Turkish Journal of Thoracic and Cardiovascular Surgery 2019;27(4):576-579
http://dx.doi.org/doi: 10.5606/tgkdc.dergisi.2019.18001

Case Report / Olgu Sunumu

Acute aortic thrombosis in long-term after endovascular aneurysm repair: A case report

Endovasküler anevrizma tamiri sonrası uzun dönemde akut aort trombozu: Olgu sunumu

Gülen Sezer Alptekin Erkul, Sinan Erkul

Department of Cardiovascular Surgery, Kütahya University of Health Sciences Evliya Çelebi Training and Research Hospital, Kütahya, Turkey

ABSTRACT

Acute aortic thrombosis which develops in the long-term following an endovascular aneurysm repair is rare. A 78-year-old male patient presented with rest pain and sudden-onset coldness at lower limbs for four hours. His medical history revealed an endovascular aneurysm repair for an infrarenal abdominal aortic aneurysm two years ago. He was diagnosed with acute ischemia at lower limbs due to acute thrombosis of the infrarenal aorta. We first performed an axillobifemoral bypass surgery for limb salvage. Due to recurrent thromboses of the left limb of the graft during long-term follow-up, we applied aortobifemoral bypass procedure to provide adequate lower limb flow.

Keywords: Acute aortic thrombosis, aortobifemoral bypass, axillobifemoral bypass, endovascular aneurysm repair.

ÖZ

Endovasküler anevrizma tamiri sonrası uzun dönemde gelişen akut aort trombozu nadirdir. Yetmiş sekiz yaşında bir erkek hasta dört saattir istirahat ağrısı ve alt ekstremitelerde ani başlangıçlı soğukluk ile başvurdu. Öyküsünden, iki yıl önce infrarenal abdominal aort anevrizması nedeniyle endovasküler anevrizma tamiri uygulanmış olduğu öğrenildi. Hastaya infrarenal akut aort trombozuna bağlı alt ekstremitelerde akut iskemi tanısı kondu. Öncelikle ekstremitenin kurtarılması amacıyla aksillo-bifemoral baypas uygulandı. Uzun dönem takip sırasında greftin sol bacağının tekrarlayan trombozları nedeniyle, yeterli alt ekstremite akımı sağlamak amacıyla aorto-bifemoral baypas işlemi yapıldı.

Anahtar sözcükler: Akut aort trombozu, aorto-bifemoral baypas, aksillo-bifemoral baypas, endovasküler anevrizma tamiri.

Acute aortic thrombosis (AAT) is a rare entity which is commonly caused by an aortic saddle embolus or thrombosis of an atherosclerotic aorta.[1] Emergent bilateral transfemoral embolectomy and anatomic or extra-anatomic bypass procedures are the conventional treatment modalities for limb salvage.[1]

Herein, we present a case of ATT due to an endovascular aneurysm repair (EVAR) procedure which was performed two years ago.

CASE REPORT

A 78-year-old male patient presented with rest pain and sudden-onset coldness at lower limbs for four hours. His medical history revealed an EVAR procedure for an infrarenal abdominal aortic aneurysm (AAA) two years before. The pulses of lower limbs were non-palpable. There was cyanosis at lower limbs and lower abdomen. Arterial blood gas analysis indicated mild metabolic acidosis with a pH value of 7.32. Urgent thoracoabdominal computed tomography angiography (CTA) revealed the thrombotic occlusion of bilateral common iliac arteries and infrarenal abdominal aorta involving the stent graft (Figure 1a). Following an urgent bilateral transfemoral embolectomy, pulsatile proximal flow was compromised. Thus, we performed an axillobifemoral bypass for limb salvage with an 8-mm ringed, expanded polytetrafluoroethylene graft (C. R. Bard Inc., Tempe, AZ, USA). After the operation, the femoral arterial pulses were palpable and Doppler ultrasonography revealed an adequate flow in the popliteal and tibial arteries bilaterally with an ankle-brachial index (ABI) of 0.8. The symptoms were relieved and ischemic signs were disappeared.

Received: March 31 2019 *Accepted*: July 16, 2019 *Published online*: October 23, 2019

Correspondence: Gülen Sezer Alptekin Erkul, MD. Kütahya Sağlık Bilimleri Üniversitesi Evliya Çelebi Eğitim ve Araştırma Hastanesi Kalp ve Damar Cerrahisi Kliniği, 43040 Kütahya, Turkey. Tel: +90 536 - 718 60 05 e-mail: gsezeralptekin@hotmail.com

Cite this article as:
Alptekin Erkul GS, Erkul S. Acute aortic thrombosis in long-term after endovascular aneurysm repair: A case report. Turk Gogus Kalp Dama 2019;27(4):576-579

Figure 1. Computed tomography angiography images. **(a)** Thrombotic occlusion of abdominal aorta involving stent graft. **(b)** At six months of follow-up, grafts were patent.

At six months of follow-up, CTA revealed that the axillobifemoral bypass grafts were patent (Figure 1b).

Subsequent recurrent thrombosis of the left limb of the graft required several embolectomy procedures. However, during the third year of follow-up, chronic ischemic signs and rest pain appeared on the left lower limb. Thus, for the limb salvage of the left lower limb and for superior long-term patency for the right lower limb, we performed an aortabifemoral bypass via a transperitoneal approach. There was no adequate infrarenal neck for aortic cross-clamping due to the nitinol wires extending approximately the suprarenal level. Therefore, we placed the aortic cross-clamp on the thoracic aorta. Following clamping, the aneurysmatic sac of the aorta was incised vertically. The debris materials and organized thrombi were removed. The wires were cut with the wire scissors without destroying the aortic wall (Figure 2a). The free-ended

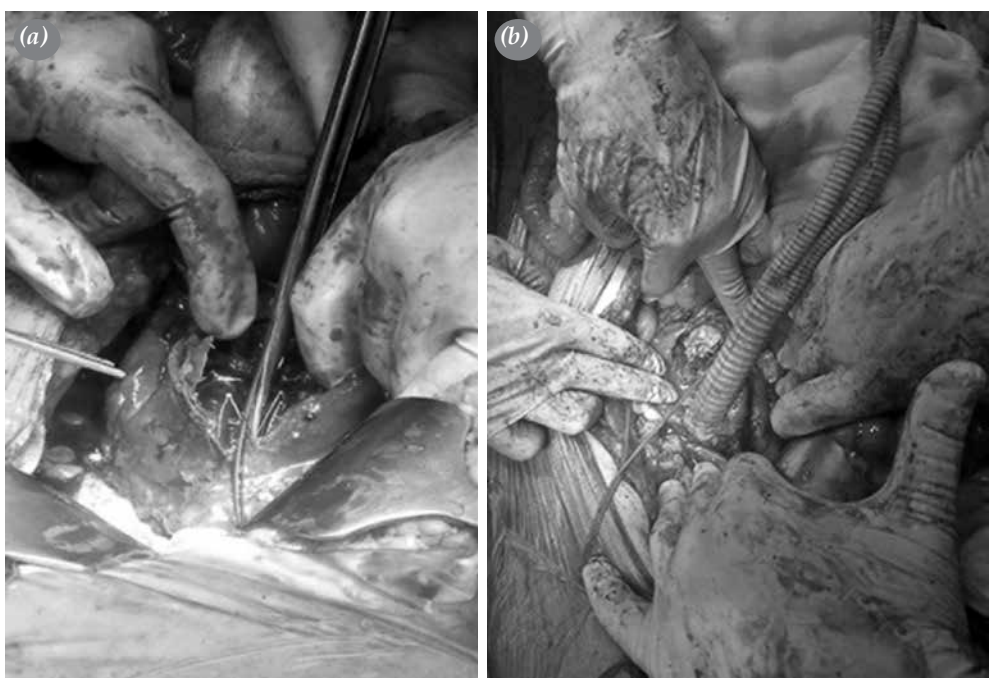

Figure 2. Intraoperative images. **(a)** The debris material with organized thrombi and nitinol wires of stent graft inside aorta. **(b)** A Dacron Y graft was anastomosed to aorta with an end-to-end fashion. The wrapped stent graft is seen on the left.

wires were stabilized with sutures and surrounded by Teflon felt to avoid the damage to the peripheral tissues. Aortobifemoral bypass was performed using a 16/8-mm Dacron Y graft (MAQUET Intervascular, Cedex, France) (Figure 2b).

At the end of the operation, the femoral, popliteal, and posterior tibial arterial pulses were palpable with an ABI of 1.0. At 24 months of follow-up after the aortobifemoral bypass, the physical examination revealed palpable pulses of the lower limb arteries and no graft failure was observed. A written informed consent was obtained from the patient.

DISCUSSION

Over the past two decades, EVAR has gained popularity as a treatment option for AAA repair, although conventional open surgical repair was considered the first-choice approach previously.[2]

Although EVAR is a less invasive treatment alternative to open surgery, it is not free of complications and still may result in severe morbidity and mortality.[3] Early and late graft failures may lead to primary or secondary conversion to open repair. Endoleaks are the main reason for primary and secondary interventions.[4,5] Also, limb occlusion is the most common complication among the ischemic complications due to the kinking of the limb, and migration or the dislocation of an endograft component.[3] However, AAT due to EVAR, as in our case, is very rare.

Mantas et al.[6] defined many anatomic characteristics and predictors of limb occlusion for EVAR treatment. The CTA imaging of our patient revealed that a severely angulated proximal neck of the aorta and calcification and kinking of the iliac arteries which were already unfavorable characteristics for an EVAR treatment. It is evident that the preoperative CTA imaging should be evaluated very carefully when EVAR is considered. The most optimal endovascular device system for the patient is also important.

The proximal aortic clamping sites for abdominal aortic surgery are infrarenal, suprarenal, supraceliac, and thoracic levels.[7,8] Infrarenal and suprarenal clamping remained unfeasible in our case, as the nitinol wires were extending to the suprarenal level. Perini et al.[9] used infrarenal clamping for late open conversion after EVAR for grafts with suprarenal fixation in their center with satisfactory results. However, none of them were aortic thromboses. The aortic neck for proximal anastomosis was limited in our case, due to the occluded aorta, and to maintain an adequate proximal aortic flow, we preferred the upper level for clamping. If supraceliac clamping had been preferred in our case, our attempt would be to avoid any hazardous complication related to bowel injury, due to the tissue adhesions as a result of the inflammatory effects of the stent graft and aortic thrombosis. Thus, we preferred the thoracic level for cross-clamping, which is suggested as a proximal clamping method for AAA surgery in the literature, as long as the clamping duration is brief.[7]

In patients at a high operative risk, an extra-anatomic bypass such as axillofemoral bypass is used as an alternative arterial reconstructive procedure. Urgent late open conversions after failed EVAR are associated with poor long-term survival rates.[8] Also, elective late open conversion after failed EVAR seem to be associated with improved outcomes than urgent conditions.[10] Since our patient was admitted with a mild acidosis due to the ischemic status, we decided to perform an extra-anatomic bypass as the first-choice for recovering the ischemic signs rapidly and providing survival. Nevertheless, an aortofemoral bypass has excellent results for long-term.[11]

In conclusion, patients should be evaluated individually for the treatment of AAA, and the anatomic criteria recommended for EVAR treatment should be well-defined for the patients to avoid catastrophic results. Unfavorable aortic anatomy is an important limitation for EVAR treatment. We believe that following the recommendations for anatomic criteria can reduce the number of late interventions, as well as the severity of late complications which are associated with high mortality and morbidity rates in the treatment of AAAs. Extra-anatomic bypass procedures should be kept in mind in urgent conditions for limb salvage. It should also be noted that the long-term patency rates of extra-anatomic bypass procedures are not excellent, whereas aortobifemoral bypass surgery is a conventional gold-standard treatment modality which yields excellent long-term patency rates.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. Surowiec SM, Isiklar H, Sreeram S, Weiss VJ, Lumsden AB. Acute occlusion of the abdominal aorta. Am J Surg 1998;176:193-7.

2. Paravastu SC, Jayarajasingam R, Cottam R, Palfreyman SJ, Michaels JA, Thomas SM. Endovascular repair of abdominal aortic aneurysm. Cochrane Database Syst Rev 2014;1:CD004178.
3. Maleux G, Koolen M, Heye S. Complications after endovascular aneurysm repair. Semin Intervent Radiol 2009;26:3-9.
4. Oğuz E, Posacıoğlu H, Parıldar M, Apaydın A. Partial removal of endovascular stent grafts: technical considerations in three cases. Turk Gogus Kalp Dama 2013;21:1074-8.
5. Parildar M, Posacioglu H. Endoleaks after endovascular aortic aneurysm repair: definition and treatment. Turk Gogus Kalp Dama 2011;19 Suppl 2:46-50.
6. Mantas GK, Antonopoulos CN, Sfyroeras GS, Moulakakis KG, Kakisis JD, Mylonas SN, et al. Factors predisposing to endograft limb occlusion after endovascular aortic repair. Eur J Vasc Endovasc Surg 2015;49:39-44.
7. Büket S, Atay Y, Islamoğlu F, Yağdi T, Posacioğlu H, Alat I, et al. Proximal clamping levels in abdominal aortic aneurysm surgery. Tex Heart Inst J 1999;26:264-8.
8. Perini P, Gargiulo M, Silingardi R, Piccinini E, Capelli P, Fontana A, et al. Late open conversions after endovascular abdominal aneurysm repair in an urgent setting. J Vasc Surg 2019;69:423-31.
9. Perini P, de Troia A, Tecchio T, Azzarone M, Bianchini Massoni C, Salcuni P, et al. Infrarenal endograft clamping in late open conversions after endovascular abdominal aneurysm repair. J Vasc Surg 2017;66:1048-55.
10. Klonaris C, Lioudaki S, Katsargyris A, Psathas E, Kouvelos G, Doulaptsis M, et al. Late open conversion after failed endovascular aortic aneurysm repair. J Vasc Surg 2014;59:291-7.
11. Onohara T, Komori K, Kume M, Ishida M, Ohta S, Takeuchi K, et al. Multivariate analysis of long-term results after an axillobifemoral and aortobifemoral bypass in patients with aortoiliac occlusive disease. J Cardiovasc Surg (Torino) 2000;41:905-10.