CASE STUDY

Gas Gangrene in Patient With Atherosclerosis Obliterans

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ABSTRACT

Clostridia are the main cause of nontraumatic spontaneous gas gangrene. Poor blood flow due to arterial occlusion exacerbates the anaerobic condition. Fulminant gas gangrene in a 54-year-old man with atherosclerosis obliterans was treated by revascularization of the iliac artery using endarterectomy, and his gangrenous lower leg was amputated. However, he died from renal failure.

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INTRODUCTION

Gas gangrene is still a life-threatening condition. The spore-forming anaerobic gram-positive bacilli Clostridia are the main cause of nontraumatic spontaneous gas gangrene. Poor blood flow due to arterial occlusion increases the anaerobic condition of the legs and prevents antibiotics reaching the site of infection. However, there are few reports of gas gangrene due to arterial occlusion.[1] A rare case of fulminant gas gangrene due to Clostridium perfringens in a patient with atherosclerosis obliterans is described.

CASE REPORT

A 54-year-old man with atherosclerosis obliterans, diabetes mellitus, and mitral valve stenosis with arterial fibrillation refused medical treatment for 6 months. Four months prior to admission, he noticed pain at rest in his left leg, and his toe became necrotic. The dry necrosis extended up his left leg. Seven days before admission, he developed fever, chills, and pain in the left thigh. On the morning of admission, a neighbor noticed an extremely foul smell from his house and called an ambulance. His blood pressure was 80/50 mm Hg, his pulse rate was 138 beats per minute, with a respiratory rate of 32 breaths per minute, and axillary temperature of 38.4°C. There was dry gangrene of the left lower leg which was cold and cyanotic, there was crepitation in the left upper leg, and crepitation and lymphadenopathy in the left inguinal region. The left femoral artery was not palpable. Laboratory tests on admission revealed a white blood cell count of 28,800/mm^3 with 93% blasts; a hemoglobin level of 96 $g \cdot L^{-1}$; and a serum creatinine concentration of 7.6 $mg \cdot L^{-1}$. Computed tomography demonstrated multiple bullae in the left thigh and pelvic region (Figure 1). Angiography showed complete occlusion of the left iliac and femoral arteries including the deep femoral artery (Figure 2). Because of the foul smell and crepitation, Clostridium infection was strongly suspected. Therefore, multiple antibiotics (piperacillin, imipenem, and cilastatin) were administered intravenously. Blood culture revealed Clostridium perfringens and Enterococcus faecalis. As the anaerobic condition of the left thigh was considered to be aggravating the severity of infection and preventing antibiotics from reaching the infection site in sufficient concentrations, surgery was undertaken.

Under general anesthesia, the left leg was amputated above the knee. Endarterectomy of the left common and

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external iliac arteries was performed using patches of superficial femoral vein. The left thigh was revascularized. Subsequently, active bleeding was detected from arteries at the edge of the amputation site; it was controlled by ligation of these vessels. Multiple skin incisions and fasciotomies of the thigh and pelvic region were performed to facilitate aerobic conditions. A foul-smelling purulent discharge was detected from the amputation site and the fasciotomies. Therefore, subcutaneous tissue and the muscles of the upper thigh and pelvis were sterilized with povidone-iodine solution, resulting in cessation of the foul smell. However, the patient died due to renal failure one day after the operation.

DISCUSSION

Clostridia are found in soil, and they are constituents of the normal flora of the human gastrointestinal, biliary, and female genitourinary tracts, and the skin. Clostridial infections have been associated with traumatic wounds and surgical procedures.[1,2] Although early diagnosis is most important to save patients with gas gangrene, fulminant gas gangrene was established in our patient when he was admitted. It was not clear when or where he acquired the Clostridium perfringens infection. The mortality rate from sepsis secondary to Clostridium perfringens ranges from 70% to 100%.[3] The treatment of choice for Clostridium perfringens bacteremia is intravenous penicillin G in doses of 10 to 24 million units daily.[3] Most treatment recommendations are based on animal models and retrospective studies of patients with gas gangrene caused by Clostridium perfringens, in which a combination of penicillin and clindamycin was more effective than penicillin alone in suppressing toxin synthesis.[4] In-vitro studies have also shown chloramphenicol to be effective against all species of Clostridia. Clostridial infection is often associated with other bacterial infections, thus broad-spectrum antibiotic coverage (piperacillin, imipenem, and cilastatin) was used in this patient. Recently, a new therapeutic strategy using a glycoprotein GPIIb-IIIa antagonist has been reported.[5]

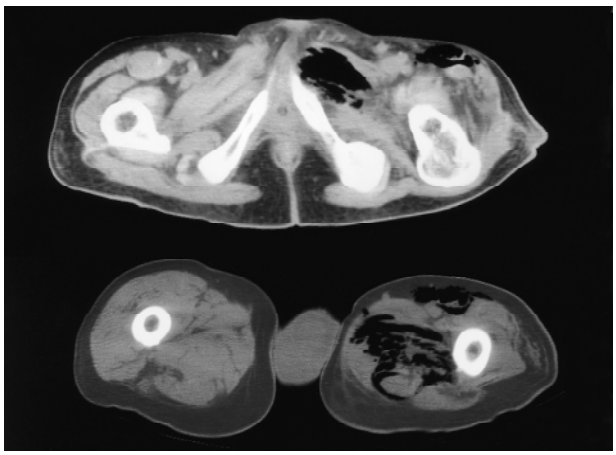

Figure 1. Selected images from computed tomography of the lower abdomen and the left thigh, showing edematous tissue with crepitation and multiple bullae.

Figure 2. Arteriogram showing complete occlusion of the left iliac, superficial femoral, and deep femoral arteries.

Surgical debridement of all involved gangrenous tissue is crucial in preventing progression of infection and subsequent exotoxin production. In this patient, the infected site could not be completely amputated as the region of gas and purulent discharge came up to the pelvis. A prosthetic graft could not be used because of the septic condition of the reconstruction site. The revascularization was successful because cyanosis subsided and active bleeding from the edge of amputation was detected after reconstruction. The cause of the renal failure was unclear. One possibility was rhabdomyolysis after revascularization. Another possibility was exotoxin from Clostridium perfringens.[6] A rare possibility was the use of povidone-iodine solution for sterilization of the infection site.[7]

An alternative treatment option for this patient might have been hyperbaric oxygen after fasciotomy of the upper leg and the lower abdomen. It has been reported that hyperbaric oxygen therapy improves phagocyte-mediated bacterial killing, suppresses toxin formation, and helps create a bacteriostatic environment. The addition of hyperbaric oxygen therapy has clearly improved the survival of patients with gas gangrene, although randomized prospective studies of this therapy have not yet been undertaken.[8] However, in view of the severe arterial occlusion, complete recovery of the anaerobic site might not have been achieved, even after fasciotomy and hyperbaric oxygen treatment. Therefore, we believed that our choice of reconstruction of the iliac artery was reasonable.

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