TISSUE EXPANSION IN LATE REPAIR OF TENDO ACHILLIS RUPTURE

ASLAM MOHAMMED, AZIZ RAHAMATALLA, CHARLES H. WYNNE-JONES

From North Staffordshire Medical Centre, Stoke-on-Trent, England

We report four patients with late presentation of rupture of tendo Achilles, treated by soft-tissue expansion of the skin before tendon repair to allow tension-free wound closure.

Received 27 January 1994; Accepted after revision 6 June 1994

Repair of a ruptured tendo Achilles (TA) may be difficult after open ruptures followed by infection or when there has been delay in diagnosis or presentation. The presence of a large gap in the tendon and tethering of the skin may prejudice wound healing and cause skin necrosis or infection which may require extensive plastic procedures. There are also the dangers of sural nerve damage, tendon adhesion, deep-vein thrombosis and rerupture.

Several methods of overcoming these potential wound problems have been described; these include a lazy-S incision from the lateral aspect side of the calcaneum to the middle of the calf (Abraham and Pankovich 1975), a darted medial incision (Inglis and Sculco 1981) and percutaneous repair (Ma and Griffith 1977). The use of a small transverse incision just distal to the palpable tendon gap has also been reported to give good wound healing (Aldam 1989).

Tendon repair aims to restore continuity at normal tension in order to allow near normal excursion and to restore normal power of plantar flexion. To achieve this, the scar tissue in the gap must be excised and the two ends of the tendon approximated. Tendon continuity may be restored by any one of the methods which have been described in the past, using fascia lata grafts (Zadek 1940; Tobin 1953), a V-Y advancement flap (Abraham and Pankovich 1975) or a peroneus brevis tendon graft (Teuffer 1974).

Skin cover can be improved by tissue expansion. Plastic surgeons have used this method since it was first described by Neumann (1957) to repair a defect of the ear. The technique was revived in the early 1980s and is now widely used.

PATIENTS AND METHODS

From 1986 to 1992 we treated four patients by preliminary tissue expansion for late-presenting rupture. All had tethering of skin to scar tissue in the gap between the ends of the ruptured tendon. A direct approach would have risked skin necrosis, and covering a bulky repair would have been difficult. A two-stage procedure was therefore performed.

The first stage was the insertion of a soft-tissue expander by a plastic surgeon. A rectangular, 100 ml capacity Rado- van soft-tissue expander with a remote injection dome (Mentor Medical Systems UK, Newbury, UK) was inserted subcutaneously under general anaesthesia near the ruptured tendon through a small longitudinal incision which could later be incorporated into that needed for the definitive repair. More proximally, a subcutaneous pocket was made for the remote injection dome. The wounds were allowed to heal for 10 to 14 days, then tissue expansion started and was continued over six to eight weeks to the full capacity of 100 ml (Fig. 1) by weekly injections of 10 to 20 ml of sterile normal saline. The volume of each injection depended on the patient’s discomfort and the appearance of the capillary return in the overlying skin. After full expansion one to two weeks were allowed for the inflammatory response to settle.

The tendon repair was performed under general anaesthesia and tourniquet control. The midline incision incorporated the scar of the previous incision taking care not to puncture the tissue expander during its removal. The capsule surrounding the expander was carefully preserved. It had the appearance of a well-vascularised ‘pseudosynovial sheath’ with a membranous undersurface to the skin (Fig. 2). Tendon repair was with an artificial ligament (ABC ligament, Surgicraft, Redditch, UK) in cases 1 and 2, by end-to-end repair in case 3 and by augmentation with the plantaris tendon and a strip of fascia lata in case 4.

After repair, the pseudosynovial sheath was wrapped around and sutured over the repair site to prevent skin tethering and to enhance the tendon’s blood supply. The wound was closed in layers over suction drains using interrupted nylon sutures for the skin. Non-adhesive dressings were applied with the foot in full equinus, a below-
knee plaster front slab was added and the leg was elevated on a Braun frame. After two days, the wounds were inspected, the drains removed and a full equinus cast applied. At two weeks the sutures were removed and a below-knee cast was applied in a less acute equinus position. The plaster was changed at three- to four-week intervals, bringing the foot gradually up to a neutral position by the time of cast removal at ten weeks. A 1.5 cm heel raise was worn for three months and passive and active physiotherapy started.

The patients were reviewed at from 10 to 77 months and assessed for wound healing, range of movement, return to
work and power of plantar flexion and dorsiflexion using a strain-gauge force-plate system.

RESULTS

Satisfactory soft-tissue expansion was achieved in all cases by 8 to 10 weeks (Table I). Three patients had no wound complications but case 4 developed an area of superficial skin necrosis of 1 cm² which healed in four weeks. All four had a good functional result and had returned to work. Ankle movements were good but the power of plantar flexion was reduced by 23.5% to 56% and of dorsiflexion by 17% to 69% compared with the normal side. Calf-muscle wasting and thickening at the site of repair persisted at long-term follow-up.

DISCUSSION

Rupture of tendo Achillis was first described by Ambroise Paré in 1575 and in 1768 by John Hunter, who sustained a rupture while dancing. He treated himself with strapping and a heel raise and obtained a good result (Kobler 1960). Ruptures are missed at presentation in up to 29% of cases (Scheller, Kasser and Quigley 1980; Inglis and Sculco 1981) and a delay of one week or more allows substantial granulation tissue to develop in the gap (Arner and Lindholm 1959). This prevents apposition of the two ends with conservative treatment.

Reurrence after conservative treatment occurs in 10% to 29% of cases (Bugg and Boyd 1968; Lea and Smith 1972; Inglis et al 1976; Jacobs et al 1978), but is as low as 2% after surgical repair (Carden et al 1987).

The use of a soft-tissue expander makes skin closure much easier and provides increased local blood flow, thus improving the potential for wound healing.

We had one minor skin complication. Zoltie, Chapman and Joss (1990) reported no complications in 22 lower-limb expansions but Manders et al (1988) described a significant complication rate in 16 lower-limb expansions. It is therefore important that an experienced plastic surgeon should perform the first-stage procedure.

We would like to thank our colleagues of the Department of Plastic Surgery at the North Staffordshire Medical Centre for inserting the soft-tissue expanders and the Medical Illustration Department for their help in providing the photographic material.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

REFERENCES


