

Use of the Free Osteocutaneous Fibula Transfer for Creation of a One-Bone Forearm

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Large skeletal and soft tissue defects about the forearm present one of the most challenging problems for both orthopaedic and plastic surgeons. Reconstruction with free vascularized fibula grafts has been used in these situations with great success. It is our experience that the creation of a one-bone forearm with an osteocutaneous vascularized free fibula graft is an effective treatment option for massive forearm skeletal and soft tissue defects.

Large skeletal and soft tissue defects about the forearm present one of the most challenging problems for both orthopaedic and plastic surgeons. It is difficult to achieve bony union using conventional bone grafts with plates or external fixators for defects of more than 6 cm^{1,2}. Reconstruction with free vascularized fibular grafts has been used in these situations with great success. Examples include infected nonunions, tumor, and trauma³.

The creation of a one-bone forearm as a salvage procedure dates back to 1921 when

Hey-Groves first described it⁴. However, it wasn't until 1974, when Dell and Shepard reported on using vascularized free fibular grafts for creation of a one-bone forearm, that massive bone defects could be corrected with consistency⁵.

Recently, there have been numerous case reports of one-bone forearm reconstruction using vascularized free fibula graft for massive forearm defects^{3,6,7,8}. However, there are no reports in the English literature describing the creation of a one-bone forearm using a free osteocutaneous fibula graft with microvascular transfer.

Description of Procedure / Case Report



A



C



B

Figure 1. (A, B) Infected nonunion of both bones fracture in patient with RA status post removal of hardware and excision of osteomyelitis. (C) Placement of antibiotic beads.

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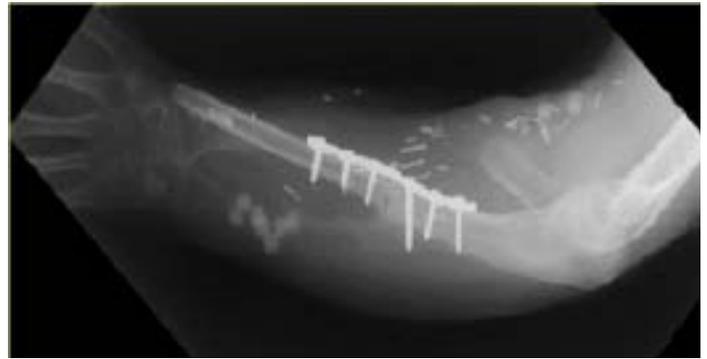


A



B

Figure 2. (A, B) Creation of one-bone forearm using a free osteocutaneous fibula graft with microvascular transfer. Skin paddle for soft-tissue augmentation and monitoring. An external fixator was used to stabilize the distal radius with the distal fibula.



A



B

Figure 3. (A, B) 12 weeks post-op x-rays of healed one-bone forearm. The proximal fibula was plated to the proximal ulna.



A



B



C

Figure 4. (A-C) 16 weeks post op. The forearm is healed with the hand in a position of function.

Discussion

Large segmental defects of both bones of the forearm due to infection, trauma, and tumor produces significant morbidity and complex issues for treating surgeons. The creation of a one-bone forearm with free vascularized fibula graft has been shown in the literature to provide an adequate salvage procedure for these patients³⁻¹².

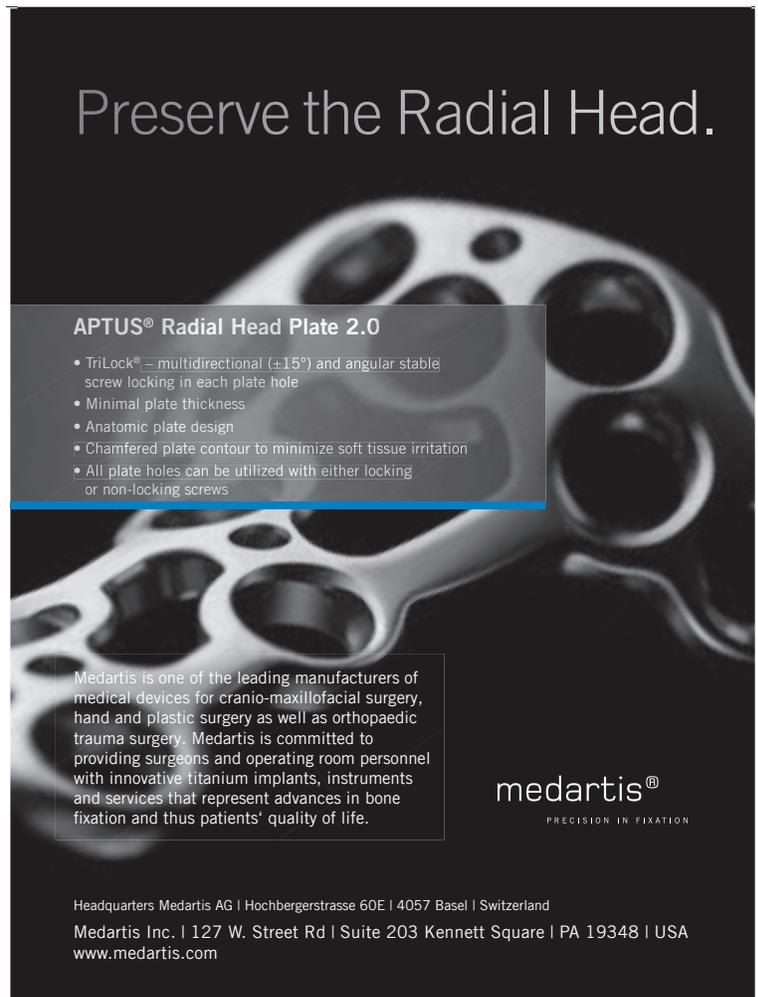
The osteocutaneous free fibula graft offers the surgeon the benefit of and monitoring of the vascularized bone graft. There is no need for skin grafting and thus no donor site morbidity, as the osteocutaneous graft provides necessary coverage for the forearm.

A prerequisite for the creation of a one-bone forearm is a normal hand with radiocarpal and ulnohumeral joints^{9,12}, with the goal of the procedure to preserve hand function after massive bone and soft tissue defects of the forearm. Although, it accomplishes this goal, the one-bone forearm does sacrifice forearm rotation, which is recommended to be fixed in slight pronation¹³.

It is our experience that creation of a one-bone forearm with an osteocutaneous vascularized free fibula graft is an effective treatment option for massive forearm skeletal and soft tissue defects. The senior author has had successful results using this treatment for infections, nonunions, trauma, and tumors. The addition of the cutaneous portion of the transfer provides needed skin coverage in lieu of skin graft.

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