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RUPTURED ACHILLES TENDON — PRELIMINARY RESULTS OF A NEW TREATMENT

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ABSTRACT

The preliminary results of a new treatment of ruptured Achilles tendons are presented. The new treatment consists of a new tendon suture and a new post-operative cast in which it is possible to make non-weight bearing movements of the ankle immediately after the operation. This makes it possible to walk the day after the operation, causes very little discomfort during the time in a cast, gives a quick return to normal mobility with normal plantar flexion strength and makes it possible to resume sport at the same level as before the injury.

Key words: Achilles tendon rupture, Cast, Surgical repair

INTRODUCTION

The optimum treatment of Achilles tendon rupture is both extensive and debatable. There are authors who adhere to the belief that all ruptures of the Achilles tendon should be treated without surgery (Nistor, 1981), while others feel that surgical intervention is an absolute necessity (Rubin and Wilson, 1980).

Most often the treatment of ruptured Achilles tendons — surgical or non-surgical — includes immobilisation for 6 to 8 weeks (Edna, 1980; Kiviluoto et al, 1985). It is evident that the long period of immobilisation is a factor which contributes to the long rehabilitation time. Furthermore it is known that immobilised tendons have a decreased blood supply, which is not likely to enhance healing in the tendon (Gelberman et al, 1980; Rothman and Slogoff, 1967).

In September 1985 a study of ruptured Achilles tendons was started in the orthopaedic department of Bispebjerg University Hospital in Copenhagen. A new cast construction was tested. This cast allowed non-weight bearing movements in the ankle (tibio-talal) joint maintaining the blood supply in the sutured tendon and thereby promoting better healing of the tendon, perhaps resulting in a shorter rehabilitation period.

The aim of this article is to present the preliminary results of the treatment of ruptured Achilles tendons with this new cast.

MATERIAL

In the period between September 1985 and November 1986, sixty patients with subcutaneous rupture of the Achilles tendon were included in a prospective randomised study comparing the traditional post-operative management versus a new mobile ankle cast. Thirty patients were treated with the mobile cast. Six patients using the new cast have now completed the planned one year follow-up and are presented.

To be included in the study the rupture was less than seven days old. The patients were between eighteen and sixty years of age and had to be available for follow-up for one year.

Six men were operated upon. Four sustained the rupture during badminton, the remaining two during every-day activities. The mean age was 39 years, range 33-46 years.

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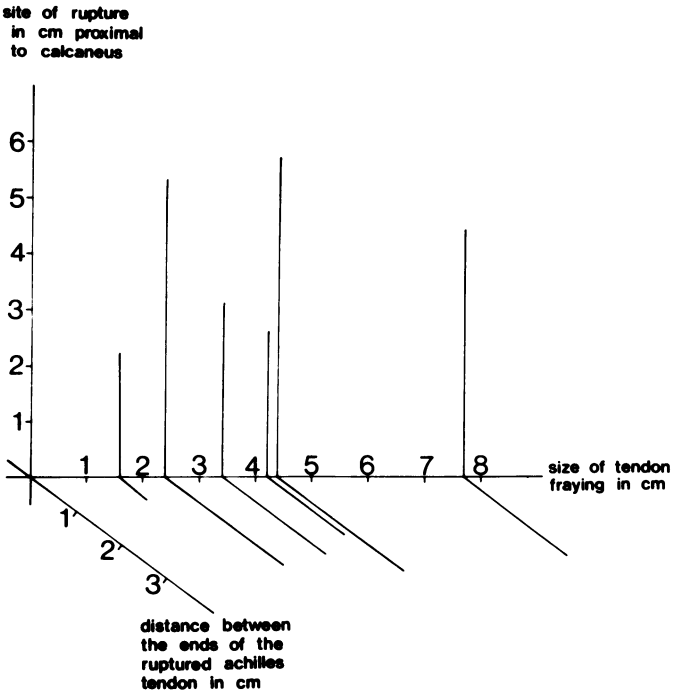


Fig. 1: Site of rupture, extent of tendon fraying and distance between the ends of the ruptured tendons in six patients with subcutaneous rupture of the Achilles tendon.

Fig. 1 shows the site of the ruptures, the distance between the ends of the ruptured tendons and the extent of frayed tendon fibres caused by the rupture.

DIAGNOSIS

The rupture was diagnosed by clinical examination. All patients had swelling, tenderness and a palpable defect at the site of the lesion. None were able to stand on their toes and all reacted positively to the calf squeeze test (Thompson and Doherty, 1962). Verification of the rupture was made by radiographs and ultrasound investigation.

TREATMENT

All patients were operated upon in a prone position. A tourniquet was not used. The operations were performed through a posterior midline incision. The paratenon was handled very carefully and divided in the midline. All tendons were frayed.

A new suture technique was performed with Vicryl no. 1 (Fig. 2). This procedure was carried out in order to establish a more rigid tendon suture which would allow immediate

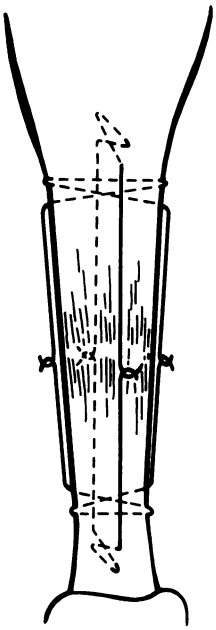


Fig. 2: The new tendon suture technique.

non-weight bearing active movements in the ankle joint performed wearing the new mobile cast. The wound was closed in layers with Vicryl no. 3-0 in the paratenon and Vicryl 2-0 in the subcutaneous layer. The skin was closed with Nylon 3-0 in the Allgöwer fashion (Fig. 3). This particular skin suture was carried out in order to handle the skin in the most gentle way and hereby avoid skin necrosis. The skin sutures were removed after 14 days.

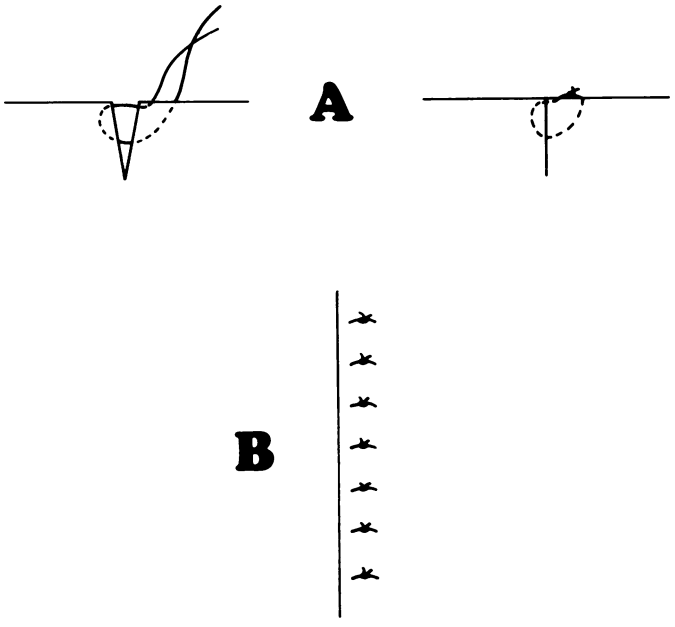
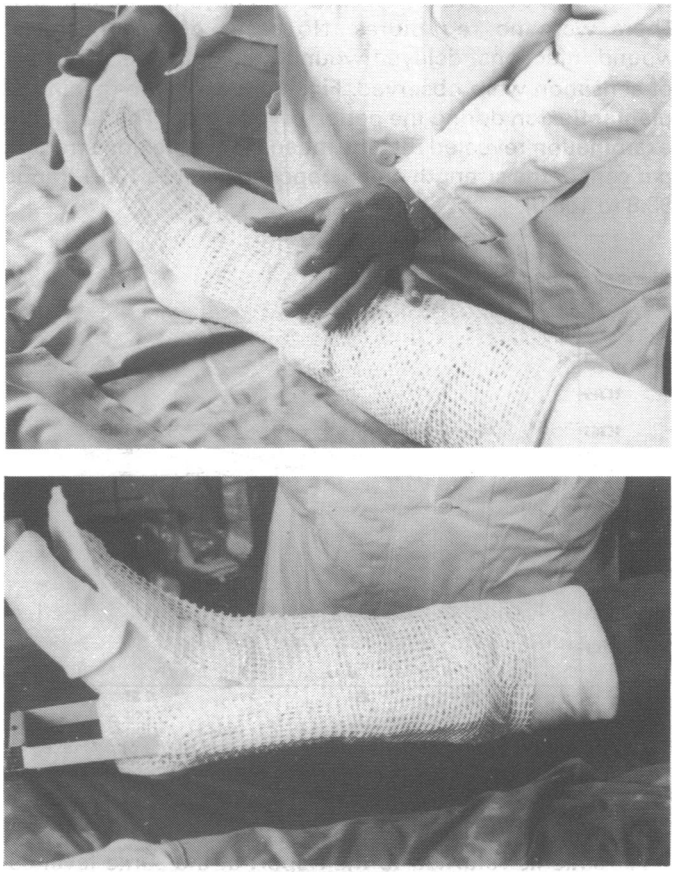


Fig. 3: Skin closure in the Allgöwer fashion.
(A) Cross-sectional view
(B) Superficial view

THE NEW MOBILE CAST

The new mobile cast was applied with the patients laying in the prone position. The material used for the cast (Hexcelite) is thermoplastic and available in rolls and sheets of different sizes. After heating the Hexcelite in a water bath for three minutes to 70°C, it becomes soft and can be applied with ease. The strength of Hexcelite is regained by cooling to room temperature. The application of Hexcelite is similar to plaster of Paris.

Figs. 4 and 5 illustrate the application of the cast. The Figs. are shown with the patient in a ventral position. It has turned out to be easier to apply the new mobile cast when the patient is prone. Fig. 4 illustrates how dorsi-flexion of the foot is limited by making a dorsal foot cover in Hexcelite. The foot cover is placed in 20° of plantar flexion. During the six weeks in the cast the patients were allowed to walk without crutches (Fig. 6).



Figs. 4 and 5: Essential steps in the application of the new mobile cast.

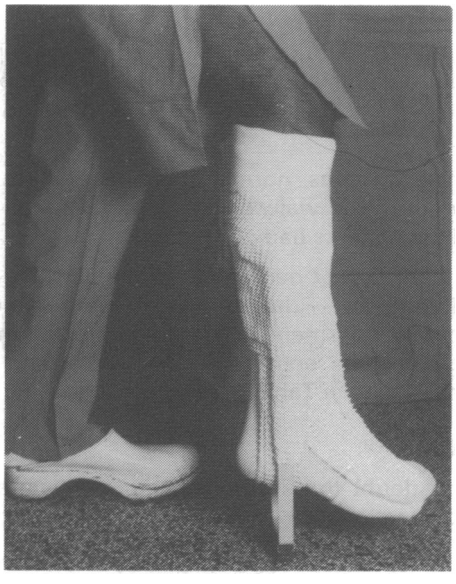


Fig. 6: The new mobile cast in a walking patient.

After the operation all patients were encouraged to perform active movements in the ankle joint. The casts were removed after six weeks and followed by walking with a one cm heelraise inside both soes for two weeks.

FOLLOW-UP

During the time in a cast all patients returned for clinical re-examination 1, 2, 3 and 6 weeks after the injury. Furthermore clinical examination took place 3, 6 and 12 months after the injury.

RESULTS

The mean sick-leave period was 21.5 days (range 6 to 52). There were no re-ruptures. No cases of skin necrosis, wound infections, delayed wound healing or disturbances of sensation were observed. Fig. 7 shows the re-gaining of plantar flexion during the period of follow-up. The 12 month examination revealed that the mean plantar flexion strength per cent of the strength of the opposite leg was 100.1 (range 93.8 to 108.0).

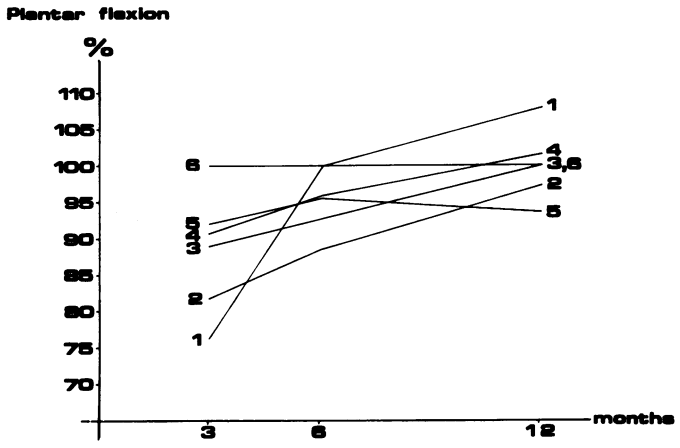


Fig. 7: The relative plantar flexion strength in per cent of the opposite leg at the time of follow-up 3, 6 and 12 months after the injury in six patients with subcutaneous rupture of the Achilles tendon.

All patients returned to their sport at the same level as before the rupture. One patient playing badminton had intermittent pain in the operated Achilles tendon during training.

Normal plantar- and dorsi-flexion in the ankle joint was noted in four patients after three months. At the six months follow-up all had normal mobility. There were no cases of scar fixation.

After three months normal gait was found in three patients, while three walked with a slight limp. After six months all the patients had normal gait.

No-one had pain or oedema in the injured leg — when positioned vertically — during the six weeks in a cast. The patients' own assessment concerning the treatment as a whole, including the end result and concerning the new mobile cast, is seen in Table I.

DISCUSSION

It is beyond doubt that immobilisation always leads to a diminished functional level, from which it requires active rehabilitation to reach normal function. The new mobile cast was constructed in order to fulfil the biomechanical recommendation that, whenever possible, cast-bracing and functional splints may be preferable to rigid plasters in many sports-related tendon or ligament injuries (Booth and Seider, 1979; Cetti et al, 1984, Gamble and Edwards, 1984).

TABLE I

Assessment of the treatment — including the end result — and of the new mobile cast in six patients with rupture of the Achilles tendon.

Assessment	The new mobile bandage	The treatment
Excellent	5	4
Good	1	2
Poor	0	0
Total	6	6

It is evident that the new cast gives a quick return to every day activities and even to work. The period of morbidity, defined as length of absence from work, was thirteen weeks on average in 45 patients treated surgically with a post-operative traditional below-knee plaster cast for seven weeks in the study conducted by Nistor in 1981. The mean sick-leave period in the present study — three weeks — is considerably shorter than seen in other studies (Wills et al, 1986). There are two main reasons for this: (a) the patients are able to walk with the new cast the day after the operation and (b) the mobility in the ankle joint, during the time in the cast, makes it possible to continue walking normally after removal of the cast. Furthermore the acceptance of the new cast and the lack of discomfort experienced from the cast motivate a quick return to work and every day activities.

The preliminary results seem promising. The new treatment gives a quick return to normal mobility and normal plantar flexion strength and makes it possible to resume sport at the same level as before the injury.

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