A Case of Infective Abdominal Aortic Aneurysm due to *Haemophilus influenzae* Type B

Toshimitsu Sato, MD, PhD¹ Masayoshi Kobayashi, MD, PhD²

¹Department of Vascular Surgery, Gifu Prefectural Tajimi Hospital, Gifu, Japan

²Division of Vascular Surgery, Department of Surgery, Nagoya University Graduate School of Medicine, Nagoya, Japan

Address for correspondence and reprint requests Toshimitsu Sato, MD, PhD, 5-161 Maebata cho, Tajimi City, Gifu Prefecture, Japan (e-mail: toshi@fujita-hu.ac.jp).

Int J Angiol 2012;21:147–150.

Abstract

Keywords

- ▶ abdominal aortic aneurysm
- ▶ infection
- ▶ mycotic aneurysm
- ▶ polytetrafluoroethylene
- ▶ C-reactive protein
- ▶ in situ reconstruction
- ▶ false aneurysm

Infective abdominal aortic aneurysm (IAAA) is relatively rare, but a case which is caused by *Haemophilus influenzae* type B is very rare. We experienced one IAAA case due to *H. influenzae* type B. The patient was 69-year-old man presenting with severe abdominal and back pain and elevated C-reactive protein (CRP), as inflammatory marker. The patient was found to have saccular aneurysm infrarenal aorta on computed tomography scanning. First, we started to treat him with antibiotic agent and second, we operated him at day 8 after admission with expanded polytetrafluoroethylene graft. Revascularization was made in situ reconstruction. As the result of culture with aneurysm wall, we found that the cause of this aneurysm was the infection of *H. influenzae* type B. As far as we know, this bacterium is scarcely reported as the cause of infective aortic aneurysms. We reported this IAAA case with the review of the English literature.

Infective or mycotic aneurysm is rare but a life-threatening disease. To our knowledge, the incidence of this disease is ~ 0.65 to 2% of all aortic aneurysms.^{1–3} This disease has an increased tendency to grow rapidly and to rupture. Patients with this disease have severe comorbidities and coexisting sepsis. Conventional surgical treatment, which consists of a radical operation with resection of the aneurysm, extensive local debridement, and revascularization by in situ reconstruction or extra-anatomic bypass is the gold standard but carries a high mortality. Recently, some authors have described that endovascular aneurysm repair (EVAR) for infective abdominal aortic aneurysm (IAAA) was effective in perioperative and mid-term results.^{3,4}

Salmonella and staphylococcal species are predominant in the cause of IAAA, however, in this case, we detected *Haemophilus influenzae*. We reported this very rare case with the review of the English literature.

Case Report

A 69-year-old man had fever (over 39°C) and, 10 days later, he had severe abdominal and back pain. He consulted nearby

doctor and was introduced to our hospital. At the time of initial examination, he did not have fever (36.7°C). On the physical examination, he complained of the spontaneous pain and tenderness at lower abdomen. In laboratory evaluation, white blood cell count and C-reactive protein (CRP) level were elevated, 9700/μL and 12.87 mg/dL, respectively. Furthermore, the level of glycated hemoglobin was 6.2% and he had mild diabetes mellitus. Blood culture result was negative.

Abdominal-enhanced computed tomography (CT) scan demonstrated a 35-mm saccular aneurysm of the infrarenal aorta surrounded by inflammatory findings (▶ Fig. 1A–C). He was diagnosed as having IAAA. First, we treated him with intravenous antibiotic administration for a week. The antibiotic was cefazolin sodium (2 g/day) to cover staphylococcal and *Salmonella* species. Just before operation, the value of white blood cell count and CRP had decreased down to 6200/μL and 2.54 mg/dL, respectively. We thought that preoperative antibiotic therapy was effective. We performed operation on day 8 after antibiotic administration, and resected the saccular aneurysm with extensive local debridements and irrigation. Revascularization was made in situ reconstruction with expanded polytetrafluoroethylene graft, and entire

Fig. 1 Abdominal-enhanced computed tomography. This figure includes upper left site (A), lower left site (B), and right site (C). Upper left site demonstrates inflammation findings surrounding abdominal aorta and duodenum; lower left site and right site demonstrate false aneurysm. Its maximum diameter is ~ 35 mm.

prosthetic graft was covered with major omentum. Blood loss was estimated at 1200 mL. Patient received four units red blood cell transfusion during this operation.

Culture of the aneurysm wall was positive for *H. influenzae* type B. We changed the antibiotic to piperacillin sodium (2 g/day). During his hospitalization, the condition of this patient had been well. We started an oral antibiotic (levofloxacin hydrate 300 mg/day) at day 7 after surgical procedure, but the patient had mild elevation of renal function (the value of serum creatinine was 1.6 mg/dL). We switched the oral antibiotic from levofloxacin hydrate to minocycline hydrochloride (200 mg/day). At the day of discharge, day 22 (14 postoperative days), the level of CRP reduced to 0.23 mg/dL and serum creatinine was 0.78 mg/dL. After discharge, he had been administered minocycline hydrochloride for 2 months.

When he finished antibiotic administration, the level of CRP was 0.03 mg/dL, and the level of CRP has been normalized since then.

Discussion

Infective or mycotic aneurysm is rare but a life-threatening disease. To our knowledge, the incidence of this disease is ~ 0.65 to 2% of all aortic aneurysms.¹⁻³

Infective aneurysms are classified into five types:

1. Mycotic aneurysms secondary to septic arterial emboli, mainly endocardial in origin.
2. Microbial arteritis with an aneurysm secondary to bacteremic infection, nonendocardial in origin.
3. Infection pre-existing aneurysm.

4. The contiguous direct spread of infection to the arterial wall from an adjacent septic site.
5. Posttraumatic infected false aneurysm.^{5,6}

We think that this case is classified in type 2 because this patient had precedent fever without endocarditis and adjacent septic site, for example, psoas muscle abscess, pre-existing aneurysm, or posttraumatic state.

Infective aneurysms can affect almost any artery in the body. With the advent of invasive monitoring and interventional procedures, the femoral artery has recently become the most common location of all infected aneurysms (56%), followed in frequency by the thoracic and abdominal aorta (33%), intra- or extracranial (5%), innominate (2%), iliac (2%), and splanchnic arteries (1%).^{5,6} Among the splanchnic arteries, the superior mesenteric artery is the most frequently involved, and the hepatic artery is the next most common site.^{5,6}

Generally, *Salmonella* and staphylococcal species are the most common agent for infective aneurysm.⁵⁻⁷ In this case, against expectation, *H. influenzae* was detected. *H. influenzae* is a rarely reported causative agent, with a limited number of isolated case report.⁷⁻¹¹ Furthermore, Degener et al described that a documented case of *H. influenzae* type B has not been presented in the modern literature.⁸ As far as we know, we found only five cases of infective aneurysm due to *H. influenzae* which included type B, two cases; type F, one case; and unknown, two cases. *H. influenzae* is a gram-negative bacillus and may be capsulated or noncapsulated. Capsulation confers increased virulence, particularly serotype B. Serotype B are important cause of invasive infection in children, however, adult infection is less common and aortitis and subsequent aneurysm formation is extremely rare.^{7,8}

With regard to the diagnosis for this disease, arterial blood culture is necessary. If blood cultures are positive, they are helpful for the specific antibiotic therapy, but negative blood cultures do not rule out the presence of an infective aneurysm. Ultrasonography, CT including CT angiogram, and magnetic resonance imaging can be helpful.

When the diagnosis of this disease is established, first, we should start an adequate and strict medical treatment. Second, in surgical treatment, we should make complete resection of aneurysm and extensive debridement. In the past, extra-anatomic bypass had been performed in many cases.^{10,12,13} However, vascular surgeons have been troubled the low rate of graft patency and the rupture of aortic stump. Recently, in situ reconstruction has been made using prosthetic graft or venous graft.^{7,8,14} On the other hand, some authors described EVAR has been used for infective aneurysm.¹⁵⁻¹⁸ Other authors described that 30-day mortality rate associated with endovascular therapy appears to be lower than that associated with open surgery.^{3,4} However, in endovascular therapy, aneurysm is not resected and infection is continued. Some authors described EVAR, when patients present with rupture or have fever, could be used as a temporary measure to quickly achieve hemodynamic stability and as a bridging measure to possibly allow further definitive surgical treatment.¹⁵⁻¹⁸

We think that classical medical and surgical treatment is essential and EVAR is an option for IAAA treatment.

Conclusion

We experienced a very rare case of IAAA caused by *H. influenzae*. We made an adequate treatment (medical and surgical) and thought that this strategy induced a good result.

References

- Reddy DJ, Shepard AD, Evans JR, Wright DJ, Smith RF, Ernst CB. Management of infected aortoiliac aneurysms. *Arch Surg* 1991;126(7):873-878, discussion 878-879
- Bandyk DF. Vascular infections. In: Greenfield LJ ed. *Surgery: Scientific Principles and Practice*. 1st ed. Philadelphia: J.B. Lippincott; 1993:1568-1579
- Söreläus K, Mani K, Björck M, Nyman R, Wanhainen A. Endovascular repair of mycotic aortic aneurysms. *J Vasc Surg* 2009;50(2):269-274
- Razavi MK, Razavi MD. Stent-graft treatment of mycotic aneurysms: a review of the current literature. *J Vasc Interv Radiol* 2008;19(6, Suppl):S51-S56
- Ohta T. Infected aneurysms. *Intern Med* 2000;39(11):875-876
- Moore WS, Malone JM. Mycotic aneurysms. In: Yao JST, Pearce WH eds. *Aneurysms: New Findings and Treatment*. Norwalk, Connecticut: Appleton and Lange; 1994:389-410
- Whitfield CG, Lonsdale RJ, Rahbour G, Parsons H, Dodd PD. Infective abdominal aortic aneurysm due to *Haemophilus influenza* identified via the polymerase chain reaction. *Eur J Vasc Endovasc Surg* 2008;36(1):28-30
- Degener JE, Voesten HG, Nap M, Roukema J. Rupture of an aortic aneurysm caused by *Haemophilus influenzae* type B infection. *Vasa* 1993;22(3):247-250
- Adlakha A, Yale SH, Patel R, Edson RS, Schultz HJ, Stanson AW. *Haemophilus influenzae* serotype f: an unusual cause of a mycotic aneurysm in an adult. *Mayo Clin Proc* 1994;69(5):467-468
- Yamazaki S, Boku K, Ueki Y, et al. A case of infectious abdominal aortic aneurysm complicated with septicaemia caused by *Haemophilus influenza*. *J Jap Soc Int Med* 1999;88:342-343 [Japanese]
- Byrne G, Barber P, Farrington M. Aortitis caused by β -lactamase producing *Haemophilus influenzae* type b. *J Clin Pathol* 1989;42(4):438-439
- Woon CYL, Sebastian MG, Tay KH, Tan SG. Extra-anatomic revascularization and aortic exclusion for mycotic aneurysms of the infrarenal aorta and iliac arteries in an Asian population. *Am J Surg* 2008;195(1):66-72
- Müller BT, Wegener OR, Grabitz K, Pillny M, Thomas L, Sandmann W. Mycotic aneurysms of the thoracic and abdominal aorta and iliac arteries: experience with anatomic and extra-anatomic repair in 33 cases. *J Vasc Surg* 2001;33(1):106-113
- Canaud L, Marzelle J, Bassinet L, Carrié AS, Desgranges P, Becquemin JP. Tuberculous aneurysms of the abdominal aorta. *J Vasc Surg* 2008;48(4):1012-1016
- Kan CD, Lee HL, Yang YJ. Outcome after endovascular stent graft treatment for mycotic aortic aneurysm: a systematic review. *J Vasc Surg* 2007;46(5):906-912
- Lee KH, Won JY, Lee Y, et al. Stent-graft treatment of infected aortic and arterial aneurysms. *J Endovasc Ther* 2006;13(3):338-345
- Sayed S, Choke E, Helme S, et al. Endovascular stent graft repair of mycotic aneurysms of the thoracic aorta. *J Cardiovasc Surg (Torino)* 2005;46(2):155-161
- Van Doorn RC, Reekers J, de Mol BA, Obertop H, Balm R. Aorto-esophageal fistula secondary to mycotic thoracic aortic aneurysm: endovascular repair and transhiatal esophagectomy. *J Endovasc Ther* 2002;9(2):212-217