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NON-SURGICAL MANAGEMENT OF METHICILLIN-SENSITIVE *STAPHYLOCOCCUS AUREUS* BACTEREMIA-RELATED MEDIASTINITIS

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ABSTRACT

Background: Acute mediastinitis is rarely caused by haematogenous spread of a remote infection. In this respect, since the only medical therapy is usually unsuccessful, treating acute mediastinitis with no source of infection detected is very challenging and management not standardized. In this case report, we describe non-surgical management experience of acute mediastinitis caused by methicillin-sensitive *Staphylococcus aureus*.

Case presentation: In a 79-year-old man judged not eligible for cardiac surgery, we attempted the infection source control through vacuum-assisted closure therapy, together with antimicrobial therapy. We observed gradual clinical, laboratory and radiologic improvements: reduced swelling and normalization of the white blood cell count and C-reactive protein level were associated with reduction in size of a periaortic abscess.

Conclusion: We managed a clinical condition with high mortality risk with chronic antimicrobial therapy alone, a strategy that is rarely considered. With this medical strategy we achieved an optimal response to a clinical picture that does not allow any other approach.

KEYWORDS

Mediastinitis, antimicrobial therapy, high risk heart surgery

LEARNING POINTS

- Mediastinitis is a rare but severe infection with a high mortality rate.
- Chronic antimicrobial therapy can be an effective strategy in high surgical risk patients.
- The present case demonstrates good tolerability of lifelong antibiotic therapy.

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INTRODUCTION

Mediastinitis is a rare but severe infection of the mediastinum, with a wide range of different aetiologies including deep sternal wound infection following sternotomy, oesophageal perforation and descending necrotizing mediastinitis, which is often secondary to an oropharyngeal abscess[1]. Rarely, acute mediastinitis can be caused by haematogenous spread from a remote infection. The literature about this is scarce and management is not standardized. There are only a few case reports that describe this process[2,3]. Due to its possible evolution into septic shock, mediastinitis is associated with a high mortality risk. Therefore, early diagnosis is crucial in order to start antibiotic therapy and perform surgery (the cornerstones of the treatment).

The ideal duration of antimicrobial therapy in mediastinitis is not well defined. The purpose of surgical treatment of mediastinitis is debridement of affected tissue. Wounds not amenable to surgical repair are usually treated with negative pressure wound therapy (VAC). VAC therapy has been widely used for the treatment of wound infection since first described in 1997. VAC can improve healing of deep sternal wound infection by increasing wound blood flow, reducing bacterial loads, enhancing the formation of granulation tissue[1,2].

CASE DESCRIPTION

A 79-year-old man presented with complaints of dyspnoea and hyperpyrexia (39°C). His past medical history was remarkable for:

- Multiple cardiovascular risk factors (previous smoking, family history of coronary heart disease - CAD, type 2 diabetes mellitus);
- CAD: triple coronary artery bypass graft surgery (CABG) 19 years prior, with following unstable angina episodes in need of percutaneous coronary intervention (PCI) on right coronary artery and left marginal after 13 years and left coronary artery after 17 years;
- Post-ischemic dilated cardiomyopathy with severe left ventricular ejection fraction reduction; Several acute decompensated heart failure episodes requiring hospitalization; Following implanted cardioverter defibrillator implantation (4 years prior);
- Aortic valve replacement with mechanical valve prostheses (18 years prior);
- Type A aortic dissection treated with Bentall endoprosthesis positioning (12 years prior);
- Functional mitral regurgitation treated with percutaneous mitral edge-to-edge valvuloplasty (2 years prior).
- Permanent atrial fibrillation;

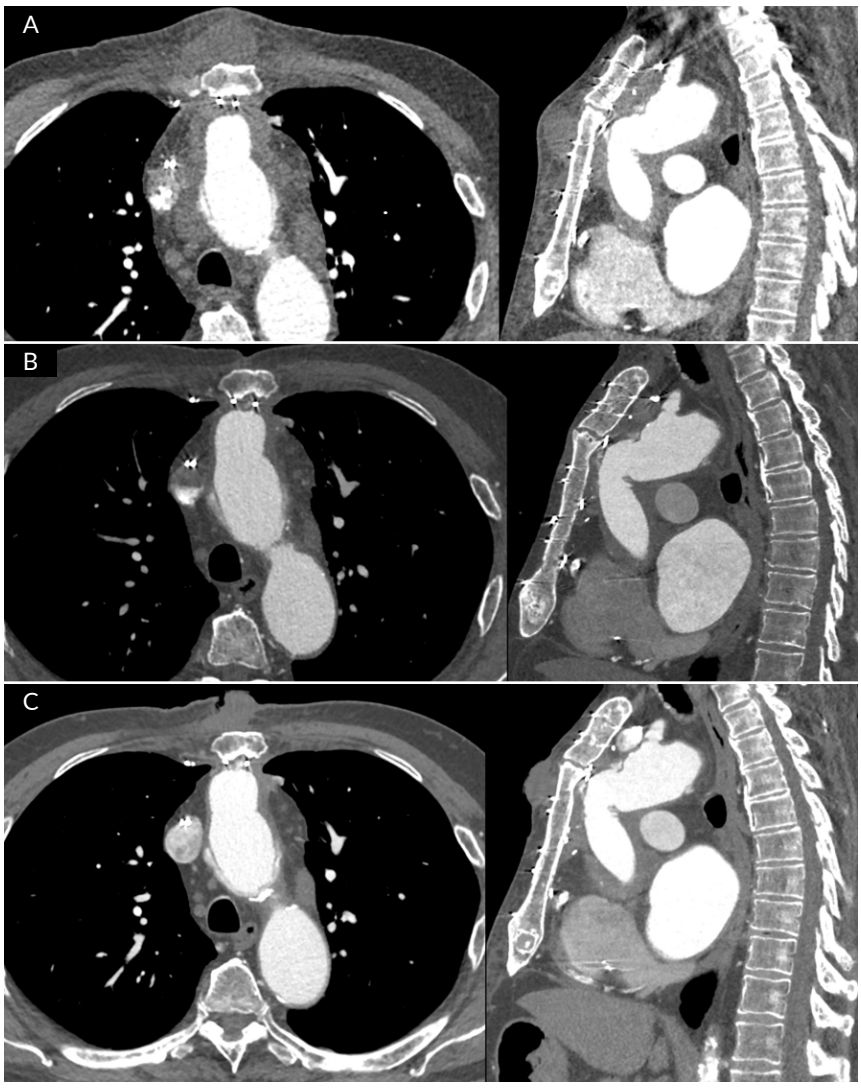

Figure 1. Axial computed tomography scan and oblique sagittal reconstruction showing: A) a collection, with fluid-like density, in the context of the subcutaneous planes, with associated stranding of the adjacent adipose tissue, anterior to the upper third of the sternal body; B) Full resolution of the collection; C) Occurrence of a new, dishomogeneous, superfluid density collection with associated continuous skin surface solution.

- Chronic cerebral vasculopathy;
- Chronic kidney disease (CKD);
- Colic angiodysplasia causing anaemia, requiring periodic blood transfusions.

On admission, the patient was febrile (body temperature: 39.4°C) and symptomatic for dyspnoea, but no desaturation was detected. A chest X-ray did not show any pleural effusion or other lesions. After blood cultures were taken, acetaminophen was administered and antimicrobial therapy with levofloxacin (at a dose of 250 mg daily) was started; when methicillin-sensitive *S. aureus* (MSSA) bacteremia was discovered, we decided to stop levofloxacin and start therapy with vancomycin (500 mg bid).

When a red, sore and mobile swelling appeared near the sternal manubrium, a chest computed tomography (CT) scan was performed and it revealed a 29 x 22 mm periaortic abscess, apparently spreading from the aortic valve root and reaching the innominate artery. Urgent cardiac surgery was judged unnecessary and targeted antimicrobial therapy with rifampin (600 mg daily) and oxacillin (12 g daily, in 6 divided doses) was started. Transoesophageal echocardiography ruled out infective endocarditis. After initial clinical improvements observed during the Cardiologic Intensive Care Unit stay, the patient was moved to Cardiology Ward.

Three days later, we repeated the chest CT scan. The abscess appeared to have increased in size and spread to the subcutaneous layer of the anterior chest wall *(Fig. 1A)*. As a result, the case was brought to the attention of the Heart Team. In this context, surgery would have been the cornerstone of the therapy; nevertheless, the patient was considered not eligible for cardiac surgery because of the high surgical risk due to his age, comorbidities, clinical condition and the abscess site itself. Thus, infection source control was attempted through VAC therapy, together with antimicrobial therapy; we observed gradual clinical, laboratory and radiologic improvements: reduced swelling and normalization of the white blood cell count and C-reactive protein level were associated with reduction in size of the abscess. The patient was discharged and the antimicrobial therapy with rifampin and oxacillin was continued for more than 6 weeks, as suggested for treatment of prosthetic valve endocarditis[4].

Two months later, a CT scan revealed complete abscess resolution *(Fig.1B)*. In this context, in agreement with the infectious disease specialist, we decided to stop rifampin and oxacillin and to continue with trimethoprim-sulfamethoxazole (80/400 mg bid) for 4 weeks. Five months later, the patient came back to the emergency room complaining of a relapsing sore and warm swelling near the sternal manubrium, draining purulent material, without other symptoms. A chest CT scan confirmed the presence of a recurrent periaortic abscess continuing in the subcutaneous layer of the anterior chest wall *(Fig. 1C)*. A new antimicrobial therapy round with gentamicin (60 mg tid) and daptomycin (750 mg daily) was undertaken, subsequently switched to oxacillin due to the evidence of a daptomycin-related rhabdomyolysis. Again, cardiac surgery was excluded because of the high risk. Blood and wound cultures were all negative. After a 16-day therapy, CT scan revealed reduced dimensions of the abscess, and the patient was discharged with the recommendation of continuing antimicrobial therapy with linezolid (600 mg bid) for 4 weeks and then with trimethoprim-sulfamethoxazole (80/400 mg bid) until the following medical evaluation.

After 2 months the patient was hospitalized for acute decompensated heart failure. The volume overload was managed with diuretics and vasoactive agents (levosimendan). On that occasion, considering the absence of signs of acute infection and the patient's many comorbidities, we confirmed life-long therapy with trimethoprim-sulfamethoxazole at a dosage of 80/400 mg bid indefinitely. The patient was then discharged. The treatment was very well tolerated. After nearly 6 years of therapy the patient is doing well, with no relapses of infection and no side effects.

DISCUSSION

The origin of this case of mediastinitis remains uncertain, as it is unlikely to be a post-surgical one, because it occurred 2 years after percutaneous mitral valvuloplasty and 12 years after Bentall endoprosthesis positioning. Most post-surgical cases appear within 7 to 14 days of surgery. In some cases, the onset may be delayed for months. The possible causes of recurrence of infection may be due to poor source control or by resistance of the pathogen or by an inadequate duration of the therapy or finally by an inadequate dosage of the antibiotic. Among these possibilities the first is perhaps the one that can explain the persistence of the clinical picture. We managed a clinical condition with a high mortality risk with chronic antimicrobial therapy alone, a strategy that is rarely considered. With this medical strategy we have achieved an optimal response to a clinical picture that does not allow any other approach (except for VAC therapy).

CONCLUSION

As this clinical event is relatively rare, the literature supporting treatment options is scarce. Future research in larger cohorts of patients is needed to determine the most appropriate management of this insidious disease.

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