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Bilateral Cadaveric Achilles Tendon Graft in Reconstruction after Achilles Tendon Tumor Resection

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ABSTRACT

The standard approach to reconstruction after resection of a diffuse-type tenosynovial giant cell tumor is a local patch with free flaps. However, in cases in which the Achilles tendon involvement is extensive, and the entire tendon must be removed, an autologous flap graft might not be adequate to allow a return to function. We report a case of a 52-year-old female patient who developed bilateral tumors of the Achilles tendon, with a 10-year duration. By the time, she sought medical help, both Achilles tendons required removal. We chose to use Achilles tendon allografts to replace the Achilles tendons. Postoperatively, the patient did well. The allograft shortened the recovery time, and the patient regained full ankle range of motion.

Diffuse-type tenosynovial giant cell tumor (D-TGCT) is defined by the World Health Organization as a destructive proliferation of synovial-like mononuclear cells (1). D-TGCT, also known as an extra-articular form of pigmented villonodular synovitis, is rare, with an incidence of only 1.8 cases/1 million people annually (2). It is more commonly seen in men (3,4) and tends to affect those younger than 40 years (1).

D-TGCTs differ from localized giant cell tumors in that the latter are commonly found in the synovium of a joint, bursa, or tendon sheath, especially in the small joints, with 85% of cases occurring in the fingers and toes (3,4). D-TGCTs, however, are commonly located in the periarticular soft tissues, although on rare occasions, they can be purely intramuscular or subcutaneous (1,4). They commonly occur in the flexor tendon sheath of the hand and wrist and are rarely found in the ankle and foot region. In a review of 50 cases of diffuse-type giant cell tumors by Somerhausen and Fletcher (5), only 3 cases were in the ankle region, and no bilateral cases were reported.

The treatment of D-TGCT is surgical excision with reconstruction using a local patch with a free flap. In the case described in the present report, D-TGCTs had invaded both Achilles tendons, and both were removed to reduce the potential for recurrence. However, this presented a reconstructive challenge, because the tendon replacement must be durable and provide reliable soft tissue coverage. We used an

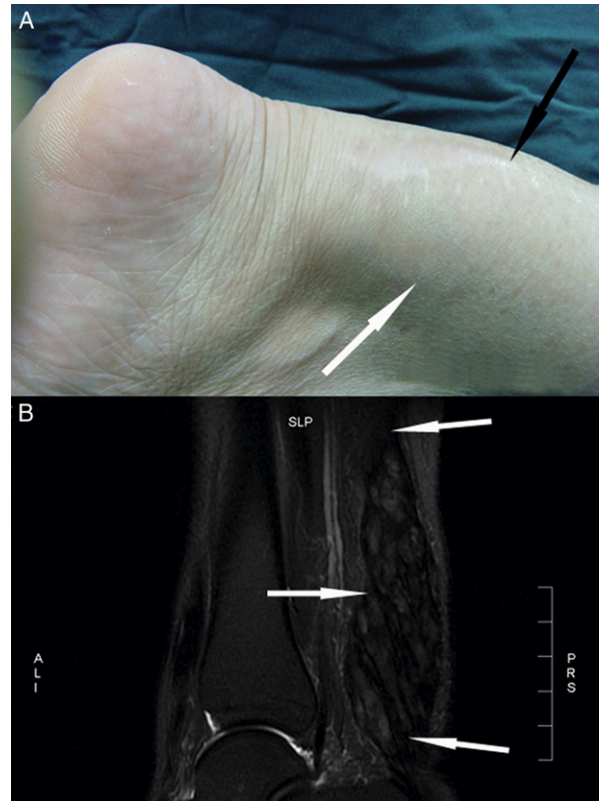

Fig. 1. (*A*) Clinical photograph of ankle showing diffuse swelling. (*B*) MRI scan of right ankle showing nonuniform signals in the area of the Achilles tendon.

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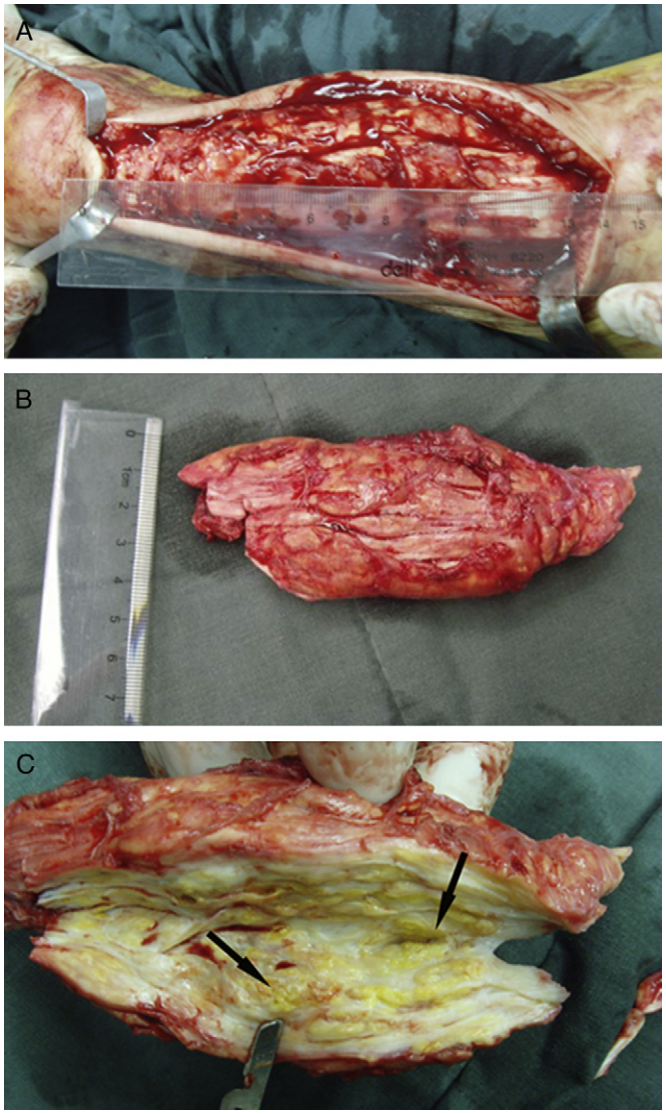

Fig. 2. Intraoperative photographs showing diffuse-type giant cell tumor. (*A*) Right ankle. Tumor in situ measured 14.0 × 5.0 × 3.0 cm. (*B*) Left ankle tumor after removal measured 14.0 × 5.0 × 3.5 cm. (*C*) Spindle-shaped aggregate cells *(arrows)*.

allograft Achilles tendon graft, which we believe to be superior to the traditional autologous flaps, primarily owing to its versatility and the lack of donor site morbidity.

Case Report

A 52-year-old female patient had experienced ankle pain for 10 years because of bilateral Achilles tendon tumors. Increasing pain during the activities of daily living and an increase in the size of the tumors prompted her to seek medical help. Physical examination showed that the area over both the Achilles tendons was diffusely swollen and tender (Fig. 1*A*). The dorsiflexion and plantarflexion of the ankle was 10° and 15°, respectively, bilaterally.

Magnetic resonance imaging (MRI) of both ankles showed bilateral tumors measuring 14.0 × 5.0 × 3.5-cm on the right and 13.0 × 5.0 × 3.0-cm on the left. Short signals on both the T_1-weighted and T_2-weighted images were detected in the area of the Achilles tendon bilaterally, and the signal inside was nonuniform (Fig. 1*B*).

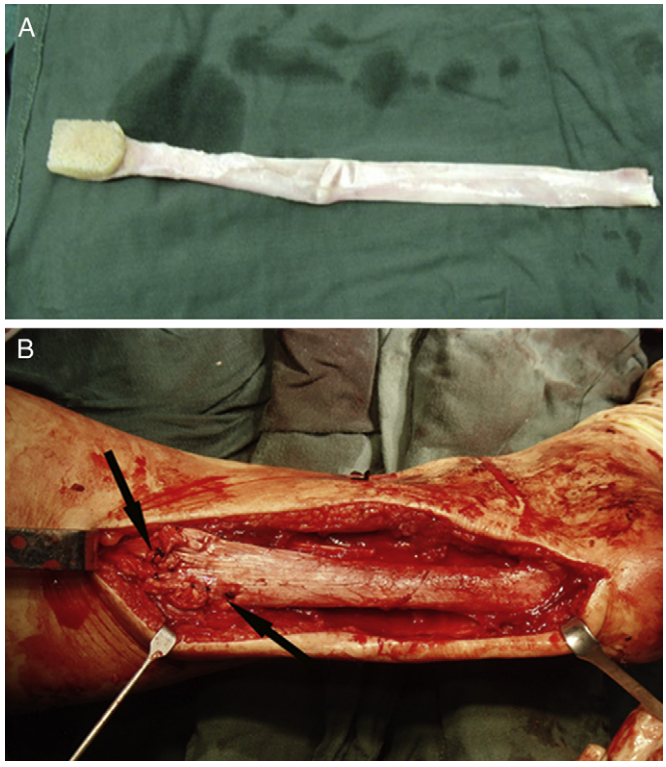

Fig. 3. (*A*) Photograph of Achilles tendon allograft just before use. (*B*) Achilles tendon appearance after transplantation. Note, tendinous segment of the allograft sutured to the patient's triceps tendon with No. 2 nonabsorbable sutures (*black arrow*).

Surgical Procedure

The procedures were performed with the patient under spinal anesthesia. The skin and Achilles tendon envelope were opened along a vertical incision. A yellow tumor commensurate in size to the MRI findings was fully embedded on the right side of the Achilles tendon (Fig. 2). The Achilles tendon, along with the embedded tumor, was removed in total. A new tendon was reconstructed using a frozen Achilles tendon allograft with an attached calcaneal bone block (Fig. 3*A*) secured distally into the calcaneal tuberosity with 1 absorbable screw. The adjacent tendinous segment of the allograft was sutured to the gastrocnemius with No. 2 nonabsorbable sutures (Fig. 3*B*). A protective splint was applied to keep the foot in a neutral position before suturing. After confirmation of moderate Achilles tendon tightness, we cleaned and sutured the wound. The same reconstructive measures were applied to the Achilles tendon on the contralateral side. Postoperatively, the tumor biopsies were sent to the pathology department for analysis. The pathologic results showed that the tumors were D-TGCTs of the Achilles tendon sheath (Fig. 4).

Rehabilitation

A strength test for plantarflexion and dorsiflexion of the ankles was performed with the BIODEX System-3 (Biodex Medical Systems, Shirley, NY) before surgery. The preoperative range of motion testing of the ankle revealed 15° plantarflexion and 10° dorsiflexion, bilaterally.

Rehabilitation started 12 weeks postoperatively. At 6 months postoperatively, active dorsiflexion and plantarflexion of the reconstructed ankles was 0° and 40°, respectively, bilaterally, which did not restrict the patient from performing her daily activities. The patient decided to stop rehabilitation after 6 months.