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PARATENDINOUS APPARATUS OF THE DIGITAL EXTENSOR MECHANISM: SOME CLINICAL FEATURES

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THE INTEGRITY of the tendons and their motion depends on their enveloping sheaths. The digital extensor tendons with their paratendinous apparatus are no exception. Viability and motion of digital extensor tendons depend on many factors, among them being the integrity of the paratendinous apparatus. The anatomy of this paratendinous apparatus in the fingers has been described previously.[3]

Local Anesthesia and the Paratendinous Apparatus

Digital block is a valuable and widely used procedure. Proper infiltration of a minimum quantity of anesthesia depends on accurate anatomical localization. When a needle is introduced into a digit from dorsal to volar the skin is first penetrated, followed by a firm resistance felt at the midlateral point caused by penetration of the paratendinous apparatus. The needle next enters the volar digital compartment which is the proper site to block the volar digital nerve.[3] Here infiltration encounters minimal resistance and causes minimal swelling. Failure to pass into the volar digital compartment when blocking the volar digital nerves causes dorsal swelling and late or incomplete volar digital nerve anesthesia. The needle is then withdrawn to the dorsal digital compartment where the dorsal digital nerves are embedded in the paratendinous apparatus. Injection here should cover the dorsum from the midradial to the midulnar points.

When the operator is aware of the existence of the paratendinous structure he will note its firm resistance to needle puncture and then may inject the anesthetic agent accurately.

The Paratendinous Apparatus in Trauma and Repair Skin Coverage.

In repairing lacerations of extensor tendons it is important to realize there is a layer of paratendinous tissue of varying thickness covering the tendon throughout its length.

This layer of tissue is thickest directly over the proximal and middle phalanges and here offers the most protection. Directly over the proximal and distal inter-

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phalangeal joints the paratendinous apparatus is thin and offers less protection to the tendon, especially in the vulnerable flexed position. Here minor trauma can be very damaging.

Wounds in which interphalangeal joints are exposed can produce high morbidity if not closed early and properly. A case illustrates the point.

A patient, aged 72, a carpenter by trade, suffered a saw wound to the dorsal region of the PIP points of the index and middle fingers. On the index finger there was loss of skin, tendon, and some lateral bone. A rotation flap was used to close the open joint and a split thickness skin graft was placed on the paratendinous apparatus.

The middle finger suffered a similar injury of smaller size and only the paratendinous apparatus was rotated over the defect. A split thickness skin graft was placed on this layer. Both grafts took very well and he returned to work in three weeks. He now has full motion of all joints.

This case illustrates that the paratendinous apparatus can be used as a base for skin grafts in certain circumstances and also can be rotated as a separate layer to cover tendon and bone.

In cases with skin loss only, split thickness skin grafts take well on the paratendinous apparatus and presence of the apparatus is helpful in maintaining the tendon's gliding mechanism. In deeper injuries when both skin and paratendinous apparatus are lost, split thickness skin grafts can be applied directly to peritenon with very good results. This may result in a slightly less supple finger.

Figure 1

The skin was removed from a fresh index finger specimen. The paratendinous apparatus was partially dissected from the dorsal aspect of the proximal interphalangeal joint (P.I.P.) and pulled with the instrument proximal-ward producing flexion of P.I.P. joint.

Local flaps from the dorsum of the digits are valuable and require careful execution. When these flaps are elevated their plane of dissection should be just beneath the paratendinous apparatus and over the peritenon. This insures the best blood supply to the flap since the veins reside in the paratendon layer. Dissection in this plane is accomplished with facility directly over the proximal and middle phalanges. As pointed out previously[1,2] if lateral mobility is needed it is necessary to divide the attachments between the skin and bone at the midlateral point.

Extensor Tendon Problems

In surgical repair of the mallet finger it is worth noting that the attachment between skin, paratendinous apparatus, and extensor tendon are very firm. Extensive undermining at the DIP joint can create vascular damage and impair healing of both tendon and skin. In extensor tendon repair over the PIP joint note that the paratendinous apparatus is thin and easily dissected free by dividing the vertical fibers of attachment. During dissections we noted that traction on the paratendinous apparatus could extend the terminal phalanx 5-10°. This motion could be produced by traction on the paratendinous apparatus at a point directly over the laternal bands of the extensor tendon one centimeter proximal to the PIP joint. This occurs both with skin intact and with the skin totally removed.

After the paratendinous apparatus is partially dissected from the proximal interphalangeal joint proximal traction on the same point as above described produces flexion of the proximal interphalangeal joint (Figure 1).

Stronger traction on the paratendinous apparatus gives a boutonniere-like deformity. As is seen in Figure 2 there is a flexion of the proximal interphalangeal joint and hyperextension of the distal interphalangeal joint.

Figure 2

On the same specimen as in Figure No. 1 stronger proximal-ward traction on the paratendinous apparatus was exerted producing boutonniere-like deformity.

Hypermobility of the interphalangeal joints occurs after removal of the skin and the paratendinous apparatus.

Conclusions

The authors feel that the paratendinous apparatus can produce postural digital joint changes of significant degree and has a significant supporting role in finger function.

Clinical observations suggest the paratendinous apparatus a) can be used as a protective layer to cover exposed bone, joint and tendon and b) provides a good base for the application of split thickness skin grafts.

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