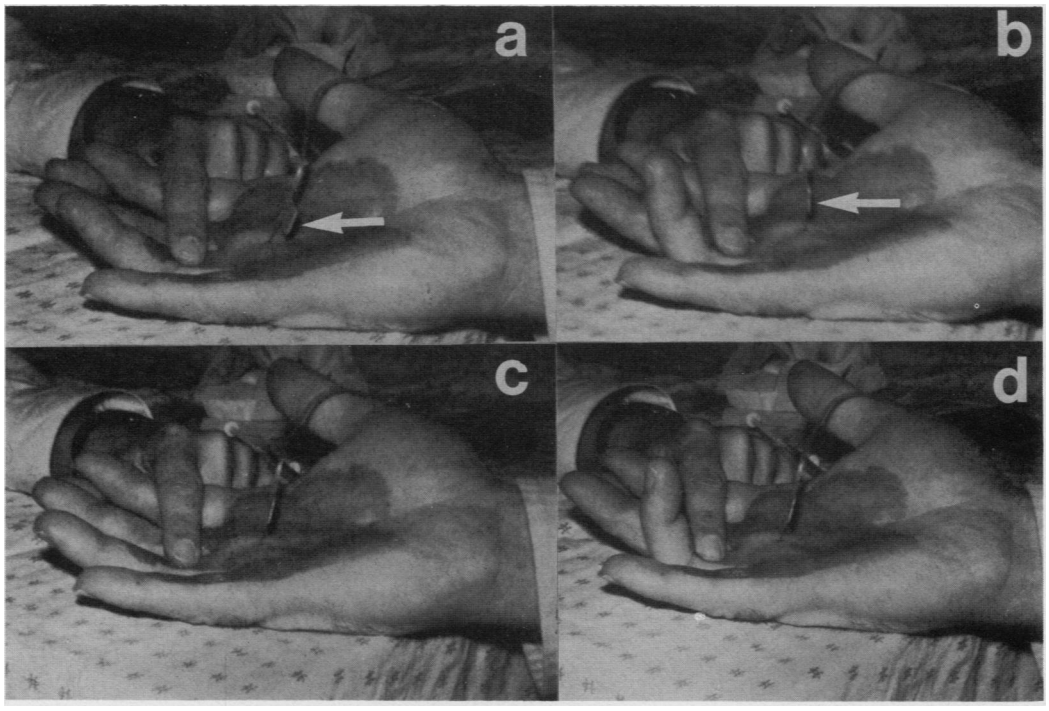
Stenosing tenosynovitis and flexor tenosynovitis are commonly encountered in a rheumatological practice.[1 2] Before surgical intervention (tenosynovectomy or tenolysis), which is seldom required, conservative treatments, including splinting or local corticosteroid injections, are usually recommended. The safety and efficacy of corticosteroid injections have been reported.[3 4] Various techniques have been described,[3–10] but given the anatomy of the flexor tendon sheath, accurate injections may be difficult, especially for the trainee.

We have developed an alternative approach to injecting the flexor tendon sheath which may be more accurate and avoid possible damage to the underlying tendon.

Method

The finger to be injected is cleaned with iodine solution and the superficial skin is anaesthetised with 1% lignocaine solution. A 1 ml syringe is filled with 0·75 ml methylprednisolone acetate (40 g/l) or any other comparable corticosteroid. The syringe is then attached to a 23 or 25 gauge butterfly needle. About 0·25 ml will be needed to fill the plastic tubing and 0·25–0·5 ml will actually be instilled into, or near, the tendon sheath. The proximal thumb crease is used as landmark for the thumb, the proximal palmar crease for the index finger, and the distal palmar crease for the third, fourth, and fifth fingers, and the needle is inserted just distal to the crease, angled at 45 degrees distally. The needle is slowly advanced by 2 mm intervals and its position checked by having the patient actively but gently flex and extend the finger at the proximal interphalangeal joint (this should be practised before the actual injection). There will be little or no movement of the butterfly until the needle touches the tendon. Tendon contact is indicated by reciprocal motion of the butterfly: proximal swing with finger extension and distal swing with flexion (figure a and b). Once this is established the needle is slowly withdrawn at 1 mm intervals until active movement of the finger does not move the butterfly (figure c and d). At that point the corticosteroid may be



(a) Proximal swing of butterfly (arrow) with proximal interphalangeal extension and (b) distal swing of butterfly with proximal interphalangeal flexion indicate tendon engagement. The needle is then withdrawn at 1 mm intervals until active movement of the finger, (c) and (d), does not move the needle. The corticosteroid may then be instilled and should meet little resistance.

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Reported tendon sheath injection techniques

Author and ref	*Needle gauge*	*Needle insertion*	*Ascertainment*	*Volume injected (ml)*
Boyle[5]	25	Oblique, proximal to metacarpophalangeal joint	Expansion of the sheath	1 (ster)*
Carlson, Curtis[6]	25 or 27	Midaxial border of finger at proximal phalangeal level	Needle pushed to bone, then gently probed toward the palm and 'slipped into the flexor tendon'	1 (lig,* ster)
Flynn[7]	25	Base of digit	Needle 'plunged into flexor tendon and then withdrawn until injection meets little resistance'	0·5 (ster)
Gray, Kiem, Gottlieb[3]	26, 27	Palmar aspect near metacarpal head; needle angled proximally at 45 degrees	Lack of resistance to injection	0·5–1 (lig, ster)
Hollander[8]	25	Palmar aspect of the base of the finger	Scratching sensation against needle upon finger motion	0·25 (ster)
Owen[9]	22	Palmar aspect of metacarpal head; needle angled proximally at 45 degrees	Lack of resistance to injection	1 (lig, ster)
Rhoades, Gelberman, Manjarris[4]	Not stated	Distal palmar crease; needle angled distally at 45 degrees	When the needle touches the metacarpal neck it is withdrawn several millimetres until injection of solution meets little resistance	2 (lig, ster)
Steinbrocker, Neustadt[10]	25	Distal head of metacarpal at point of maximal tenderness; needle angled proximally at 45 degrees	Not stated	0·5 (lig, ster)

*ster=corticosteroid suspension; lig=lignocaine solution.

instilled and should meet little resistance. Actual filling of the sheath may be palpated. Afterwards the finger is placed in a splint for three days.

Discussion

Various techniques for injection of flexor tendon sheath have been described (table). Each technique has depended on the lack of resistance while injecting the corticosteroid as indicating that the tendon itself is not injected. This does not guarantee, however, that the injection was within the sheath or into the tissue layers adjacent to the tendon. In one technique the correct position of the needle was determined by scratching of the needle against the tendon when the finger was actively moved.[8]

We have applied the functional role of the flexor tendon as a landmark for injecting the tendon sheath or its vicinity. If the needle is within the tendon any active movement of flexor tendon will be reciprocally transmitted to the butterfly needle. If the needle is withdrawn slowly until there is minimal or no movement of the butterfly when the finger is flexed then it is unlikely that the instillation of the steroids is within the tendon itself. In addition, one may define the border of the tendon with its surrounding sheath and be confident that the steroid is not injected too superficially. Last but not least, the flexible tubing between the needle and the syringe absorbs any extraneous motion of the doctor's hand, avoiding mishaps.

Although most of our experience with this technique has been in the treatment of trigger finger and digital rheumatoid flexor tenosynovitis, we have modified the technique for use in other areas where similar principles may be applied. Thus in carpal tunnel injections reciprocal swings in the butterfly upon gentle active finger movements indicate tendon engagement and the need to reposition the needle. By way of contrast, the reciprocal movement of the needle may delineate the site of injection without the need to withdraw the needle—for example, in the case of tennis elbow.

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