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Caso clinico

Case report

Molecular diagnosis of *Staphylococcus aureus* prosthetic aortic graft infection: a case report

Diagnosi molecolare di infezione di endoprotesi aortica da Staphylococcus aureus*: un caso clinico*

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INTRODUCTION

Aortic graft infection is an extensively debated topic in the literature: it represents about 1% of post-surgical complications and is associated with a high rate of complications and mortality [1, 2]. Early vascular graft infection occurs within 4 months from implantation, followed by subsequent late infections, respectively caused most frequently by *Staphylococcus aureus* or coagulase-negative staphylococci [2-4]. In most cases such infections are treated with empirical antibiotic therapy because blood cultures are usually negative [1].
Recent literature has investigated the new molecular diagnostic possibilities, especially the operating of such complications within a specific diagnostic algorithm and management of the patient [1, 5, 6].

CASE REPORT

We present the case of a 62-year-old patient with hypertension, coronary artery disease, pacemaker, and abdominal aortic aneurysms (AAA) treated in 2004 by endovascular repair of abdominal aortic aneurysms (EVAR). In 2009, a type II endoleak was treated by CT-guided direct puncture and embolization of aneurysm due to progressive enlargement of the aortic aneurism sac during annual follow-up. After nine days the patient was hospitalized for septic fever. Upon admission, after collecting the first blood culture, broad spectrum antibiotic therapy coverage was started. In the following days the clinical features of the patient did not improve. Blood cultures collected upon admission resulted negative. Thus the infectious disease hypothesis of aortic prosthetic graft infection formulated on the basis of clinical signs and anamnesis was not supported by microbiological response at this stage. On the 11th day after admission, given the worsening of the septic patient, a second set of blood cultures and a sample for microbiological molecular assay SeptiFast M Grade Test (Roche Diagnostic) were contextually collected. After a few hours of collections the molecular test provided a *S. aureus* positive DNA detection, while the second set of blood cultures was confirmed negative. After molecular microbiological confirmation the infected graft was surgically removed and an aortic homograft was implanted, under appropriate antibiotic therapy and without further complications. After 51 days from hospitalization the patient was discharged.

METHODS

Sample collection A skin disinfection was performed with chlorhexidine digluconate alcohol-spray formulation (Citroclorex 2%, Esoform, Rovigo, Italy) [5]. During a febrile episode a single venipuncture was used to draw samples for 2 x 3 bottles of Bact/Alert (bioMérieux, Marcy l'Etoile, France). Immediately after the blood was drawn for the BC (8-10 mL/bottle), 1.5 mL

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of whole blood was collected in sterile EDTA-KE tubes (Sarstedt, Nümbrecht, Germany) for the molecular method.

LightCycler SeptiFast PCR The LightCycler Septi*Fast* Test M Grade assay detects a wide range of bacterial and fungal pathogens [6]. Blood collected in EDTA tubes was lysed according to the manufacturer's instructions (LightCycler Septi*Fast* Test M Grade, Roche Molecular System). DNA extraction was performed in a laminar flow cabinet situated in a dedicated pre-PCR room to prevent contamination. Multiplex Real-time PCR and subsequent melting analysis with fluorescent labelled probes allowed the specific simultaneous detection of 25 microorganisms. The melting peaks were automatically analyzed by dedicated software (Septi*Fast* Software Set).

DISCUSSION

Post-implant infections of aortic endoprosthesis are extensively discussed in the literature and represent about 1% of post-surgical complications also associated with a high mortality rate. These infections are classified into early infections (occurring within 4 months of implantation) or late infections and are caused most frequently by *S. aureus* or coagulase-negative staphylococci, respectively [1]. In most cases such infections are prepared empirically because patients are almost always under antibiotic coverage, so as not to allow the isolation of the pathogen.

In particular, given that at least 50% of post-surgical vascular infections occur in patients colonized with MRSA, how to approach these infections in both prophylactic and therapeutic terms has been extensively debated [1]. Moreover, cumulative data indicate that MRSA infections are associated with a high risk of mortality and complications. Optimal therapy for these infections remains a therapeutic challenge [7-10].

The case reported was therapeutically prepared on the basis of prevalence of methicillin resistance in our geographical area (30.7 % in 2008) and of hospitalizations for sepsis by MRSA in 2008 (28% of total sepsis caused by *S. aureus*). The patient was empirically treated throughout the duration of hospitalization (51 days) with daptomycin+levofloxacin+rifampicin. New surgery was practised at day 30 in light of the lack of response to medical therapy performed, and in light of positive microbiological molecular data (which arrived on day 11). Despite prolonged antibiotic therapy against MRSA, only after the removal of the endoprosthesis did the patient experience a progressive and permanent improvement. Indeed, the aneurysmal sac can constitute a real reservoir of bacteria hardly reached by adequate concentrations of antibiotics. The optimal therapeutic choice, supported by *S. aureus*-DNA detection is to intervene with new surgery.

The clinical case presented shows that in contexts in which the standard diagnostic culture could not allow answers to be obtained, specific molecular tests may be decisive to obtain results that can effectively impact on the therapeutic intervention and on the outcome of the patient's medical condition.

The current literature looks ahead to the possibilities of new molecular diagnostics [1, 11]. In an environment in which molecular tests still require a huge investment both in training and employment of highly skilled staff and in economic terms, it is necessary to identify specific shared diagnostic approaches between clinicians and microbiologists aimed at specific targets, justifying their rational exploitation [12].

Keywords: graft infection, sepsis, molecular identification.

SUMMARY

Introduction. Aortic graft infection is a widely debated topic in the literature, it represents about 1% of post-surgical complications and is associated with a high complication and mortality rate.

In most cases, such infections are treated empirically because patients are already under antibiotic coverage so as not to allow isolation of the pathogen. The literature in this regard is very attentive to new molecular diagnostic possibilities, and especially the operating of such complications in a precise diagnostic algorithm and management of the patient.

Report. We present the case of a 62-year-old patient with abdominal aortic aneurysms (AAA) treated in 2004 by endovascular repair of abdominal aortic aneurysms (EVAR). In 2009, a type II endoleak (the most frequent complication in this kind of surgery)

was treated by CT-guided direct puncture and embolization of aneurysm, due to progressive enlargement of the aortic aneurism sac during annual follow-up. After nine days the patient was hospitalized for septic fever.

Discussion. When traditional culture does not allow microbiological diagnosis, molecular tests may permit results to be obtained that can change the effective therapeutic intervention, with a decisive impact on patient outcome.

RIASSUNTO

Introduzione. *Il capitolo delle infezioni post impianto di endoprotesi aortica è un capitolo dibattuto ampiamente in letteratura. Rappresentano circa l'1% delle complicanze post-chirurgiche e sono associate ad un tasso elevato di mortalità. Nella maggior parte dei casi tali infezioni vengono affrontate empiricamente perché tali pazienti sono già in copertura antibiotica così da non consentire l'isolamento del patogeno. Al riguardo, la letteratura è molto attenta alle nuove possibilità diagnostiche molecolari, e specialmente all'inquadramento di tali complicanze in un preciso algoritmo diagnostico e gestionale del paziente.*
Caso clinico. *Paziente di 62 anni sottoposto nel 2004 a chirurgia protesica endovascolare EVAR in seguito ad insorto aneurisma dell'aorta addominale sottorenale. Nel 2009, in seguito a un normale controllo, viene rilevato un endoleak tipo II, la più frequente complicanza a lungo termine per questo genere di interventi. Si decide di intervenire procedendo all'embolizzazione dell'aneurisma con puntura diretta TAC guidata, ma dopo 9 giorni il paziente viene ricoverato per iperpiressia.*
Discussione. *Il caso clinico presentato dimostra che in contesti nei quali la diagnostica colturale standard non consente di avere delle risposte a specifici quesiti eziologici, i test molecolari permettono invece di ottenere risultati in grado di modificare efficacemente l'intervento terapeutico con un decisivo impatto sull'*outcome *clinico del paziente.*

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