

CASE REPORT

Martina Carnevalini · Fabrizio Faccenna
Roberto Gabrielli · Luigi Irace · Serena Dell'Isola
Gabriella d'Ettorre · Vincenzo Vullo
Claudio Maria Mastroianni

Abdominal aortic mycotic aneurysm, psoas abscess, and aorto-bisiliac graft infection due to *Salmonella typhimurium*

Received: July 7, 2005 / Accepted: September 8, 2005

Abstract Infections due to nontyphoidal *Salmonella* are common and their incidence has been increasing in the last few years. Here, we describe a patient with a rupture of abdominal aortic aneurysm associated with a psoas abscess due to *Salmonella typhimurium*. Early diagnosis, prompt surgical intervention, and active and prolonged antibiotic therapy are the gold standard for the management of this severe clinical situation.

Key words *Salmonella typhimurium* · Mycotic aneurysm · Psoas abscess

Introduction

Nontyphoidal *Salmonella* are an important cause of foodborne infections worldwide, causing about 1–3 million illnesses and 500–600 deaths annually in the United States.¹ A serious complication of *Salmonella* bacteremia is the development of endovascular infection, which usually involves atherosclerotic plaques of the aorta and its major branches or pre-existing aneurysms.² Mycotic aneurysms are the most common endovascular infections due to nontyphoidal *Salmonella*, although these microorganisms can also cause infections that involve vascular grafts and prosthetic heart valves. Infected aortic aneurysms could be complicated by pneumonia, vertebral osteomyelitis, aortobronchial or aortoenteric fistula and, rarely, psoas abscess. Here, we describe a patient with abdominal mycotic

aneurysm, psoas abscess, and aorto-biiliac graft infection due to *Salmonella typhimurium*.

Case report

A 63-year-old man with a 10-year history of diabetes mellitus and hypertension was admitted because of abdominal pain, lipotimic event, and fever. Three months before he had been treated in another institution, as he was affected by rupture of an infrarenal abdominal aortic aneurysm (5.3 cm in diameter) with a large retroperitoneal hematoma and enlargement of the left psoas muscle.

The patient underwent surgical intervention, and an aorto-aortic tube graft in Dacron and debridement of the hematoma were performed. After 2 weeks, a computed tomography (CT) scan revealed a large retroperitoneal abscess including the left psoas muscle. The abscess was drained. Microbiological cultures grew *Salmonella typhimurium* susceptible to fluoroquinolones and the patient was started on parenteral antibiotic therapy with ciprofloxacin (800 mg/day) for 2 weeks. A control CT scan revealed a significant reduction of the abscessual cavity. The patient was then discharged in good clinical condition. After 3 months he was admitted to our emergency department after abdominal pain and hypotension became apparent. Computed tomography showed a failure of proximal anastomosis of the implanted aorto-aortic graft and a small cavity localized inside the psoas muscle. Thus, the patient underwent immediate surgical intervention: an aorto-bisiliac bifurcated polytetrafluoroethylene (PTFE) prosthetic graft was implanted in situ. The choice of an in situ reconstruction was justified by the absence of evident abscess and local macroscopic signs of infection near the graft position. Antibiotic treatment with imipenem and teicoplanin was also administered for 2 weeks after the operation, and the patient was discharged.

Two months later, the patient again underwent surgical intervention for dehiscence of proximal anastomosis. Angio-CT scan showed a failure of the proximal

M. Carnevalini · S. Dell'Isola · G. d'Ettorre · V. Vullo
Department of Infectious and Tropical Diseases, La Sapienza University, Rome, Italy

F. Faccenna · R. Gabrielli · L. Irace
Unit of Vascular Surgery, La Sapienza University, Rome, Italy

C.M. Mastroianni (✉)
Department of Infectious and Tropical Diseases, Polo Pontino, La Sapienza University, Viale del Policlinico 155, 00161 Rome, Italy
Tel. +39-064-997-0136; fax +39-064-997-2625
e-mail: claudio.mastroianni@uniroma1.it



Fig. 1. Dehiscence of proximal anastomosis associated with large abscess with the presence of gas in the left psoas muscle



Fig. 2. Complete regression of psoas abscess after extra-anatomic (axillo-bifemoral) reconstruction with removal of infected prosthesis

anastomosis and a large abscess with the presence of gas in left psoas muscle (Fig. 1). Therefore, an extra-anatomic (axillo-bifemoral) reconstruction associated with removal of the infected prosthesis and blind closure of the infrarenal aortic stump was performed; the omentum was mobilized to cover the aortic stump and rigorous debridement of all infected tissue was carried out. After a few days later an abdominal fistula extending from a psoas abscess to the left flank was detected.

Bacterial cultures of the abscess, fistula, and prosthesis grew *Salmonella typhimurium*. Ciprofloxacin (800 mg/day) was administered intravenously for 2 weeks with an additional 8 weeks of oral therapy (1000 mg/day) until the clinical, laboratory variables (leukocytes, C protein level) and abdominal CT returned to normal. After 1 year of follow-up, the patient is in good clinical condition.

Discussion

The risk of endothelial infection in patients with *Salmonella* bacteremia is estimated at about 7%–10%.³ The incidence of endovascular infection rose to 35% in patients older than 65 years; in addition, atherosclerotic disease, diabetes mellitus, hypertension, rheumatoid arthritis, extremes of age, malignancy, and AIDS are risk factors for the development of aortic infective aneurysms.⁴ In our case, the patient was 65 years old and had a history of hypertension and diabetes mellitus. It is probable that, in the presence of diabetes associated or not with hypertension, the intimal damage and atherosclerosis promote the development of mycotic aneurysm.

The management of infected aortic aneurysm represents an important medical and surgical issue. The prognosis is severe, especially in the case of rupture of the aneurysm and the simultaneous development of a psoas abscess.^{5,6} It is obvious that early abscess drainage and arterial reconstruction are fundamental, but mortality is still high in patients undergoing urgent surgical intervention. Therefore, a prompt diagnosis of infected aortic aneurysm is important in order to avoid rupture and other complications that negatively affect clinical outcome. Data from the literature indicate that the major determinants of mortality in patients with infected aortic aneurysm are advanced age, aneurysm rupture, non-*Salmonella* infection, and no operation.^{7,8} However, in other series of patients, aneurysm rupture and *Salmonella* infection are reported to be poor prognostic factors for aneurysm-related death.⁹

Crucial points in the management of infected aortic aneurysm are the timing of surgical intervention (immediate, early, or late), the optimal surgical management, and the antibiotic strategy. Analysis of literature data indicates that in the presence of aortic aneurysm infected by nontyphoidal *Salmonella*, the timing of surgical intervention and a prolonged course of antibiotic therapy are associated with a favorable clinical prognosis.^{8,9} The first step is to immediately start antibiotic therapy. Several antimicrobial regimens, such as third-generation cephalosporins, ampicillin, and fluoroquinolones, have been used for the treatment of endovascular infections due to nontyphoidal *Salmonella*; however, the optimal treatment approach is not well established especially because of the increased emergence of multidrug resistance.¹⁰ The use of bactericidal antibiotics increases the probability of therapeutic success even if it is necessary to prolong treatment for at least 6–8 weeks. Antibiotic therapy alone is not sufficient to avoid relapse. Hohmann¹⁰ observed a relapse rate of 17% after therapy and in particular, a major rate of relapse in AIDS patients. Therefore, a second important step in the management of *Salmonella* mycotic aneurysm is the use of an optimal surgical approach. Surgical intervention should be carried out after 4–6 weeks of successful antibiotic treatment. Early operation before 4–6 weeks of antibiotic therapy is indicated only in the presence of a complicated infection or aneurysm rupture. The rate of survival after surgical and medical therapy is about 62% and rises to 77% for patients

who undergo extra-anatomic bypass with construction of an axillo-bifemoral graft. In situ reconstruction with a PTFE tube is not recommended because a high risk of reinfection exists. In our patients the duration of antibiotic therapy has been important; indeed, we observed a full recovery after 2 weeks of treatment with fluoroquinolone parenteral therapy, followed by 8 weeks of oral therapy with the same antibiotic.

Although in the last years the prognosis of patients with mycotic aneurysm due to nontyphoidal *Salmonella* has improved with the use of new vascular surgical techniques, the mortality rate is still high. Earlier diagnosis, timing of surgical intervention, and a life-long treatment course with bactericidal antibiotics (6–8 weeks) are essential for the optimal management of this severe clinical condition.

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