



Case Report

Infected thoracic aortic aneurysm caused by *Clostridium ramosum*: A case report



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ABSTRACT

A 73-year-old man undergoing conservative management of acute aortic dissection (Stanford type B) was diagnosed with infected aortic aneurysm based on clinical findings of aortic dilatation and recurrent laryngeal nerve paralysis. We performed total aortic arch replacement with a synthetic graft and omentopexy; and *Clostridium ramosum* was isolated from resection specimens. Infected aortic aneurysms are rare but may lead to death from aortic dissection or rupture. *C. ramosum* infection is rare and has seldom been reported, and thus no treatment guidelines, including antibiotic therapy, have been established. Therefore, it is necessary to accumulate a larger number of cases of aortic aneurysm infected by *C. ramosum*. To date, there has been no reported case of infected aortic aneurysm due to *C. ramosum*. Here, we report a case of infected aortic aneurysm due to *C. ramosum*.

<Learning objective: Infected aortic aneurysm is a life-threatening condition because of the possibility of aortic dissection and rupture. Infected aortic aneurysms are often caused by *Staphylococcus aureus* and *Salmonella* species, and there has been no report of aortic aneurysm infected by *C. ramosum*. Regarded as a non-pathogenic intestinal bacterium, *C. ramosum* is seldom identified as a causative bacterium. In this case, dilatation of aorta progressed rapidly, requiring early surgical treatment.>

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Introduction

Infected aortic aneurysm is a rare life-threatening condition because of the possibility of aortic dissection and rupture as well as perforation to surrounding organs. Therefore, it is essential to provide early surgical and antibiotic intervention [1]. Infected aortic aneurysms are often caused by *Staphylococcus aureus* and *Salmonella* species [2], and there has been no report of aortic aneurysm infected by *Clostridium ramosum*. Regarded as a non-pathogenic intestinal bacterium, *C. ramosum* is seldom identified as a causative bacterium. Here, with a literature review, we report a case of infected aortic aneurysm due to *C. ramosum*.

Case report

A 73-year-old man complained of upper abdominal pain, and he visited a nearby clinic. He was diagnosed with acute aortic dissection (Stanford type B, DeBakey IIIa) with computed tomography (CT) (Fig. 1), and he was referred to his previous hospital. No organ injury from ischemia was observed. An ulcer-like projection (ULP) was observed, but because the false lumen was largely thrombosed, the patient was treated conservatively. On hospital day 19, he got a fever (Fig. 2). Due to the enlargement of the ULP, mild dilatation of the distal aortic arch (Fig. 3), and features of recurrent laryngeal nerve paralysis such as hoarseness, infected aortic aneurysm was suspected, and antibiotic therapy with meropenem (MEPM) was initiated. On hospital day 22, the patient was transferred to our hospital for further treatment. At the previous hospital, two sets of blood culture samples were collected before the initiation of antibiotic therapy, but the results were negative.

CT findings revealed 55-mm dissecting aortic aneurysm with a ULP was observed in the distal aortic arch (Fig. 2). Aortic wall

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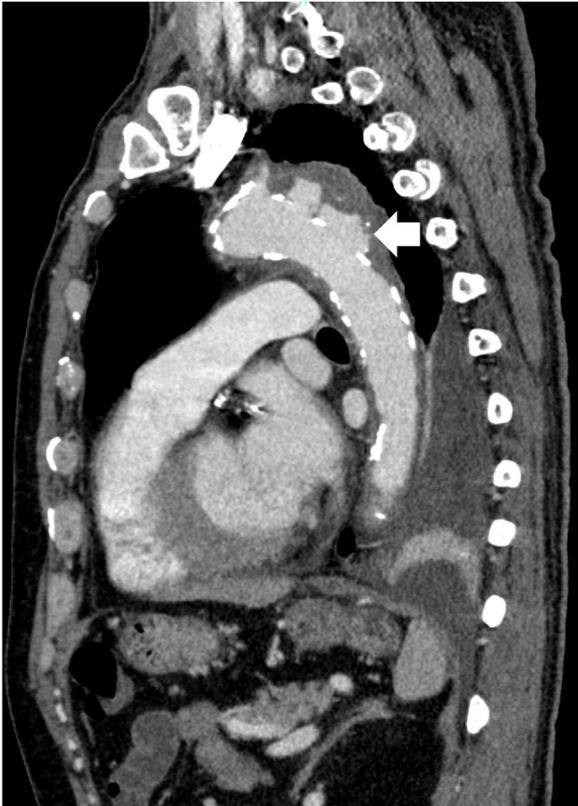


Fig. 1. Computed tomography (CT) scan at onset of acute aortic dissection. Ulcer-like projection (ULP) (white arrow) located in the distal aortic arch.

thickening, right common iliac artery stenosis, and left common iliac artery occlusion were also observed.

On the third day after hospitalization, total aortic arch replacement and omentopexy were performed with the patient supine under general anesthesia. Through a median sternotomy and a left fourth intercostal thoracotomy, we approached to the aortic aneurysm. After we incised the aneurysm, charcoal white pus flowed out. We resected the wall of aneurysm as much as possible, then performed total aortic arch replacement with a

26-mm four-branched J graft SHIELD NEO[®] vascular graft (Japan Lifeline, Tokyo, Japan), which had been immersed in rifampicin. Laparotomy was then performed to lift the omentum from the anterior mediastinum to the anastomosis site in the descending aorta in order to cover the synthetic graft with omentum. Total operative time was 6 h 55 min.

We continued antibiotic therapy with MEPM during peri- and postoperative course. *C. ramosum* was isolated from the aortic wall and surrounding tissue samples collected during surgery, then in addition to MEPM (0.5 g × 4 times/day), metronidazole (500 mg × 3 times/day) was administered for 7 days, and intravenous immunoglobulin therapy was administered for 3 days. Although left recurrent laryngeal nerve paralysis persisted, the patient's general condition stabilized. He was transferred to another hospital for rehabilitation on postoperative day 11. Upper gastrointestinal endoscopy and colonoscopy performed after hospital transfer revealed diverticula in the cecum and ascending colon, but no neoplastic lesions. Oral minocycline, to which the pathogen was highly susceptible based on tissue culture of intraoperative specimens, was initiated, and no signs of infection recurrence have been observed after 4 months.

Discussion

Infected aortic aneurysms, first reported by Osler in 1885 [3], account for 0.7–2.6% of all aortic aneurysms. Infection starts in an existing aneurysm and spreads into the surrounding area continuously along with the vascular wall in the direction of blood flow. Infected aortic aneurysms occur often in patients with a pathological condition associated with a high incidence of atheroma, such as hypertension and diabetes [1].

In principle, surgery is indicated for infected aortic aneurysms because infection may spread rapidly, inducing pseudoaneurysms and causing organ perforation and penetration. Antibiotics are administered perioperatively for an extended period of time, but no clear consensus on the duration of antibiotic therapy has been established [1].

Treponema pallidum is a well-known pathogen of infected aortic aneurysm, but the incidence is rare in recent years owing to early diagnosis and treatment. Today, *S. aureus* and *Salmonella* species are more common [2]. To date, there has been no reported case of infected aortic aneurysm due to *C. ramosum*.

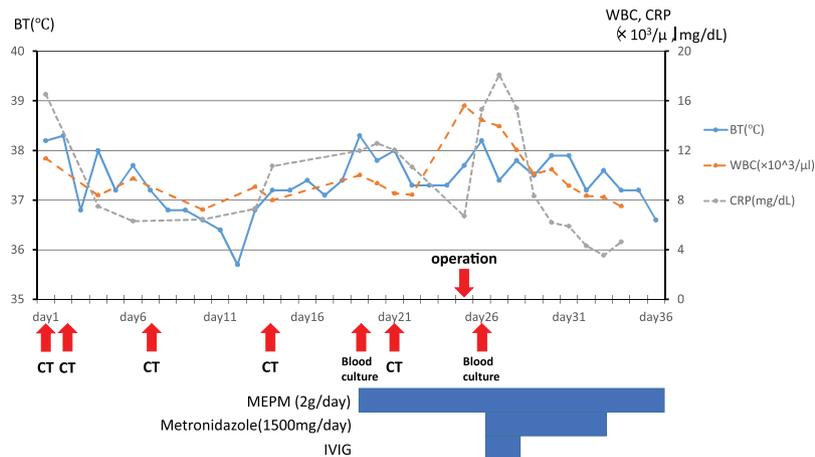


Fig. 2. Fever chart and therapeutic treatment course. He got high fever on hospital day 19, then antibiotic therapy was initiated. It was effective and the operation was done.



Fig. 3. CT scan at 3 weeks after onset of acute aortic dissection. Aortic dilatation was seen. Enlargement of ULP was also observed.

Despite negative blood culture results, *C. ramosum* was isolated from the aortic wall and surrounding tissue. *C. ramosum* was isolated for the first time in 1898 by Veillon and Zuber from a patient with appendicitis and pulmonary gangrene. *Clostridium*, a genus of Gram-positive bacteria, is a spore-forming intestinal anaerobic bacillus. The bacterium has rarely been isolated as a pathogen and is thought to be non-pathogenic. *C. ramosum* is normally sensitive to chloramphenicol, vancomycin, and metronidazole but resistant to rifampicin, tetracycline, and aminoglycosides [4]. However, due to sensitivity to the broad-spectrum tetracycline minocycline, oral minocycline was used for long-term postoperative management in the present case.

Forrester et al. reported a case of *C. ramosum* bacteremia due to perforation resulting from of pancreatic cancer metastasis to the sigmoid colon. They also divided the reported cases of *C. ramosum* infections into two groups, revealing a high risk of this infection among small children with acute or chronic otitis media and elderly individuals with comorbid conditions that increase susceptibility to infection, such as diabetes. *C. ramosum* has been

associated with brain abscess, lung abscess, intra-abdominal infection, emphysematous pyelonephritis, gas gangrene, osteomyelitis, spondylodiscitis, septicemia, and arthritis [5], but not infectious aortitis. In addition, there have been some reports of dissection and rupture of the aorta infected by *Clostridium septicum* [2]. Anaerobic bacteria rarely infect the aorta, but atherosclerotic lesions persist longer and are thus more susceptible to infection under anaerobic environments [6]. Several studies have identified *Clostridium difficile* as a pathogen. Based on examination of infected thoracic aortic aneurysm that occurred after thoracic endovascular aortic repair (TEVAR) for thoracic aortic aneurysm, Hagiya et al. hypothesized that infectious aortitis was induced by vascular and interventional radiology, which triggered the formation of a false lumen with no blood flow, creating an anaerobic environment that promotes the growth of *C. difficile* [7]. In the present case, after *C. ramosum* infection established at atherosclerotic lesions of aortic arch, infection might have caused acute aortic dissection, or false lumen thrombosis may have led to the establishment of an anaerobic environment in the lumen, promoting infectious aortitis by *C. ramosum*. The patient had no apparent gastrointestinal lesions, but his medically compromised conditions such as untreated diabetes, onset of acute aortic dissection, and conservative treatment with bed rest are thought to have increased his susceptibility to infection, together contributing to infected aortic aneurysm.

C. ramosum infection is rare, and no study has reported its association with infected aortic aneurysm. However, in the present case, the aortic dilatation progressed rapidly, requiring early surgical intervention. Because of the low incidence rate and the lack of treatment guidelines, we don't have any evidence for the relationship between the *C. ramosum* and the rapid progression of aortic aneurysm. So, further accumulation of cases of aortic aneurysm with *C. ramosum* infection is necessary in the future.

Conflict of interest

The authors declare that there is no conflict of interest.

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