Femoropopliteal prosthetic bypass graft infection due to Mycobacterium abscessus localized by FDG-PET/CT scan

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A patient with postvascular graft placement presented with bacteremia but no localizing symptoms. Our standard infected graft workup of computed tomography (CT) scan, ultrasound scan, magnetic resonance imaging (MRI) scan, and additional laboratory tests did not localize the infection source. Nuclear medicine had three options including white blood cell (WBC) scan, gallium scan, and the fluorine-18-fluorodeoxyglucose positron emission tomography (FDG-PET)/CT scan. FDG-PET/CT imaging alone demonstrated the location. We present an unusual case of Mycobacterium abscessus in a vascular graft not localized with CT scan, ultrasound scan, or MRI scan and could only be localized with FDG-PET/CT scan. (J Vasc Surg 2009;50:907-9.)

The reported incidence of vascular bypass graft infection varies from 1% to 6%. Most cases involve gram-positive cocci-like Staphylococcus epidermidis and aureus.1-8 It is easy to recognize a graft infection when localizing symptoms (ie, warmth, swelling, pain, or drainage) are present. However, the diagnosis can be challenging with only nonspecific signs and symptoms (ie, elevated white blood cell [WBC] count, C-reactive protein or erythrocyte sedimentation rate, or bacteremia). Computed tomography (CT) scans have long been considered the best confirmatory test of graft infection.6 We report a case of a femoral-to-popliteal polytetrafluoroethylene (Gore-Tex; W. L. Gore & Associates, Inc, Elkton, Md) bypass graft infection by Mycobacterium abscessus localized only by fluorine-18-fluorodeoxyglucose positron emission tomography/computed tomography (FDG-PET/CT).

CASE REPORT

A 75-year-old female with type 2 diabetes mellitus, chronic renal failure, hypertension, and peripheral vascular disease was admitted to the hospital for a nonhealing foot ulcer with suspected underlying osteomyelitis. The vascular evaluation revealed left superficial femoral artery occlusion at its origin with reconstitution of flow in the mid to distal superficial femoral artery. There were no veins available for lower extremity bypass.

Ultimately, the patient underwent a left femoral-to-popliteal Gore-Tex bypass graft. Postoperatively, the patient required multiple hospital admissions for systemic illness, including bowel ob-

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strect and pneumonia. Approximately 5 months after her vascular bypass procedure, she developed swelling, pain, and patchy erythema of her left leg from the foot to the thigh. Suspicion arose of an infected prosthetic graft, but a Doppler/duplex scan graft study showed a patent vascular graft unchanged from previous studies, as well as normal venous compressibility and augmentation response. The patient continued to have edema in her operative leg with subsequent development of erythema and pain. A repeat sonographic bypass study showed no change from the previous exams. A screening noncontrast and contrast-enhanced magnetic resonance imaging (MRI) scan of the postoperative leg from the thigh to the foot showed widespread soft tissue and muscle edema consistent with nonspecific cellulitis/myositis, but no signs of osteomyelitis or bypass graft infection (Fig 1). In order to rule out myositis and myonecrosis, which the widespread edema suggested, a quadriceps femoris muscle biopsy was done that showed no inflammation.

A nuclear medicine consult suggested three possible studies that might help in identifying a suspected infection: In-111 oxyquinoline (Indium-Oxine; GE Healthcare and Amersham Biosciences, Pittsburgh, Pa) or Tc-99m hexamethylpropyleneamine oxime (HMPAO; GE Healthcare and Amersham Biosciences) labeled white blood cell (WBC), gallium-67 citrate (Mallinckrodt Inc, Maryland Heights, Mo), and fluorine-18-fluorodeoxyglucose positron emission tomography (FDG-PET/CT) scan. The highest resolution and fastest turnaround in our rural community was the FDG-PET/CT scan. When the patient failed to improve, an FDG-PET/CT scan was ordered to re-evaluate the source of her infection, which localized increased abnormal activity overlying 18 cm of the bypass graft with a standardized uptake value (SUV) of 4.9 (Fig 2). Blood cultures eventually grew Mycobacterium abscessus.

The prosthetic graft was resected and reconstruction was performed utilizing an arm vein. The graft was covered with a severe inflammatory reaction, but there was no fluid or purulence. The patient was treated systemically with clarithromycin and minocycline for 9 months with a plan for a total of 12 months. Cultures from the explanted graft grew the same Mycobacterium abscessus as the blood cultures. There were no postoperative complications and she recovered fully.
DISCUSSION

Prosthetic vascular grafts for bypass procedures have been successfully employed for decades. Known complications include infection, material deterioration, erosion or fistulization, anastomotic aneurysm, and occlusion.7 Furthermore, amputation rates up to 70% and cumulative mortality rates ranging from 25% up to 88% are seen after prosthetic vascular graft infection.1,2,8,9 The causative organisms for infection are most commonly reported as Staphylococcus aureus and coagulase-negative staphylococci, although in as many as 25% of cases, the causative organism is never identified.10,11 To the best of our knowledge and literature review, there have been no previous reports of prosthetic vascular graft infections due to Mycobacterium abscessus.

Mycobacterium abscessus is one of the rapidly growing mycobacteria that grow on agar media within 7 days. It is found worldwide and rapidly recovered from soil, plants, animal and bird materials, and both natural and treated water. Mycobacterium abscessus causes disease in both normal and immunocompromised hosts. Although uncommon, there have been case reports of postoperative surgical infections and prosthetic device infections.

The continuous bacteremia over several days suggested an endovascular infection and the prosthetic graft was suspect. The PET/CT imaging scan was helpful in confirming this impression. The patient eventually did well following graft removal and prolonged parenteral and oral antibiotics.

We report the Mycobacterium abscessus infection of an infrainguinal vascular bypass prosthetic graft localized by FDG-PET/CT scan. Historically, CT scans are reported as the principal means of distinguishing graft infection from other infectious diseases.6 Our patient had a Doppler ultrasound scan as well as an MRI scan of her extremity, both of which did not reveal localizing signs of infection or compromise of the bypass graft. A CT scan was not performed because of the patient’s chronic renal failure. Once bacteremia was detected, localization of the source of the patient’s infection was identified only by FDG-PET/CT scan. Mycobacteria elicit a secondary immune response which may explain the lack of fluid around the graft. Several studies suggest FDG-PET/CT scans can assess the location and extent of infection more accurately than conventional imaging modalities, especially when infection symptoms are nonlocalizing.12-19 The most recent literature reports the sensitivity and specificity of PET for arterial prosthetic graft infection at 91% and 95%, respectively.20

FDG-PET/CT scan studies have not been approved for reimbursement by Centers for Medicare & Medicaid Services (CMS) yet. Most people working with PET/CT scans feel it is far superior to other older radionuclide studies. Presently, there are two ways to have the study reimbursed: admit the patient for the infection workup and

Fig 1. Transaxial magnetic resonance short tau inversion recovery image shows extensive inflammatory changes in the subcutaneous tissues but no graft infarction and a patent graft.

Fig 2. The three-dimensional (3D) maximum intensity projection fluorodeoxyglucose-positron emission tomography/computed tomography (FDG-PET/CT) scan images demonstrate the location and extent of the graft infection.
have it performed as an in-patient, or in the Medicare-aged patients have it done under the National Oncologic PET Registry.

CONCLUSION

Vascular prosthetic graft infections are a rare but potentially devastating complication. The diagnosis should be suspected on the history and physical findings with the appropriate confirmatory tests. Atypical infections may not present with the usual signs of graft infection. An FDG-PET/CT scan can be useful in confirming the presence and location of a graft infection, especially when conventional imaging fails to localize the source of infection.

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