

## TENDON TECHNIQUES

Tendon graft material can be obtained from a number of **sources** and for a number of purposes including tendon repair/ transfer, ligament repair, pulley repair and soft tissue interposition. Most commonly used are palmaris longus, plantaris and extrinsic toe extensors. It may well be appropriate to use other donor material, such as other ruptured tendons in the case of rheumatoid arthritis, where the operator knows that these will not be repaired and are available.

The **palmaris longus** can be harvested through a series of step-cut incisions or can easily be harvested using a tendon stripper. The latter method avoids the cosmetic impact of multiple scars. When making the distal incision at the wrist, it is important to avoid injury to the palmar cutaneous branch of the median nerve (which pierces the distal forearm fascia just before the wrist crease) since this may cause a painful neuroma. The palmaris is generally a reasonable quality graft though of relatively limited length.

In patients who do not have palmaris longus, **plantaris** may be present. This is located through a short incision mid-way between the medial malleolus and the tendo Achilles. It generally lies subfascially on the deep surface of the tendo Achilles and is easily found. It produces similar quality tendon graft material to palmaris with additional length. It is important that a suitably long tendon stripper is used if you attempt to harvest plantaris.

For those patients who do not have palmaris or plantaris available, **extrinsic toe extensors** are a perfectly reasonable alternative. Provided the intrinsic extensors remain, the patients should not have any disturbance of posture in their toes. I generally commence with a transverse incision at the level of the metatarsophalangeal joint or just distal to this and then make a series of step-cuts progressing up to and if necessary above the extensor retinaculum. Some textbooks depict the use of tendon strippers from the dorsum of the foot. In my experience this is extremely unlikely to be workable, because the stripper will not negotiate the retinaculum with ease.

For extensor tendon repairs/reconstruction, it is sometimes appropriate to use a short segment of **extensor retinaculum** as donor material, since this may very accurately reproduce the ribbon like qualities of the extensors distal to the metacarpophalangeal joints.

**Split tendon** such as FCR (as for trapeziectomy and LRTI): although this may similarly be raised through a series of step-cut incisions, it is easily possible to avoid this, using long loops of dental wire, carefully manoeuvred up and down the tendon sheaths.

Once the tendon graft material is harvested, it should be **debrided** of loose synovial tissue and any residual muscle, particularly if it's to be used within the digital flexor sheaths.

Tendon grafts will tend to either to be used as **interposition grafts** to bridge segmental defects or as tendon extensions, in which case they will pass from a tendon proximally to bone distally (typically). In the former situation by far the strongest type of repair can be achieved using **weave techniques** with straight or bent Pulvertaft tendon weavers, rather than by using end-to-end tenorrhaphy. This can equally be said for many tendon transfers too.

The original Pulvertaft weave described essentially two passes through the tendon. If sufficient length is available however, additional security can be given to the repair if three tendon passes can be made with the graft and I recommend the use of many sutures to provide anchorage between the two tendons.

In **anchoring tendon to bone**, various techniques may be used. For flexor tendon reconstruction, it may be possible to use a simple Kessler suture modification between the graft and the original tendon stump or it may be secured by drilling transversely across the base of the terminal phalanx and passing the suture through the bone itself. My own

## TENDON TECHNIQUES

preferred technique is to roughen the palmar cortex of the terminal phalanx and pass the graft through a tunnel emerging at the hyponychium, looping this onto the dorsum of the nail plate, where it is anchored with one or two sutures through the latter. It is also quite useful for allowing tensioning if the proximal weave has been performed.

The other useful adjuncts for securing tendons to bone are the various **bone anchors** that are available including Mitek and Tag varieties.

**Side-to-side repair**, e.g. EDC little to EDC ring, can be done by a simple tenorrhaphy, but is more strongly effected using a weave technique.

Palmaris graft may also be used for A2 and A4 **pulley reconstruction** in zone 2. A single or double loop held in close approximation to the tendons should provide adequate strength. These loops should pass under the extensor hood for A2 and over the extensor for A4, i.e. in a subcutaneous plan. Sometimes extensor retinaculum makes good graft material for pulley reconstruction and may be reasonably attached to the pulley remnants. A single distally based slip of FDS can be passed over FDP and attached to A2 creating a sort of long oblique A3.