

CLINICAL CASE

MANAGEMENT OF NECROTIC LESIONS IN CHRONIC LIMB ISCHEMIA

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Abstract

Peripheral vascular disease commonly affects the arteries supplying the leg and is mostly caused by atherosclerosis. Restriction of blood flow due to arterial stenosis or occlusion often leads patients to complain of muscle pain on walking (intermittent claudication). Any further reduction in blood flow causes ischemic pain at rest, affecting by consequence the extremity. Ulceration and gangrene may then supervene and can result in loss of the limb if not treated. We present the case of a 55 year old male, C.I., with tissue necrosis of the right calf, aching pain at rest in the distal foot and disabling claudication (stage IV Fontaine PAOD). The patient's history reveals that he is a former smoker undergoing anticoagulation and vasodilation treatment. He also suffered severe spinal cord injury leading to paraplegia in 2008, a laryngeal neoplasm surgery in 2013 and a PTA with stent placement in the proximal right CIA.

Keywords: *claudication, ulceration, gangrene, split-thickness skin graft, femoropopliteal bypass***Introduction**

Peripheral vascular disease commonly affects the arteries supplying the leg and is mostly caused by atherosclerosis. Restriction of blood flow due to arterial stenosis or occlusion often leads patients to complain of muscle pain on walking (intermittent claudication) [1].

A history of muscular, cramp like pain on walking that is rapidly relieved by resting, together with absent pulses, strongly supports the diagnosis of intermittent claudication. Disease of the superficial femoral artery in the thigh results in absent popliteal and foot pulses and often causes calf claudication. Disease of the aorta or iliac artery results in a weak or absent femoral pulse, often associated with a

femoral bruit. Disease at this level may cause calf, thigh, or buttock claudication [1].

The dorsalis pedis artery lies superficially on the dorsum of the foot, although its position varies considerably. The posterior tibial artery lies deeper behind the medial malleolus. Many healthy people have only one foot pulse. The popliteal pulse can be difficult to palpate in muscular patients. A prominent popliteal pulse suggests the possibility of a popliteal aneurysm[1].

Case presentation

C.I, a 55- year-old male with a history of severe spinal cord injury and paraplegia (2008), laryngeal neoplasm (treated by surgery in

November 2013), stage IV Leriche-Fontaine PAOD with right chronic limb ischemia and a PTCA with stent placement in the proximal right CIA, was admitted with tissue necrosis of the right lower leg, aching pain at rest in the distal foot and disabling claudication (Figure 1). The patient is a former smoker (quit smoking 2 years before current presentation) and has a chronic therapy with anticoagulation and vasodilators drugs.

Physical examination reveals an underweight (BMI=17 kg/ sq. m), afebrile patient with a low general status. The following are worth mentioning: an incomplete occluded tracheostomy, residual posttraumatic crural deficit, slightly pale teguments and mucosae, extensive wet gangrene on right calf, cold and mottled skin, femoral pulses in both limbs and absence of pulses in the distal right limb.



Figure 1 - Aspect of the patient's right lower limb on admission

Lab results show the following:

- Leukocytes: 13,800/mmc (N: 4,000 – 10,000/mm³)
- Neutrophils: 80.5% (N: 43 – 65%)
- Hemoglobin: 10 g/dl (N: 12 – 16 g/dl)
- Platelets : 495,000/mmc (N: 150,000 – 450,000/mm³)
- Albumin: 2.6 g/dl (N: 150,000 – 450,000/mm³)
- Urea: 13.29 mg/dl (N: 16 – 46 mg/dl)
- Creatinine: 0.55 mg/dl (N: 0.7 – 1.2 mg/dl)
- rare leukocytes in the urinary sediment

On the first day of the patient's stay in the hospital tissue culture is taken and an empiric intravenous treatment with Ceftriaxone and Ciprofloxacin is started. Two days later

surgical debridement is carried out and the necrotic material is cleared, thus resulting into a post-excisional defect measuring 14 x 12 cm. A week after being admitted to the hospital the result of the tissue culture revealed multidrug-sensitive Staphylococcus Aureus and Serratia Marcescens; by consequence Cephalosporine is replaced with Aminoglycoside – Gentamicin.

After surgical debridement, the evolution of the patient is favorable, yet the ischemic rest pain continues. A skin graft and a femoropopliteal surgical bypass in the right proximal thigh with the great reversed saphenous vein are performed during the same intervention (Figure 2). The split-thickness skin graft is taken from the left thigh and spread on the bare area to be covered.



Figure 2 - Skin graft application

Due to the fact that the patient suffered a major surgery for laryngeal neoplasm, during the procedure the anesthesiologist used a method of ventilation with cycling variations between two continuous positive airway pressure levels called BIPAP.

Results

The patient is discharged with a changed health status being afebrile, hemodynamically stable and showing signs of wound healing by secondary intention (Figure 3). In addition, he was given the following recommendations and medical treatment: antiplatelet and vasodilation therapy – Plavix (1cp/day) and Pentoxifylline (2cp/day); stitches are to be removed 14 days postoperatively, trauma should be avoided around the operated area and periodic consultation and medical observation are required every 3 months.



Figure 3 - Seventh postoperative day

The skin graft had successfully adhered to the wound bed. An improvement of his mobility was noticed 3 months after the procedure.



Figure 4 - Three months after the surgical procedure

Discussions

Many causes of leg pain can occur in the presence of asymptomatic peripheral vascular disease. A good history together with an ankle brachial systolic pressure index of less than 0.9 confirms the diagnosis. Exercise testing provides an objective measurement of walking distance and highlights other exercise limiting conditions, such as arthritis and breathlessness. Only those with a good history of claudication and normal resting ankle brachial systolic pressure indices require an exercise test. Duplex ultrasound scanning is useful for delineating the anatomic site of disease in the lower limb. Many hospitals still use arteriography for this purpose or when the

results of duplex scanning are equivocal. This invasive and expensive investigation should not be requested unless there is a plan to proceed with revascularization, if possible [2].

Intermittent claudication seems a relatively benign condition, although severe claudication may preclude patients from manual work. The risk of generalized vascular disease is probably more important. Patients with claudication have three times higher risk of death compared with age matched controls. Modifying risk factors is therefore vital to reduce death from myocardial infarction and stroke. All patients should be advised to stop smoking and participate in regular exercise. They should also be screened for hyperlipidemia and diabetes. Patients with peripheral vascular disease benefit from regular podiatric care, and those with diabetes should be seen in a foot clinic. Obesity reduces exercise capacity, and losing weight will improve the walking distance.

The role of surgical bypass grafting for longer arterial occlusions remains poorly defined because of a lack of proper trials comparing it with percutaneous transluminal angioplasty and conservative treatment. Polyester (Dacron) aortobifemoral bypass grafts have 5-year patency rates of over 90% but are associated with a mortality of up to 5%. Complications include graft infection and postoperative impotence. Femoropopliteal bypass grafting, using autologous reversed great saphenous vein, polyester, or polytetrafluoroethylene (Gore-Tex) yields patency rates of less than 70% at 5 years. The early patency of prosthetic grafts seems similar to that of vein grafts, although the long-term results seem less good. However, femoropopliteal bypass grafts should rarely be used for patients with claudication [3].

Resolving the problem of gangrenes and necrotic lesions requires a procedure creating an injury that is essentially the same as those used clinically to harvest skin for split-thickness skin grafts. The technique of creating partial-thickness excision wounds is extremely effective when performed correctly, but it is very operator dependent [4].

Conclusions

The therapeutic approaches applied in our patient's case include two surgical procedures: the first one includes large excisional debridement of the right calf necrosis area induced by gangrene and the second step is the sequential revascularization along with the application of split-thickness skin grafts on post-excisional defect. By performing these procedures, the team is able to preserve the lower limb that conventionally would have had indication for high amputation.

The management of severe limb ischemia requires close collaboration between the Plastic Surgery Department, the Vascular Surgery Department and the Anesthesiology Department & I.C.U. so that the main goal should be limb preservation, in those cases when medical conditions allow it. We highly encourage this therapeutic method in those cases that allow it: non-obese, non-diabetic patients.

List of abbreviations

BIPAP – Bilevel Positive Airway Pressure;
CIA – Common Iliac Artery;
BMI – Body Mass Index;
PAOD – Peripheral Arterial Occlusive Disease;
PTCA – Percutaneous Transluminal Coronary Angioplasty.

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