Case report - Vascular thoracic

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

Yosuke Takahashi*, Yasushi Tsutsumi, Osamu Monta, Hirokazu Ohashi

Department of Cardiovascular Surgery, Fukui Cardiovascular Center, 2-228 Shinbo, Fukui 910-0833, Japan

Received 20 July 2010; received in revised form 5 October 2010; accepted 7 October 2010

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 enhanced computed tomography (CT) demonstrated acute expansion of the distal aortic arch aneurysm. Because of the acute aneurysm expansion and elevated inflammatory response, 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 protein level: 18 mg/dl), we suspected a mycotic aortic aneurysm with possible impending rupture. Since there was severe liver dysfunction and hemiplegia, conventional open chest surgery was considered to carry a high operative risk, and therefore, we selected a stent–graft procedure.

The stent–graft procedure was performed with the patient under general anesthesia and systemic heparinization. After surgical exposure of the bilateral common femoral artery, a delivery system with a 22-Fr preloading type introducer (W.L. Gore & Associates, Flagstaff, AZ, USA) was advanced into the aorta through the right common femoral artery and a Gore TAG thoracic endoprosthesis (31 x 15 cm) (W.L. Gore & Associates) was deployed across the orifice of the aneurysm with occlusion of the left subclavian artery. A combination of vancomycin (1 g/day) and gentamicin (120 mg/day) were used for two weeks before a culture was carried out of the blood sample. Oral administration of carbapenem therapy (2 g/day) was then performed after detection of ESBL-producing E. coli in the blood sample culture. Enhanced CT after two weeks showed no endoleak and no infectious signs (Fig. 2a). However, four weeks after stent-grafting, the patient experienced a high-grade fever. Enhanced CT demonstrated a marked decrease in size of the aneurysm, but there were possible persistent infectious signs with air bubbles around the stent graft (Fig. 2b). Intravenous administration of carbapenem and gentamycin were then initiated and the postoperative course was uneventful. Twelve months after the operation the patient was well with long oral antibiotics, and enhanced CT revealed the disappearance of the aneurysm and no infectious signs (Fig. 2c).

*Corresponding author. Tel.: +81-776-54-5660; fax: +81-776-53-2132. E-mail address: ysk@msic.med.osaka-cu.ac.jp (Y. Takahashi).

© 2011 Published by European Association for Cardio-Thoracic Surgery
factors for infection of ESBL-producing older age in male patients have been identified as risk urinary tract infections, previous hospital admission, and 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 blood stream ESBL infection has been reported as approximately 26% [3]. Carbenemem 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 carbenemem 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 peroperative 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

Authors: Murat Ugurlucan, Duzce Ataturk State Hospital, Cardiovascular Surgery Clinic, Duzce, Turkey; Sevi Umaroglu, Emin Tireli, Ufuk Alpagut
doi:10.1510/icvts.2010.249102A

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 life-long 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