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CASE REPORT

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Spontaneous "spaghetti" flexor tendon ruptures in the rheumatoid wrist

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Abstract A 54-year-old woman who had been treated for rheumatoid arthritis for 12 years developed spontaneous multiple flexor tendon ruptures during a 5-month period. Radiography revealed volar subluxation of the lunate bone. Surgery was performed 5 months after the first onset of tendon rupture. All eight flexors, except the flexor pollicis longus tendons, had ruptured, and the damage resembled spaghetti. Four flexor digitorum profundus tendons were reconstructed by bridge graft using their respective sublimis tendons. Wrist joint fusion and tenolysis were performed 3 months after the first operation. Each finger achieved a good range of motion 2 years and 6 months after the second operation.

Key words Multiple flexor tendon rupture · Rheumatoid arthritis (RA) · Surgical outcome · Wrist

Introduction

Spontaneous rupture of flexor tendons of the hand in patients with rheumatoid arthritis (RA) is less common than rupture of the extensor tendons.[1] Isolated multiple spontaneous ruptures of the flexor tendons are very rare.[2] However, they are less rare in association with subluxation of lunate or scaphoid bones. In this cautionary tale, we report the results of the use of tendon grafts to treat an active patient with advanced RA who had eight spontaneous flexor tendon ruptures and lunate subluxation.

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Case report

A 54-year-old woman had been treated for RA (Steinbrocker stage 3, class 2) for approximately 12 years. The patient lost the ability to flex all four fingers of her right hand during a 5-month period. The successive losses began with her little and ring fingers in December 1997, followed by the middle finger in March of the next year, and the index finger in May. The patient was referred to our hospital for tendon repair. An examination showed both sublimis and profundus tendon ruptures of all four fingers (Fig. 1). Movement of the wrist in any direction was limited and painful. Volar subluxation of the lunate bone was revealed in radiographs (Fig. 2). Some carpal instability was apparent on the radiographs and the diagnosis was mutilans type.

Ruptures of all flexor digitorum superficialis (FDS) and flexor digitorum profundus (FDP) tendons were confirmed during the operation. The ruptured ends of each flexor were bridged with scar tissue. After debridement of the scar tissue, the ruptured tendon edges resembled strands of cooked spaghetti (Fig. 3). The lunate bone protruded volarly into the gliding floor of the flexor tendons. Mild synovial hyperplasia was noted around the tendon ruptures. Radiolunate instability was greater than expected. Although total arthrodesis would have been appropriate at that time, prior specific informed consent for it was lacking.

The spur of the protruding portion of the lunate bone was trimmed. The FDP tendons were restored with bridge grafts using their respective FDS tendons (Fig. 4). We used a so-called "dual wrapping suture" modified from the cocoon-type juncture technique[3] with an interlacing suture, which provides strength in suturing tendons of different diameters. This technique produces a gradual transition of tendon diameter through the suture area, unlike the abrupt stepped change of the interlacing suture technique. During the operation, the surgeons found that the smoother tendon surface made the second tenolysis easy.

Wrist instability persisted, and a total arthrodesis of the wrist combined with Darrach's procedure and tenolysis was

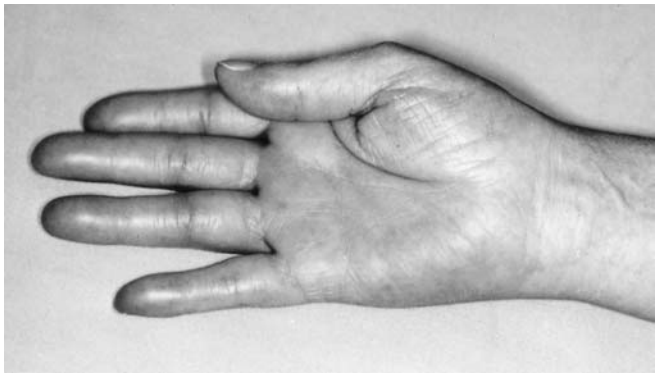

Fig. 1. Preoperative photograph of the forearm. All four fingers are stretched out in the resting position

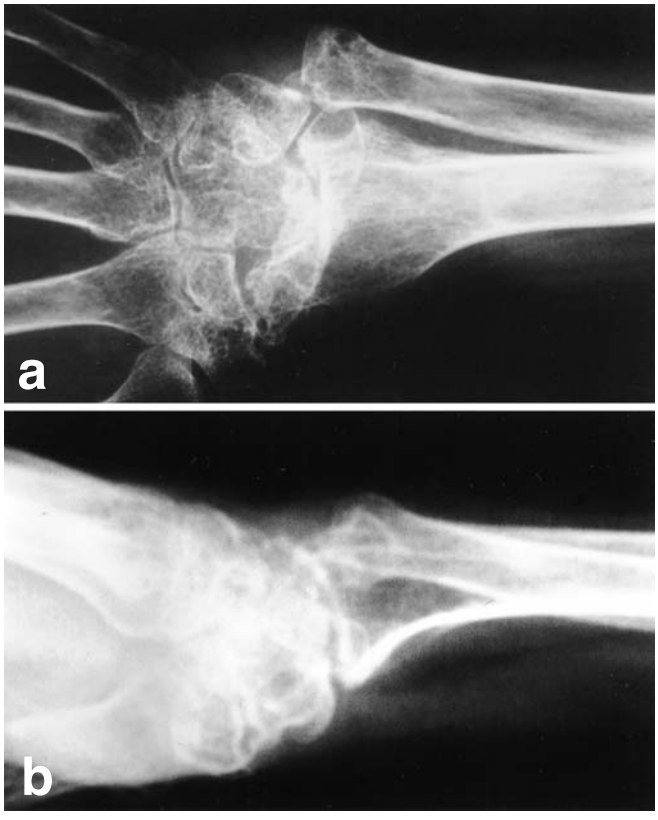

Fig. 2. Preoperative radiographs. **a** Anteroposterior view. **b** Lateral view

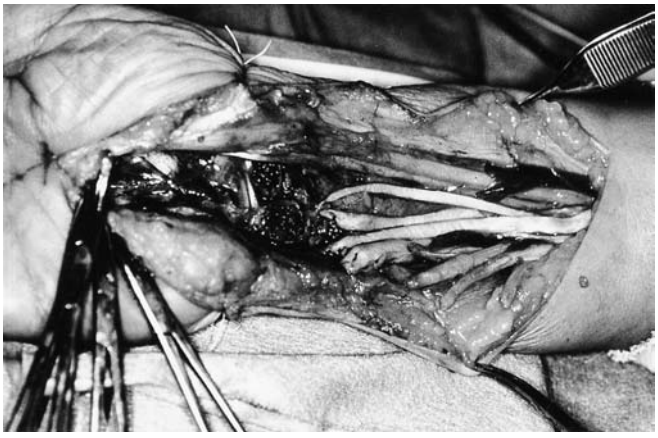

Fig. 3. Operative findings of spontaneous flexor tendon ruptures showing spaghetti-like appearance

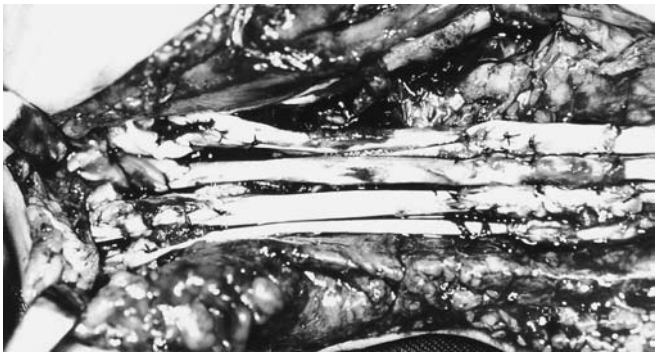

Fig. 4. Bridge graft to flexor digitorum profundus (FDP) tendons using their respective flexor digitorum superficialis (FDS) tendons

Fig. 5. Condition of the grafted tendons 3 months after the first operation

performed 3 months after the first operation. The grafted tendons had healed well (Fig. 5).

To date, the results have been satisfactory and the patient continues to live independently (Fig. 6). Active motion of the fingers is good. Individual finger-tip pinches with adequate power are now possible.

Discussion

Multiple tendon ruptures, combined with radial and ulnar artery and median and ulnar nerve injuries with no fewer than 10 components in the volar wrist area, were termed a

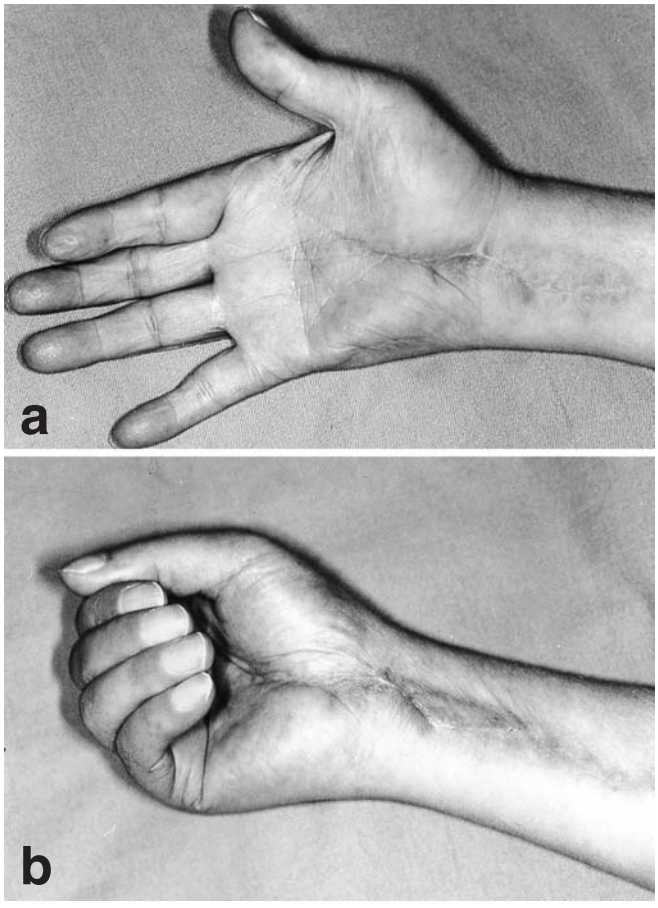

Fig. 6. Postoperative photograph of the hand. **a** Extension. **b** Flexion

"spaghetti wrist" by Katz.[4] After his first reference to this term, multiple organ injuries in the wrist have commonly been referred to as a "spaghetti wrist".[5–7] It is our practice to use this term for multiple (at least six) spontaneous tendon ruptures to help visualize the operative appearance in the wrist and to imply the necessity of multiple tendon grafts.

The onset mechanisms of spontaneous flexor tendon ruptures in RA patients are direct invasions of the tendons by synovial proliferation, and the asceptic partial necrosis of tendons due to poor circulation impaired by synovial proliferation, attrition from friction by bony protrusions, excessive carpal tunnel pressure, and steroid injection.[8] Almost two-thirds of these cases are caused by attrition rupture.[9]

In this case, the coincidence of lunate subluxation and the areas of the tendon ruptures, as well as the low level of synovial proliferation, indicated that the ruptures were due to attrition. This case is unusual in having lunate subluxation rather than the more common scaphoid subluxation and its attendent rupture of the pollicis longus.[9] This case is also valuable as a cautionary tale for hand surgeons and those who refer such cases for surgery because it fell into the troublesome gray area between the mutilans and osteoarthritic types based on preoperative radiographic appearances.

The results of tendon repair in the "spaghetti wrist" due to laceration have been reported to be poor because of the extensive involvement of many tendons, fibrosis induced by sepsis, and poor patient compliance. We attribute the good surgical results in our case to the tendon graft procedure and subsequent arthrodesis. In the treatment of multiple spontaneous ruptures, tendon grafts are often required in the presence of granulation tissue at the rupture sites, which can significantly increase the distance between the healthy ruptured ends, and also when multiple suitable donor tendons are not available. Our bridge graft technique for FDP tendons using their respective FDS tendons was useful in this case, and preserved a degree of flexion that was acceptable to the patient.

A stable wrist joint is also important in order to achieve and sustain normal finger motion. In our case, the residual instability also interferred with postoperative rehabilitation exercises. The patient was able to complete the exercises after arthrodesis of the wrist.

Overall, the results of tendon bridge grafts for the "spontaneous spaghetti wrist" were exceedingly good, but there is some sacrifice of grip power for hand motion in using the FDS tendons as graft donors.

References

1. Moore JR, Weiland AJ, Valdata L. Tendon ruptures in the rheumatoid hand: analysis of treatment and functional results in 60 patients. J Hand Surg 1987;12A:9–14.
2. Egloff D, Verdan C. Spontaneous tendon ruptures at the wrist in rheumatoid arthritis. In: Tendon surgery of the hand. 1st edn. Edinburgh, London, New York: Churchill Livingstone; 1979. p. 154–61.
3. Conolly WB, Kilgore ES. Tendons. In: Kilgore ES, Graham WP, editors. The hand: surgical and non-surgical management. 1st edn. Philadelphia: Lee & Febiger; 1977. p. 162–210.
4. Katz RG. Results of treatment of extensive volar wrist lacerations: the spaghetti wrist. Plast Reconstr Surg 1984;75:720–1.
5. Hudson DA, de Jager LT. The spaghetti wrist: simultaneous laceration of the median and ulnar nerves with flexor tendons at the wrist. J Hand Surg 1993;18B:171–3.
6. Puckett CL, Meyer V. Results of treatment of extensive volar wrist lacerations: the spaghetti wrist. Plast Reconstr Surg 1985;75:720–1.
7. Widgerow AD. Full-house/spaghetti wrist injuries. South African J Surg 1990;28:6–10.
8. Mannerfelt L, Norman O. Attrition ruptures of flexor tendons in rheumatoid arthritis caused by bony spurs in the carpal tunnel. J Bone Joint Surg 1969;51B:270–7.
9. Ertel AN, Millender LH, Nalebuff E, McKay D, Leslie B. Flexor tendon ruptures in patients with rheumatoid arthritis. J Hand Surg 1988;13A:860–6.