Case report - Vascular thoracic

Mycotic aneurysm of the thoracic aorta caused by extended-spectrum beta-lactamase-producing Escherichia coli

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Abstract

We report a case of successful treatment of a mycotic aneurysm of the thoracic aorta. A 65-year-old man with a dissecting aneurysm presented with urinary tract infection. He had a history of severe liver cirrhosis. Two weeks after admission, he had a high-grade fever and elevated inflammatory response (C-reactive protein level: 18 mg/dL), we suspected a mycotic aortic aneurysm with possible impending rupture. Since conventional open chest surgery was considered to carry a high operative risk, the patient was managed with a combination of emergency endovascular treatment and antibiotic chemotherapy. Extended-spectrum beta-lactamase-producing Escherichia coli were identified from blood culture before treatment. After strict antibiotic therapy, the postoperative course was uneventful and the patient remained well 12 months later.

Keywords: Extended-spectrum beta-lactamase-producing Escherichia coli; Mycotic aneurysm; Thoracic aorta

1. Introduction

Extended-spectrum beta-lactamase (ESBL)-producing Escherichia coli have become increasingly common and they have been recognized as critical causative agents according to multi-resistant third and subsequent generation cephalosporins, fluoroquinolones, and trimethoprim [1]. Mycotic aneurysms caused by ESBL-producing E. coli are extremely rare. Here we report a case of successful endovascular treatment of a mycotic aneurysm caused by ESBL-producing E. coli.

2. Case report

A 65-year-old man with a history of alcoholic liver cirrhosis (child type B) was admitted to our hospital for treatment of a DeBakey Type IIIa dissecting aneurysm, which was incidentally detected by chest computed tomography (CT). He had a past history of subarachnoid hemorrhage resulting in left hemiplegia. Enhanced CT showed a 5.3-cm aneurysm in the distal arch (Fig. 1a). On admission to the hospital, he experienced low-grade fever and we performed several cultures, such as blood, urine, and sputa. ESBL-producing E. coli that were resistant to fluoroquinolone were detected by a culture of a urine sample. Two weeks after admission, the patient experienced high-grade fever and enhanced CT confirmed acute expansion of the aneurysm to 7 cm in diameter (Fig. 1b). Because of the acute aneurysm expansion and elevated inflammatory response (C-reactive pro-
3. Discussion

During the past two decades, broad-spectrum cephalosporins, including oxymino-β-lactam antibiotics, have been used worldwide, and antibiotic-resistant strains that produce ESBLs have emerged among the Enterobacteriaceae, predominantly in *E. coli* and *Klebsiella pneumoniae*. Bloodstream infections with *E. coli* in adults are most often related to underlying infection of the urinary or biliary tract or other intra-abdominal focal infections, such as pericolic abscess [1]. Vascular infections are exceedingly rare and a few isolated cases with only medical therapy have been reported [1]. To date, this is the first report of endovascular treatment for mycotic aneurysm caused by ESBL-producing *E. coli*.

Diabetes mellitus, previous fluoroquinolone use, recurrent urinary tract infections, previous hospital admission, and older age in male patients have been identified as risk factors for infection of ESBL-producing *E. coli* [2], similar to this case. Thirty-day mortality of patients with bloodstream ESBL infection has been reported as approximately 26% [3]. Carbapenem is the most effective antibiotic for ESBLs and it reduces the mortality rate to 12.9% in patients with bacteremia [3]. There is limited experience with the use of antibiotics in ESBL-producing *E. coli* bacteremia. Since single carbapenem therapy resulted in inadequate suppression of infection of the prosthetic graft and mycotic aneurysm, combination therapy was considered to be effective in this case. This case report is important in terms of suppression of infection of a prosthetic graft in patients with ESBL-producing *E. coli* bacteremia.

The prior abdominal aortic surgery, the length of stent graft, non-revascularization of left subclavian artery, hypotension during operation was associated with increased risk of paraplegia [4]. Preoperative enhanced brain and chest CT confirmed the Adamkiewicz artery at the thoracoabdominal aorta and good connection of circle of Willis. Since the length of stent-covered aorta was small, we thought there was a low risk of paraplegia if the left subclavian artery was excluded.

Müller et al. demonstrated that in situ reconstruction with a prosthetic graft and rigorous debridement of all infected tissues are necessary and an omental pedicle should be used when technically possible in patients with mycotic aneurysms [5]. Endovascular stent grafting has recently provided an alternative treatment for mycotic aortic aneurysms [6]. Kan et al. demonstrated that early mortality and morbidity are approximately 10% in patients with mycotic aneurysms [6]. However, in patients with persistent infection, endovascular treatment has a 12-month survival rate of only 39%. They also demonstrated that 11 patients (23%) suffered from persistent graft infection after insertion of the stent grafts among 48 reported cases [6]. Although our case had the possibility of graft infection during the perioperative period, we were able to suppress persistent infection by selecting appropriate antibiotics. Careful follow-up is required because the long-term results of endovascular stent grafts for mycotic thoracic aortic aneurysms are unknown, and ESBL-producing *E. coli* bacteremia carries a high mortality.

References

eComment: Endovascular treatment of mycotic saccular aneurysms of the thoracic aorta

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We read with great interest the article by Takahashi et al. [1]. Our group published a very similar case with nearly the same radiologic findings in 2006 [2]. We believe the authors’ article contains certain points which need to be clarified.

From the preoperative chest tomography views [1] the pathology resembles a saccular aneurysm and most probably a mycotic one at the distal aortic arch rather than a DeBakey type IIIa dissection. Such an image might have been accepted as a relative cardiovascular emergency and treated on an urgent basis [2]. Could the authors give reasons about the two-week waiting period until the treatment?

The title of the article states that the mycotic aneurysm was secondary to extended-spectrum beta-lactamase-producing Escherichia coli; however, the infectious agent could only be cultivated in the urine before the endovascular treatment and in the blood sample a few weeks after the therapy [1]. Despite the fact that it seems most probably the Escherichia coli in this paper [1], we believe that deep tissue cultures, which are very hard to obtain in such circumstances, are required in order to precisely indicate the causative agent [2].

The authors prepared both of the femoral arteries for stent graft deployment [1]. In our practice we prefer one femoral artery, which is for the deployment of the stent graft system, and if necessary, the right brachial artery for angiographic monitoring and precision of the endovascular treatment for thoracic aortic aneurysms as well as dissections [2, 3]. The patient was discharged with lifelong oral antibiotics [1]. We believe it would be helpful for the readers if the authors indicated which antibiotic regimen they preferred for their particular case.

Another reason why we would like to comment on this manuscript is that during the follow-up course of our patient [2], in the mid-term he was admitted to the clinic with acute onset back pain, thoracoabdominal computerized tomography angiography revealed rupture of the descending aorta from the region immediately at the end of the stent graft, which was excluded successfully with another stent graft.

We believe that long-term results on endoluminal mycotic aneurysm repair from different centers will aid to provide a treatment protocol for this challenging pathology.

References