

Microsurgical Vascularized Fibular Grafts for Avascular Necrosis of the Hip

► Penn orthopaedic surgeons are performing free vascularized fibular grafts (FVFG) to treat patients with avascular necrosis of the hip. An elective microsurgical procedure, free vascularized fibular grafting is an option for hip joint preservation.

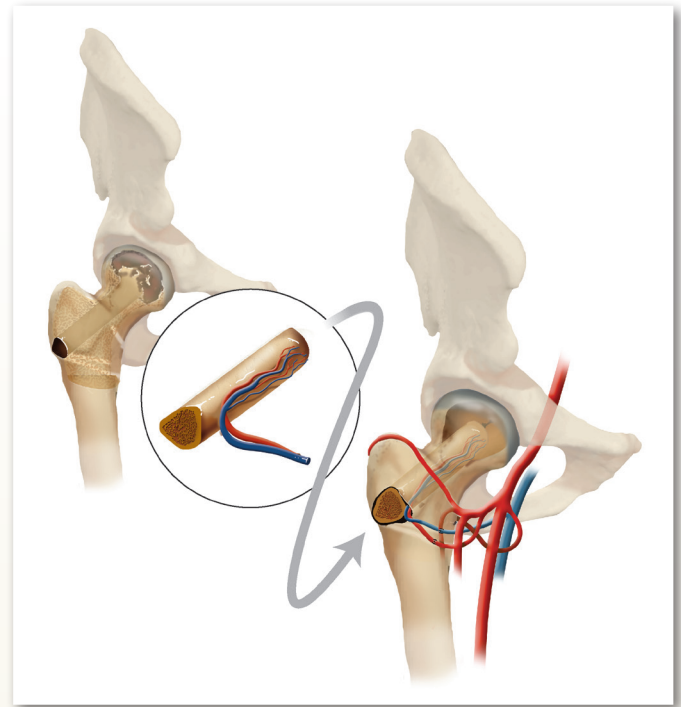
Avascular necrosis (AVN) involves progressive necrosis of the hip provoked by vascular compromise of circulation to bone. The resulting bone death contributes to femoral head collapse and secondary osteoarthritis and is believed to be irreversible. The majority of patients with avascular necrosis are young, with an average age of 38.

Conditions and events known to contribute to AVN in bone include sickle cell disease, rheumatoid arthritis and other disease states, as well as trauma, alcohol abuse and prolonged corticosteroid use. Treatment options for mild-to-moderate AVN include core decompression and bone grafting.

For patients with late stage AVN, the standard treatment is total hip arthroplasty. However, at Penn Orthopaedics, microsurgical free vascularized fibular grafting (FVFG) is available as an alternative to total hip replacement for patients suffering from osteonecrosis who are younger than 50 years of age.

FVFG is a microsurgical procedure that replaces dead bone with viable, structurally sound, vascularized bone grafted from a patient's own fibula. The procedure has several advantages by comparison to total hip surgeries. FVFG introduces healthy bone at the site of necrosis, eliminating the progression of osteonecrosis, and does not preclude later surgeries, if needed. Moreover, FVFG incorporates a number of innovative intraoperative advances—including microsurgery, bone and tissue grafting and advanced arthroplastic techniques—as well as multidisciplinary care and the concept of long-term benefit for younger patients. [1]

As such, the procedure is representative of both the intrinsic sophistication of the surgery program at Penn Orthopaedics and its departmental mission to provide patient-centered, compassionate care for patients with complex surgical needs.



► **Figure 1:** During free vascularized fibular graft surgery, a section of fibular bone with attached artery and veins is harvested and transferred to the femoral head, which has been cored out to remove necrotic bone. The vessels in the fibula graft are then microscopically anastomosed to donor vessels at the hip.

Case Study

Mr. A, a 26-year-old man with advanced idiopathic bilateral avascular necrosis (AVN) of the hip, presented to Penn Orthopaedics seeking alternatives to bilateral hip replacement surgery. After a consultation with the microsurgical team, Mr. A chose to have free vascularized fibular graft surgery.

In the weeks before surgery, X-rays and MRIs were performed to evaluate the extent of Mr. A's osteonecrosis. At pre-admission, a physical examination and lab tests were performed to ensure his well-being and preparedness for surgery.

Mr. A had FVFG surgery on his right hip first. At the femur, an incision was made over the greater trochanter and the recipient vessels identified and prepared for grafting. A guide pin was placed at the center of the necrotic bone of the femoral head and positioned to permit subchondral bone to remain in the femoral head.

Reference

1. Ligh CA, Nelson JA, Fischer JP, Kovach SJ, Levin LS. The Effectiveness of Free Vascularized Fibular Flaps in Osteonecrosis of the Femoral Head and Neck: A Systematic Review. *J Reconstr Microsurg.* 2017;33:163-172.

(Case study continued from page 1)

The femoral head was reamed to the diameter of the harvested graft under fluoroscopic guidance. Cancellous bone was collected from the region of the greater trochanter and placed into the cavity and impacted to fill any subchondral voids in the femoral head. Following placement of the graft in the femoral cavity, the donor and recipient vessels were microsurgically anastomosed. Blood flow was then restored to the fibula and the surgical site was closed.

On the day after surgery, Mr. A began physical therapy to guide him in crutch-walking and muscle-strengthening exercises. At this time he also received counseling on which activities to avoid or limit during recovery. Three days after his surgery, he was discharged to home.

Within a month of surgery, Mr. A was on crutches and reporting only mild levels of discomfort. He began weight-bearing at six weeks post-surgery and is expected to make a full recovery by six months. A second FVFG procedure for his other hip is scheduled to take place shortly thereafter.

Access

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Faculty Team

The country's first department of orthopaedic surgery and a national leader in National Institutes of Health (NIH) funding, Penn Orthopaedics offers advanced, personally-tailored care and the latest treatment options for a variety of injuries and disorders within ten orthopaedic subspecialties. In addition to orthopaedic procedures, the collective skills of Penn's orthopaedic specialists include microsurgery, nerve and tendon transfer and reconstructive transplantation.

Performing Microsurgical Free Vascularized Fibular Graft Surgery at Penn Medicine

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