Peripheral Vascular Disease: A Tale of Ulcers and Cans of Tomatoes

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Case

This is a case of peripheral vascular disease, but it is not a story about a toe. Rather, it is a story about a can of tomatoes. A can that is perched precariously on the counter in the home of a 92-year old woman, Mrs. S. Six months ago, that can fell onto the first toe of her left foot. Five months ago, Mrs. S began to experience increasing discomfort in that toe and began a home treatment regimen of Polysporin (bacitracin and polymyxin) and Bactroban.

Mrs. S is accustomed to managing her own health concerns, as she is currently on medication for hypothyroidism (Synthroid), hypertension (Adalat and Inhibace) and atrial fibrillation (Coumadin). She has peripheral vascular disease that was treated with bilateral surgical revascularization twenty years ago yet she has absent popliteal and pedal pulses. Her medical history was notable for migraines, angina, varicosities, macular degeneration, and profound hearing loss in the left ear.

When it became clear that her home treatments were making slow progress, Mrs. S presented to her internist’s office. The can of tomatoes had done considerable damage—the sole of the left great hallux was marked by a 1.5 cm ulceration that extended to the bone. There was no necrosis or obvious signs of infection except a slight yellow drainage. Mrs. S needed to wear her shoes at all times in order to maintain her balance—meaning the wound was under constant pressure.

The internist informed Mrs. S that in order to prevent amputation of the toe and possibly the foot, she would need to be admitted to hospital, a treatment plan that was less than appealing to Mrs. S. She had a home and a dog to care for and was reluctant to relinquish her independence, yet she eventually consented to enter the hospital. The wound was diagnosed as an ischaemic ulcer secondary to peripheral vascular disease and a plastic surgery consult was ordered. The x-ray revealed no fractures or dislocations but significant vascular calcification between the first and second metatarsals. She was treated with a silver sulfadiazine dressing (Flamazine), Amoxicillin and Clavulin orally. Mrs. S spent 27 days in hospital and was discharged with forefoot offloading shoes.

Peripheral Vascular Disease: Manifestations

Peripheral vascular disease is an occlusive disorder caused by atherosclerosis. More than 50% of patients are asymptomatic whereas others present with claudication, ischaemic ulcers, or gangrene when blood supply is unable to meet metabolic demand (Figure 1).1,2 PVD is more common in the
elderly, with a 5.6% prevalence in the 38-59 age range versus 26% in those 81 and older.\textsuperscript{1} A study in Wound Repair and Regeneration found that 26.2% of patients admitted from nursing homes had pressure ulcers compared to only 4.8% from other living situations.\textsuperscript{3} Ulcers are especially prevalent among patients with diabetes mellitus, with up to 25% of diabetics developing an ulcer.\textsuperscript{4} Risk factors for PVD include smoking, hypothyroidism, diabetes, hypertension, dyslipidemia, elevated plasma homocysteine.\textsuperscript{1} Besides endangering the viability of peripheral tissue, PVD can also increase the risk of adverse cardiovascular events such as MI or stroke.\textsuperscript{1}

PVD most often manifests as leg ulcers, which can be classified as arterial, venous, or neuropathic:\textsuperscript{5}

![Figure 1](image_url)

Figure 1. Comparison of the manifestations of leg ulcers in terms of location, colour of wound, presence of pain/pulse/sensation, and subclassification.\textsuperscript{1,2}
PVD: Diagnosis

The single most useful tool in assessing the manifestations of PVD, according to the Ontario Venous Leg Ulcer Community Care Protocol, is the ankle-brachial pressure index (ABPI), a ratio of the blood pressure in the arm relative to the leg.\textsuperscript{6} Normal ABPI is 0.9 to 1.2, venous ulcers have an ABPI greater than 0.8, mixed ulcers between 0.5 and 0.8 and arterial ulcers less than 0.5.\textsuperscript{6,1} This distinction determines management as arterial ulcers often require referral to a vascular specialist while venous ulcers may be treated with compression bandages and topical antibiotics.\textsuperscript{6} Also helpful in the diagnosis of PVD are segmental Doppler pressures, volume plethysmography, duplex imaging, magnetic resonance angiography, and contrast angiography.\textsuperscript{5}

As in the case of Mrs. S, the manifestations are easy to diagnose once they are observed but the challenge is often the identification step. Despite frequent access to quality care, ulcers may go unnoticed for a myriad of reasons- they are overshadowed by more pressing health concerns or they are unnoticed even by the patient (such as in cases of diabetic neuropathy). In a study of patients receiving home health care, 7-12\% had pressure ulcers.\textsuperscript{7} This study recommended an educational program for home healthcare workers in order to promote early recognition of ulcers.

PVD: Treatment

To promote healing, the ulcerated area must be offloaded. This can be achieved through footwear modification or activity restriction.\textsuperscript{8} The challenge is to remove pressure from the wound without compromising balance. Options for footwear modification include insoles (Sorbothane or polyurethane), plantar moulding, forefoot offloading shoes, and rocker bottom shoes. However these modifications have been shown to reduce activity level by up to 90\%.\textsuperscript{8}

Treatment of leg ulcers often involves topical or oral antibiotics with more severe cases requiring amputation. Treatment of PVD focuses on control of risk factors- smoking cessation, diabetic control, statins for dyslipidemia, antiplatelet therapy, ACE inhibitors, and exercise.\textsuperscript{1}

Discussion

The diagnosis and treatment in this case was fairly straight forward- a known history of peripheral vascular disease, a clear mechanism of injury, recognition of the need to remove sources of pressure to promote healing and the use of antibiotics to prevent infection. The unique features of the case pertain to the can of tomatoes.

Two immediate questions are why the injury occurred in the first place and why it went untreated for six months. The answer to the first question may be attributed to advances in internal medicine. According to Dr. Hazel, a plastic surgeon in Lethbridge, Alberta, “internal medicine has
become too good—people no longer die of their organ problems; now we have to be aware of peripheral issues.” In the USA, 60,000 patients die of peripheral ulcer complications annually. Mrs. S had a past history riddled with internal complaints but all were well controlled with medication, thus allowing her to remain in her own home at the age of 92. So while the internists may congratulate themselves on the arsenal of effective medications at their disposal, they must be aware of the new Frankenstein their success has created. Increasing attention must be paid to issues outside of the head and thorax. The Ontario Leg Ulcer Community Care Protocol suggests that monitoring is the single best intervention in regards to peripheral ulcers. Simple tests such as the ankle-brachial index are quick and easy to complete at each visit and when combined with a physical exam that extends to each digit may lead to earlier diagnosis of arterial ulcers. Care of PVD and subsequent ulcers requires a multidisciplinary approach.

The response to the second question is twofold- the ulcer was not noted because Mrs. S’s caretakers and physicians did not see it and because she chose not to display it. Why did she choose to conceal a bone-depth ulceration? It is likely because she knew that in hospital tomatoes came not in cans, but only in the plastic compartment of her meal tray. The can represented her independence, her ability to care for herself. This is in contrast to what Morgan and Moffatt described as the “social ulcer”- a wound that the patient hopes will not heal in order to maintain contact with the medical profession and thus the outside world. The complication in this case was not the diagnosis or treatment of the ulcer, but the struggle of an elderly woman to choose between staying in a place where tomatoes came in cans and entering a place that would promote the viability of her toe. A study in International Wound Care identified practitioner focus on the wound rather than the whole person as one of the greatest barriers to ulcer care.

Struggles such as this take time to contemplate- time that most internists do not have. Enter the medical student. We often worry that we don’t have the knowledge or experience to effectively treat patients. But we are also lacking something else that serves in our favour- pagers. A medical student is at liberty to spend an hour with patients like Mrs. S, working out details such as who would care for her dog. So the next time you feel under qualified or obtrusive as a medical student, remember that both the physician and the patient will be grateful for your pager-less ability to acknowledge the importance of the can of tomatoes, not just the ulcer.

References


Inspiration
Location: Lethbridge Regional Hospital in Lethbridge, AB
Program: One-month Internal Medicine Observership through the Alberta Rural Physician Action Plan