

Hidden complications: A case study in peripheral arterial disease

Follow the patient over the years, from her initial diagnosis of PAD through multiple complications and treatments.

By Pamela Anderson, MS, RN, APN-BC, CCRN, and Terri Townsend, MA, RN, CCRN-CMC, CVRN-BC

Jan Smith, age 59, is admitted to the coronary intensive care unit with an acute inferior myocardial infarction (MI). Recently diagnosed with hypertension and hyperlipidemia, she smokes a pack and a half of cigarettes daily. She reports she has always been healthy and can't believe she has had a heart attack. (Note: Name is fictitious.)

On physical exam, the cardiologist finds decreased femoral pulses bilaterally and recommends immediate cardiac catheterization. Fortunately, primary percutaneous coronary intervention (PCI) is readily available at this hospital. PCI is the preferred reperfusion method when it can be provided by skilled cardiologists in a timely manner.

After Jan undergoes catheterization and stent placement in the right coronary artery, the nurse performs hourly neurovascular checks, evaluating her legs for the five Ps—pallor, pulselessness, pain, paralysis, and paresthesia. This is especially important because the femoral artery was accessed for catheterization. The nurse monitors the femoral access site for bleeding and hematomas.

Because of Jan's decreased femoral pulses, the cardiologist orders a peripheral vascular consultation by a nurse practitioner (NP), who obtains a history and performs a physical exam. The NP's findings are similar to the cardiologist's. Jan tells the



NP she has had hip, thigh, and buttock cramps when walking for the past 18 months. She says she has limited her activities because of these symptoms, which she attributes to aging. The NP obtains arterial Doppler and ankle-brachial index measurements and diagnoses peripheral arterial disease (PAD) with claudication.

Jan asks the NP, "What's PAD? Are my

symptoms related to my heart attack?” The NP tells her PAD stands for peripheral arterial disease and that atherosclerosis of her leg arteries is causing her cramping. The nurse informs her that atherosclerosis is a systemic process, and that having the disease in one vascular bed (such as the coronary arteries) raises the risk of disease in another vascular bed, such as the limbs or cerebral arteries.

A systemic disease affecting more than 8 million Americans, PAD is an independent risk factor for cardiovascular death. People with symptomatic PAD have a 30% mortality from cerebrovascular or cardiovascular disease within 5 years and at least a 50% mortality over 10 years. About 50% of symptomatic patients such as Jan have concomitant coronary artery disease.

PAD affects the noncoronary arterial circulation, causing changes in the structure and function of the arteries that perfuse the visceral organs, limbs, and brain. PAD encompasses a diverse group of disorders that cause either aneurysmal dilation or progressive stenosis or occlusion of the aorta and its noncoronary branch arteries (carotid, upper extremity, visceral, and lower extremity arterial beds).

Atherosclerosis, the most common cause of PAD, is linked to such risk factors as smoking, diabetes mellitus, hypertension, hyperlipidemia, family history, and postmenopausal status. Recently, elevated levels of homocysteine and C-reactive protein have been identified as risk factors. (See *Preventing atherosclerotic cardiovascular disease*.)

Signs and symptoms

Signs and symptoms of PAD run the gamut from none to those of critical limb ischemia—ischemic rest pain (pain occurring with leg elevation); dry gangrene of the legs, feet, or toes; nonhealing wounds or ulcers of the feet or legs; and pain or numbness of the feet or legs. Ischemic rest

Preventing atherosclerotic cardiovascular disease

The American College of Cardiology and the American Heart Association recently updated the guideline for hypercholesterolemia treatment in adults to reduce atherosclerotic cardiac and cerebrovascular events. The revised guideline identifies four groups of people likely to benefit from statin therapy, and recommends a statin dosage dependent on a person’s risk of developing subsequent cardiovascular disease. People with known atherosclerotic cardiovascular disease need high-intensity statin therapy to reduce the risk of atherosclerotic events.

The guideline stresses the importance of heart-healthy habits in preventing atherosclerotic cardiovascular disease. Dietary counseling in the physician’s office or with a registered dietitian should be offered to all at-risk patients. The importance of regular physical activity should be stressed. Tobacco use should be evaluated at all office visits and subsequent hospitalizations. All health team members need to discuss smoking cessation with the patient at every office visit.

pain commonly occurs at night and causes severe pain that awakens the person.

The most common PAD symptom is intermittent claudication—pain, muscle aches, or fatigue arising with activity and subsiding with rest. Claudication can be reproduced by walking at defined distances.

Symptomatic PAD reduces quality of life. As the disease progresses, the patient may experience limb pain at rest, ischemic ulcers, and gangrene.

Complications

PAD is a major contributor to certain acute and chronic diseases. Acute conditions linked to PAD include a sudden episode of acute limb ischemia caused by in situ thrombosis, brought on by atherosclerosis. Chronic conditions include coronary artery disease or carotid disease.

PAD itself is a chronic illness that commonly progresses over time if risk factors aren’t controlled. It increases cardiovascular and all-cause mortality, reduces quality

of life and functional ability, and may necessitate amputation. Because PAD is systemic, atherosclerosis commonly develops in the coronary and cerebral arteries, increasing the risk of a myocardial or cerebrovascular event leading to death.

Mesenteric ischemia is another vascular complication. Atherosclerotic plaque can build up in the superior or inferior mesenteric artery and celiac artery, decreasing blood flow to the intestines. Signs and

mortality risk. The American College of Cardiology/American Heart Association guideline recommends asking patients about their tobacco use at every physician visit and offering behavioral and pharmacologic treatments to stop smoking.

Hypertension control is important, especially in patients with diabetes or preexisting renal disease. Angiotensin-converting enzyme inhibitors or beta blockers commonly are used, with diuretics added when necessary. Controlling the blood glucose level with a glycosylated hemoglobin (HbA1c) value below 7% reduces microvascular complications commonly linked to diabetes. For patients with clinical atherosclerotic cardiovascular disease (ASCVD), aggressive lipid management with high intensity statin therapy is recommended to reduce low-density lipoprotein levels by greater than or equal to 50%. Research shows statin therapy can reduce both fatal and nonfatal ASCVD events.

Pharmacologic management includes antiplatelet therapy using aspirin. If needed, clopidogrel can be used instead of aspirin or added to the regimen. For patients with intermittent claudication, cilostazol has been widely used to increase walking distance and improve symptoms; it also reduces triglyceride levels and increases levels of high-density lipoproteins (the “good” cholesterol). Pentoxifylline is a second-line drug used to improve walking distance in patients with claudication. However, trials comparing pentoxifylline to placebo found no significant improvement in walking distance or pain-free walking in patients taking this drug.

Jan’s nurse tailors her education and treatment plan to reduce her cardiovascular risk factors. The cardiologist recommends a heart-healthy diet, dual antiplatelet therapy with aspirin and clopidogrel, lisinopril continuation for adequate hypertension control, atorvastatin for lipid management, and total smoking cessation.

PAD can affect a patient’s ability to continue living independently at home.

symptoms include abdominal pain after eating (usually in the epigastric or periumbilical region), nausea, vomiting, and diarrhea. Patients may develop “food fear” and eventually become malnourished.

Independent functioning at home and in the community hinges on the patient’s ability to ambulate without assistance. Ultimately, PAD can affect a patient’s ability to continue living independently at home.

Management

Primary goals of PAD management are to reduce the risk of cardiovascular complications and relieve claudication. Non-pharmacologic interventions such as exercise help reduce pain and increase the ability to walk longer distances without symptoms. Other lifestyle modifications, such as a heart-healthy diet and smoking cessation, can reduce the incidence of cardiovascular complications (MI, stroke, and renal disease) and reduce long-term

A week after Jan's discharge, she sees the peripheral vascular specialist, who reviews with her the signs, symptoms, and risk factors for PAD. The specialist tells her she must stop smoking completely and adhere to a low-fat diet, and prescribes cilostazol to help relieve intermittent claudication symptoms.

Jan eventually begins to feel better and is able to participate in the outpatient cardiac exercise program. However, she continues to smoke, and 1 year after her MI, requires an aortobifemoral bypass to treat lifestyle-limiting claudication.

Other treatments

Endovascular treatments (minimally invasive nonsurgical therapies such as percutaneous transluminal angioplasty [PTA]) are recommended when lifestyle changes and medications don't relieve symptoms, especially when isolated areas of stenosis occur in the femoral, femoropopliteal, and iliac arteries. If a residual stenosis is present after PTA, a bare metal stent or balloon-expandable stent may be used.

Surgery is reserved for patients whose claudication symptoms significantly limit their daily activities or put them at risk for limb loss. Aortobifemoral, iliofemoral, axillofemoral-femoral, or femoropopliteal artery bypass can restore function to patients who previously would have required amputation. Bypass grafts may involve autogenous vein or synthetic grafts.

After Jan's aortobifemoral bypass, she returns to the vascular surgeon for her 1-month postoperative checkup. But after this, she is lost to follow-up for 3 years until she schedules an appointment with her primary care physician complaining of abdominal pain and weight loss. She states that the pain occurs 15 to 30 minutes after eating, and says she is worried she might have an ulcer. She admits she hasn't stopped smoking, although she did cut down to three-quarters of a pack per day.

She also reports she didn't refill her cilostazol and clopidogrel prescriptions because they were expensive and she had unexpected bills to pay. In addition, she says her claudication symptoms have returned.

The physician orders a right upper quadrant ultrasound. When the results come back negative, he refers Jan to a gastroenterologist for an upper endoscopy, which is negative as well.

Finally, Jan follows up with the vascular

PAD has a 50% mortality over 10 years.

surgeon for her claudication symptoms. She tells him she has lost significant weight and is having abdominal pain. She states, "My abdominal pain has gotten so bad that I'm afraid to eat." ("Food fear" is a common complaint in patients with chronic mesenteric ischemia.)

Jan undergoes a mesenteric duplex ultrasound exam, which reveals chronic occlusion of the superior mesenteric artery and critical stenosis of the celiac artery. She is scheduled for an abdominal aortogram with run-off (an arteriogram of the lower abdominal aorta and leg arteries). This test confirms chronic occlusion of the superior mesenteric artery and critical stenosis of the proximal celiac artery, with no visualization of the inferior mesenteric artery.

The surgeon determines Jan needs an aorta-to-celiac artery bypass. Because she also has occlusions of the bilateral superficial femoral arteries, she will need bilateral femoral-to-popliteal bypasses as well. Jan's chronic mesenteric ischemia is deemed urgent, so she is referred to a cardiologist for cardiovascular clearance. She undergoes a supraceliac-to-celiac artery bypass (performed above the celiac artery

at the aorta to the celiac artery) with polytetrafluoroethylene (a synthetic material used for bypass grafts).

Chronic mesenteric ischemia (also called intestinal angina) most often stems from atherosclerosis. Signs and symptoms are nonspecific, which can result in delayed diagnosis, as with Jan. Approximately 70% of patients are female. After eating a meal, perfusion to the splanchnic circulation normally increases—but not in a patient with mesenteric ischemia. As a result, abdominal pain occurs, usually in the periumbilical or epigastric region. Treatments for chronic mesenteric ischemia include stent placement, surgical revascularization, or both.

Fortunately for Jan, her last surgical intervention relieves her symptoms. She finally decides to stop smoking and continue taking prescribed medications. She is able to resume her favorite activities and maintains a healthy weight. Over the next year, she makes slow, steady progress. Her appetite increases gradually over several months and she begins walking regularly with her husband. Her claudication symptoms remain stable and don't limit her lifestyle.

Jan is aware that she needs to have regular follow-up visits with the vascular surgeon to evaluate her mesenteric circulation and lower-extremity perfusion. At these visits, an ultrasound exam and physical examination of her feet, in conjunction with clinical questions, can help determine whether her PAD has remained stable or advanced.

Understanding the mechanism of PAD and its effect on systemic circulation can lead to more-timely diagnosis and effective treatment. As Jan's case illustrates, stopping smoking and adhering to prescribed dietary and medication regimens can go a long way toward relieving symptoms and increasing quality of life. ■

Selected references

Ali FN, Carman TL. Medical management for chronic atherosclerotic peripheral arterial disease. *Drugs*. 2012;72(16):2073-85.

Anderson JA, Halperin JL, Albert N, et al. Management of patients with peripheral artery disease (compilation of 2005 and 2011 ACCF/AHA guideline recommendations): a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2013;61(14):555-70.

Andrews L. Antiplatelet and anticoagulant drugs for prevention of restenosis/reocclusion after peripheral endovascular treatment. *Clin Nurse Spec*. 2013;27(3):21-2.

Jaffery Z, Greenbaum AB, Siddiqui MF, et al. Predictors of mortality in patients with lower extremity peripheral arterial disease: 5-year follow-up. *J Interv Cardiol*. 2009;22(6):564-70.

McDermott MM, Liu K, Ferruci L, et al. Decline in functional performance predicts later increased mobility loss and mortality in peripheral arterial disease. *J Am Coll Cardiol*. 2011;57(8):962-70. doi: 10.1016/j.jacc.2010.09.053.

Rizzo M, Corrado E, Patti AM, Rini GB, Mikhailidis DP. Cilostazol and atherogenic dyslipidemia: a clinically relevant effect? *Expert Opin Pharmacother*. 2011;12(4):647-55.

Rooke TW, Hirsch AT, Misra S, et al; Society for Cardiovascular Angiography and Interventions; Society of Interventional Radiology; Society for Vascular Medicine; Society for Vascular Surgery. 2011 ACCF/AHA Focused Update of the Guideline for the Management of Patients with Peripheral Artery Disease (updating the 2005 guideline): a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2011;58(19):2020-45.

Stone NJ, Robinson J, Lichtenstein AH, et al. 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2013 Nov 7. pii: S0735-1097(13)06028-2.

Treat-Jacobson D, Henly SJ, Bronas UG, Leon AS, Henly GA. The pain trajectory during treadmill testing in peripheral artery disease. *Nurs Res*. 2011;60(3 Suppl):S38-49.

Pamela Anderson is an adult nurse practitioner at St. Vincent Medical Group Vascular Surgery in Indianapolis, Indiana, and an instructor for Ball State University School of Nursing in Muncie, Indiana. Terri Townsend is a medical-surgical nursing staff educator at Community Hospital in Anderson, Indiana.