The Journal of Foot & Ankle Surgery 55 (2016) 397–400

Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

Reverse Transfer of the Proximal Vascularized Fibula to Reconstruct the Lateral Malleolus: A Case Report and Literature Review

You-Shui Gao, MD, PhD [1], Chang-Qing Zhang, MD, PhD [2], Jia-Gen Sheng, MD, PhD [2]

[1] *Orthopedic Surgeon, Department of Orthopedic Surgery, Shanghai Jiao Tong University Affiliated Sixth People's Hospital, Shanghai, China*
[2] *Professor, Department of Orthopedic Surgery, Sixth People's Hospital of Shanghai Jiao Tong University, Shanghai, China*

ARTICLE INFO

Level of Clinical Evidence: 4

Keywords:
distal fibula
fibrous dysplasia
lateral malleolus
vascularized fibula transfer

ABSTRACT

Defects of the lateral malleolus and distal fibula occur occasionally, mainly because of severe trauma or wide resection of fibular neoplasms. These bony defects should be reconstructed to avoid persistent pain and to prevent an abnormal gait induced by ankle instability. Various methods of repair have been developed, including allografting, autologous iliac crest transplantation, scapular apophysis transplantation, and arthrodesis and prosthetic reconstruction. A reverse transfer of the proximal vascularized fibula is also effective. Its morphologic advantage is apparent, and the surgery is simple and direct, with no need for vascular anastomosis. We treated recurrent fibrous dysplasia in the distal fibula of a young male with wide resection and reconstruction using reverse transfer of the proximal, vascularized fibula. At the 6-year follow-up examination, the patient had an American Orthopaedic Foot and Ankle Society ankle-hindfoot score of 100, without any apparent complications. Additionally, we critically reviewed other methods for reconstructing the lateral malleolus and distal fibula and have concluded that reverse transfer of the proximal vascularized fibula compares favorably and could be the treatment of choice.

Bony defects in the lateral malleolus and distal fibula are mainly caused by severe trauma and wide resections of fibular neoplasms (1,2). The lateral malleolus and distal fibula contribute to the stability of the ankle, and ankle instability can cause persistent pain and an abnormal gait and posture. In children, defects of the lateral malleolus and distal fibula can also lead to a valgus abnormality (3).

Various techniques have been used to reconstruct these defects. The lateral malleolus can be reconstructed with allografts, autografts from the iliac crest and scapular apophysis, and vascularized or nonvascularized proximal fibula transfers (4–11). However, the disadvantages of allografts and donor site complications are obvious (12,13). Proximal fibular transfers are preferable, because they have identical contours and sufficient strength. Additionally, in children, the fibular head can be used to restore a damaged epiphysis of the distal fibula (9). Although reconstruction with either vascularized or nonvascularized fibular grafts will provide satisfactory results, vascularized fibula transfers can provide better bone union (14,15). An ipsilateral proximal vascularized fibular transfer is indicated to reconstruct defects in the distal fibula or lateral malleolus to preserve the entrance of the vessels into the fibula, avoiding vascular anastomosis and shortening the operative time.

We report a 15-year-old male with recurrent fibrous dysplasia in the distal fibula, which was treated by wide resection and reconstructed with reverse transfer of the proximal vascularized fibula. The clinical outcome was excellent and without complications. Additionally, given the rarity of the condition and the different methods available for reconstructing the lateral malleolus, we critically reviewed the published data and compared the advantages and disadvantages of the various methods.

Case Report

A 12-year-old male presented with persistent swelling and pain on the lateral malleolus of his left ankle in January 2004. Radiographic examination revealed osteolytic disease in the distal fibula. The cortex of the fibula had thinned; however, the lesion was clearly defined and no periosteal reaction occurred. At that time, the histologic analysis confirmed the diagnosis of fibrous dysplasia. The lesion was treated with curettage and an allograft (Fig. 1). Postoperatively, the swelling and pain were both relieved, and his function was satisfactory.

However, the swelling and moderate pain recurred in May 2007. Radiographic examination of the joint showed an expansive lesion in the distal fibula. Again, the cortex was thin, and the border was well

Financial Disclosure: None reported.
Conflict of Interest: None reported.

Address correspondence to: Jia-Gen Sheng, MD, PhD, Department of Orthopedic Surgery, Shanghai Jiao Tong University Affiliated Sixth People's Hospital, No. 600 Yishan Road, Shanghai 200233, China.
E-mail address: shengjiagen_ssph@126.com (J.-G. Sheng).

1067-2516/$ - see front matter © 2016 by the American College of Foot and Ankle Surgeons. All rights reserved.
http://dx.doi.org/10.1053/j.jfas.2015.02.004

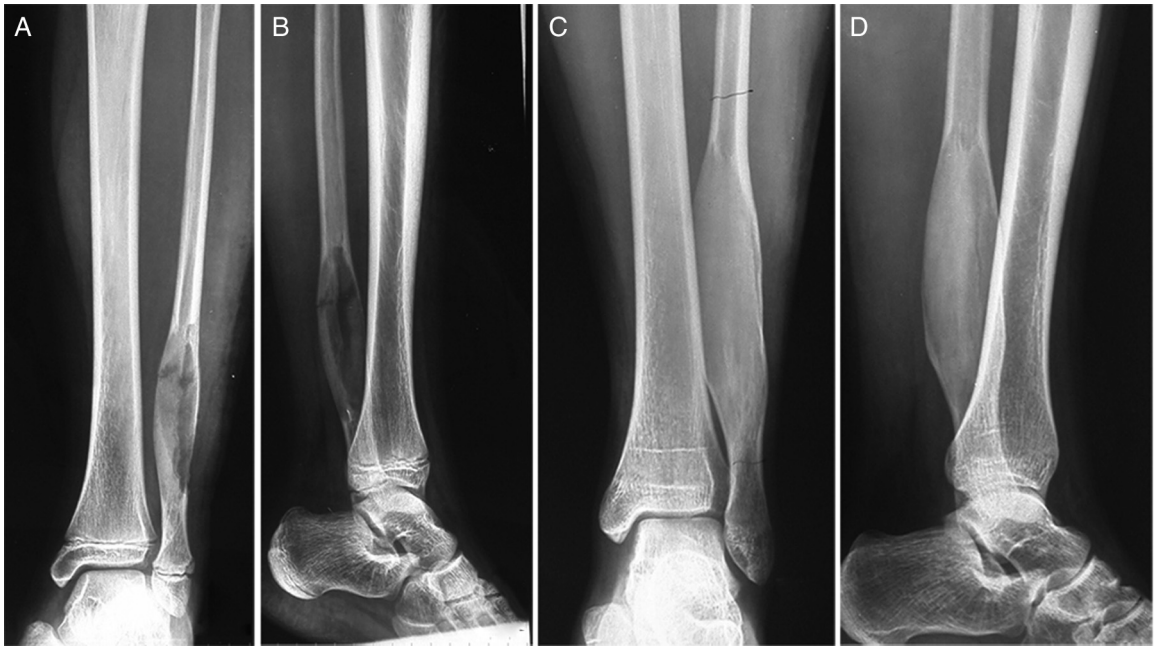

Fig. 1. The left foreleg of our 12-year-old male patient in 2004 with osteolytic disease of the distal fibula. (*A*) Anteroposterior and (*B*) lateral radiographs showed a thin fibular cortex and a clearly defined lesion. The lesion was treated with curettage and an allograft. (*C*) Anteroposterior and (*D*) lateral radiographs of the same foreleg 3 years later showed recurrence of the lesion.

defined. The lesion was considered to be recurrent fibrous dysplasia in situ. The epiphyseal line was closed, and the distal fibular tip was uninvolved. The lesion was just above the tibiofibular syndesmosis (Fig. 1) and required wide resection (Fig. 2) and reconstruction of the lateral malleolus to avoid potential instability and valgus deformity.

Vessels enter the fibula at the middle third; therefore, in the present case, the ipsilateral proximal fibula could be reversed and stabilized with the lateral malleolus after resection. A lateral approach was used to directly expose the lateral facet of the fibula. The lesion was resected with wide margins, and a partial tibiofibular syndesmosis was removed. Intraoperatively, the lateral malleolus was unstable after resection. After meticulous dissection of the vessels, the proximal fibula was removed, reversed, and fixed to the lateral malleolus with cable and wires. The proximal end was screwed to the tibia to improve the stability. Vascular anastomosis was unnecessary. After the transfer, the lateral malleolus was stable during passive motion of the ankle joint. The contour of the ankle was satisfactory (Fig. 2). The peroneal longus and brevis tendon sheath were repaired intraoperatively. The ankle was placed in a cast for 2 weeks, and functional exercise was encouraged thereafter. The histologic findings supported the diagnosis of fibrous dysplasia (Fig. 3).

At 3 months postoperatively, radiographs showed bony union between the reversed fibula and malleolus (Fig. 4). One month later, the swelling and pain had resolved, and he could return to school,

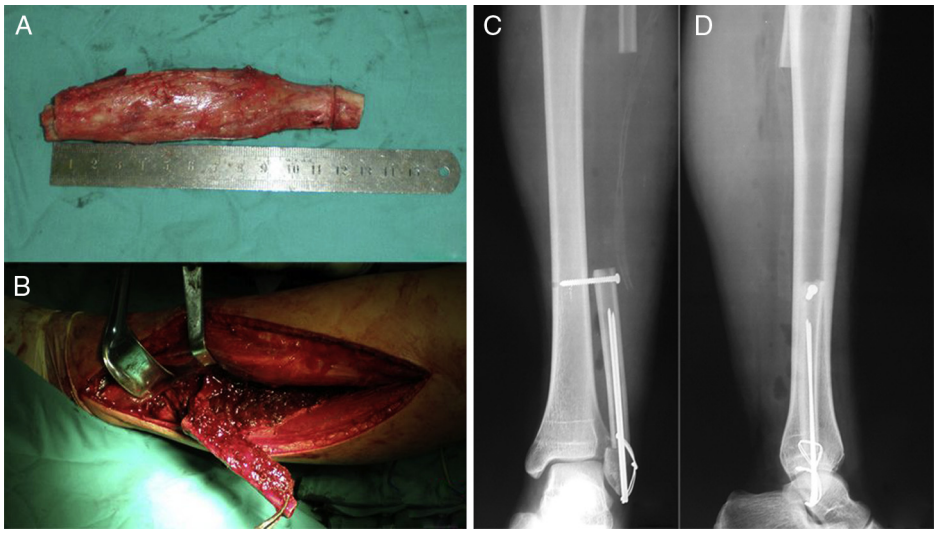

Fig. 2. The patient's second surgery in 2007 consisted of (*A*) resection of the lesion with wide margins and (*B*) creation of reverse transfer of the ipsilateral proximal fibula. The pedicle of the fibular vessels was protected. (*C*) Anteroposterior and (*D*) lateral views of the reversed fibula fixed to the lateral malleolus using cable and wires. The proximal fibular strut was screwed to the tibia to improve functional stability.