Stent-graft Implantation for Clinically Diagnosed Syphilitic Aortic Aneurysm in an HIV-infected Patient

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We describe our experience with stent-graft placement in a patient with a clinically diagnosed syphilitic aortic aneurysm. The patient was a 43-year-old man with syphilitic and human immunodeficiency virus (HIV) co-infection. Computed tomography (CT) revealed an aortic aneurysm with 89 mm in maximum size which was located at distal aortic arch and was considered syphilis derived saccular aneurysm. The aneurysm was judged at high risk of rupture from its shape. We decided to perform stent-graft implantation. Before surgery, the patient was given antibacterial and anti-HIV agents. Hand-made fenestrated stent graft by Tokyo Medical University was implanted. The graft was placed from the ascending aorta to Th 9 level in the descending aorta. The aneurysm completely disappeared during follow-up, with no flare-up of syphilitic infection up to 2 years after surgery. The number of patients with syphilis and human immunodeficiency virus co-infection is now increasing. Stent-graft implantation may be an effective treatment in such immunocompromised patients.

Keywords: stent graft, syphilitic aortic aneurysm, HIV infection

Introduction

Recently, the number of stent-graft implantation has been increasing in patients with thoracic aortic aneurysms. We describe our experience with a human immunodeficiency virus (HIV)-positive, immunocompromised patient who underwent stent-graft implantation for a clinically diagnosed syphilitic aortic aneurysm. The aneurysm completely disappeared 6 months after the surgery without the sign of recurrence up to 2 years.

Case Report

The patient was a 43-year-old man suffering from discomfort of the abdomen. He had a history of acute nephritis. The family history was irrelevant to the current disorder. The patient worked as a waiter and visited a local clinic due to abdominal discomfort. Blood tests revealed that he was positive for HIV antibodies and syphilitic infection. An abnormal shadow was found at a chest X-ray. Computed tomography (CT) of the chest
revealed an aortic aneurysm at the distal aortic arch. The patient was referred to our hospital for treatment.

On admission, his height was 182 cm and the body weight was 65 kg. The blood pressure was 119/53 mmHg, the pulse rate was 88 beats per minute, and the body temperature was 36.8°C. The entire body was covered by a rash. Alveolar breathing sound and heart sound were normal. On blood tests (performed at the time of presentation to the previous physician), the hemoglobin concentration was 12.3 g/dL, the white-cell count was 6320/µL, the C-reactive protein level was 0.5 mg/dL, the rapid plasma reagin (RPR) test (a qualitative test for the detection of syphilis) was 1:1024, the Treponema pallidum hemagglutination titer was 1:81920, the CD4-positive T-cell count was 54/µL (normal range: 700 to 1300), and the HIV titer exceeded 20,000 copies/µL. Chest radiography disclosed marked protrusion of the first left arch. A 12-lead echocardiogram was normal except for left axis deviation. A chest CT scan showed an aneurysm with 89 mm in maximum size at the distal aortic arch associated with bone destruction in the thoracic vertebra and the left ribs. Lateral protrusion was also observed (Fig. 1). An aortic aneurysm due to syphilitic infection was strongly suspected clinically. The shape and size of the aneurysm suggested a high risk of rupture. Urgent application of surgical treatment was scheduled, but open thoracic surgery was considered very risky because of his state of immunodeficiency. Therefore, we decided to perform stent-graft implantation after adequate antibacterial treatment. On magnetic resonance angiography of the head and neck, both vertebral arteries converged into the basilar artery.

The patient received aminobenzyl penicillin (3 g/day) for 21 days to treat syphilis. Because neurosyphilis was also complicated, ceftriaxone (2 g/day) was given for 14 days. Anti-HIV therapy with fosamprenavir, ritonavir, and emtricitabine/tenofovir was also performed at the same time. Opportunistic infection due to immunodeficiency was not recognized.

One week after the completion of aminobenzyl penicillin treatment, hand-made fenestrated stent graft by Tokyo Medical University was implanted. A 6-French sheath was placed in the right brachial artery. The right femoral artery was exposed and incised. A 0.032-inch guidewire (Radifocus®; Terumo, Tokyo, Japan) was inserted into the right brachial artery sheath and exteriorized through the right femoral artery. The sheath containing the stent graft was introduced into the aortic arch via the right femoral artery, using the pull-through technique. We used a 5-segment Z-shaped stainless steel stent covered with a polytetrafluoroethylene (e-PTFE) graft (Fig. 2). At first, a non-fenestrated stent graft was placed at just distal part of the origin of the left common carotid artery. Thus, the left subclavian artery was occluded.
by the stent graft. Next, a fenestrated stent graft was placed into the ascending aorta and positioned so that the fenestrations correspond to the orifices of the brachiocephalic artery and the left common carotid artery. When the second (fenestrated) stent graft was placed, the non-fenestrated stent graft was supposed to move slightly towards the distal side of the aorta owing to the pressure of aortic flow because the proximal edge of first stent graft had not been adequately secured. We took this slip into consideration when we decided the initial position of the first stent graft. Finally, these two stent grafts overlapped for the distance of a 1.5 Z-shaped stent and the grafts were placed from the ascending aorta to Th 9 level in the descending aorta. An extremely tiny endoleak was observed at the lesser curvature of the aortic arch, however, we decided to finish the procedure at this moment and to follow the patient. Postoperative awakening of the patient was smooth, and no complications were observed during hospitalization. CT performed on 7th postoperative day showed no signs of endoleak. On the 8th postoperative day, the patient was discharged from the hospital in good condition.

A CT scan performed 6 months after the surgery showed that the aneurysm had disappeared completely (Fig. 3). The HIV titer decreased to 40 copies/µL in 2 months after the beginning of the treatment, and the CD4-positive T-cell count rose to 261/µL. The RPR titer decreased to 1:64 about 1 year after the surgery, and syphilis infection was considered cured. And there was no evidence of aneurysmal expansion or flare-up of infection up to 2 years after the surgery.

Discussion

Syphilis is a sexually transmitted disease caused by the bacterium Treponema pallidum. It is classified from stages I to IV on the basis of clinical course and disease stage. Late syphilis is extremely rare because of recent advances in antibacterial agents. However, a rise in the number of homosexual couples resulted in increased cases of syphilis.1 Syphilitic aortic aneurysms are mainly seen in stage III syphilis and are a final manifestation of syphilitic arteritis. Syphilitic aortitis develops in about 10% of patients with untreated syphilis and most commonly affects the ascending aorta (46%), followed by the aortic arch (29%).2–4 Our patient had HIV infection...
as well as a syphilitic aortic aneurysm. We could not get definitive diagnosis of syphilitic aortic aneurysm because of a lack of pathological specimen, however, syphilitic aortic aneurysm was strongly suspected from its clinical manifestation in young man. Recently, the incidence of syphilis and HIV coinfection has been rising. A study reported that 25% of patients with newly diagnosed syphilis had HIV infection. Syphilis progresses rapidly in HIV-infected patients, and it may further suppress host immunity in patients with HIV infection.

In our patient, surgical aortic arch and descending aortic replacement might be a rational treatment because he was a 43-year-old man: however, very high early mortality of 22.6% is reported in HIV-infected patients in the cardiac surgery. In addition, surgical management of these mycotic aneurysms is associated with high risks and mortality. In contrast, the outcomes of endovascular treatment for such aneurysms were almost acceptable. We therefore, abandoned open thoracic surgery and decided to perform stent-graft implantation although the number of HIV-infected patients who have undergone EVAR treatment remains very few. Our success was partially contributed by the adequate treatment of syphilis with effective antibacterial agents before surgery to control syphilitic infection. Syphilis is an infectious disease that responds well to antibacterial agents, thus cure is often achieved. In our patient, syphilis was cured by preoperative treatment with adequate doses of antibacterial agents. It might prevent new development of aneurysms at the site of stent-graft implantation, including the landing zone.

We used a hand-made fenestrated stent graft in our patient because of a lack of commercial availability of such grafts in Japan. This graft required the landing zone at least 15 mm. The distance of the proximal landing zone at the distal aortic arch was adequate in this case, therefore a non-fenestrated stent graft was placed at just distal part of the origin of the left common carotid artery. However, a possibility of endoleak was considered quite high, because the shape of the landing zone was reverse taper form. Then, we applied a fenestrated stent graft. This graft allowed the ascending aorta to serve as the proximal landing zone and stabilized the distal stent graft which may prevent its migration. The fenestrations were able to preserve blood flow to the brachiocephalic artery and the left common carotid artery. We placed the stent graft from the ascending aorta to Th 9 level in the descending aorta to ensure long-term outcomes, and succeeded in complete exclusion which resulted in the disappearance of the aneurysm 6 months after the surgery. However, the non-fenestrated stent graft might seem to migrate for the distance of a 0.5 Z stent under the influence of the bending of the aorta. If a type 3 endoleak occurred, we would implant an additional non-fenestrated stent graft between the two stent grafts.

In our patient, the left subclavian artery had to be occluded to secure an adequate landing zone. In case of both vertebral arteries supply blood to the basilar artery, the left subclavian artery can be occluded without the fear of ischemia of the brain. Although, coil embolization of the left subclavian artery is required to treat type II endoleak in some cases, that was not needed in this case fortunately.

When an aneurysm is located near the origin of the
left common carotid artery like our patient, commercially available stent graft frequently requires debranching technique. Debranching procedure may be a risk factor for infection in immune-deficient patients like ours. Our stent graft can avoid the debranching procedure and may reduce the risk of infection. In addition, the long term results of debranching technique are unknown. Application of debranching technique to young patient is still controversial. Because of less invasiveness of our fenestrated stent-graft technique, it might be a good alternative for the patients with high risk including extensive vasculitis. Because long term outcome of this stent graft is still unclear, close follow-up is mandatory.

Conclusion

Placement of a hand-made fenestrated stent graft resulted in a good outcome in an HIV-infected patient with a clinically diagnosed syphilitic thoracic aortic aneurysm. The recent increase in the number of patients with syphilis and HIV co-infection will probably lead more patients with high-risk conditions in this field. Preoperative antibacterial therapy for syphilis combined with stent-graft implantation may be an effective alternative in such patients.

Disclosure Statement

None of the authors have a financial or other type of conflict of interest regarding this work.

References