

A hybrid therapy as a third approach for type 1 proximal endoleak of thoracic endovascular aortic replacement: Carotid-carotid bypass and re-redo endovascular therapy



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Introduction: In selected cases with thoracic aortic aneurysm (TAA), thoracic endovascular aortic replacement (TEVAR) is commonly used and shall be proper therapy method. We are presenting a case of TAA previously treated twice by endovascular aortic approaches and complicated by type 1 endoleak.

Case: A 67-year-old male patient was admitted to our clinic with back pain at rest. He underwent TEVAR five years ago, twice in 6 month. With contrasted computed tomography of chest and abdomen, a new type 1 proximal endoleak was diagnosed, and after routine preoperative follow up, the patient was operated on. At the same session right to left carotid-carotid bypass and re-redo TEVAR were performed. The new endovascular graft was placed as the proximal landing zone to be set between left carotid artery and brachiocephalic truncus. The patient was discharged on postoperative day 4 without any problems.

Conclusion: As new techniques and methods have been developed, mortality rates have decreased to 2–3% but in older and high risk patients, mortality rates still remain high [1]. TEVAR is a safe and effective treatment method in the proper and selected patients with thoracic artery aneurysm [2]. Moreover, TEVAR can also be performed as a part of hybrid procedures for aortic aneurysms [3]. But it should be kept in mind that late secondary intervention rates are higher in TEVAR.

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Introduction

Thoracic aortic aneurysm (TAA) has always been one of the most complicated topics of cardiovascular surgery. The open surgery is not easy to perform and also the recovery period is long and vulnerable both for the surgeon and the patient. Moreover, open surgery has high a mortality and morbidity ratio especially in high risk, older patients and in patients with aortic arc involvement.

We are presenting a case of TAA – previously treated twice by TEVAR – with type 1 proximal endoleak.

Case

A 67-year-old male patient was admitted to our clinic with back pain at rest with a history of two operations for aortic aneurysm. Five years previously he underwent TEVAR in our institution for descending thoracic aortic aneurysm with Stanford Type B dissection (40 No. 20 cm Medtronic Talent Graft). In that procedure, proximal landing zone (PLZ) was kept between left carotid artery (LCA) and left subclavian artery (LSA). Six months after the operation for type 1 distal leak, he underwent a second TEVAR procedure in another institution. Five years' follow up have been uneventful.

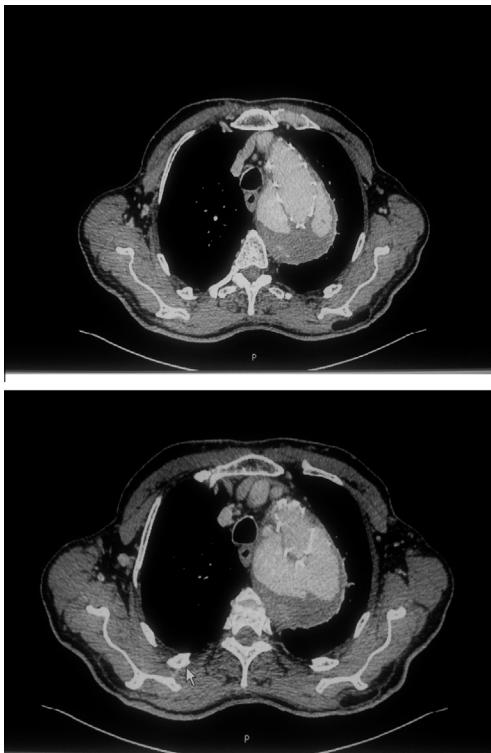


Figure 1. (a) and (b) Preoperative contrasted computed tomography.

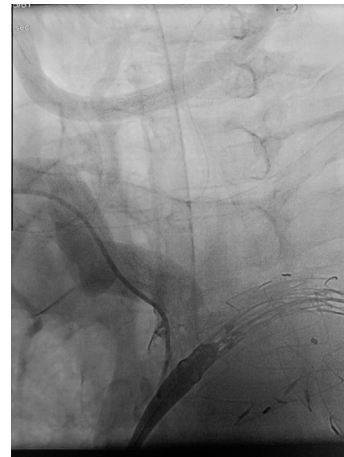


Figure 2. Angiography sight before the new stent graft placement. Carotidocarotid bypass on the upper part of the figure; old stent graft on the right left part of the figure.



Figure 3. Postoperative contrasted computed tomography of the chest and the neck.

In the latest admission, physical examination was normal; all peripheral pulses were palpable except the left upper extremity. In contrasted computed tomography (CT) (Fig. 1), the ascending aorta was 42 mm wide. Type 1 leak from the proximal edge was seen. After routine preoperative follow-up, the operation was scheduled.

Before the endovascular procedure, right to left carotidocarotid bypass was performed with PTFE graft (8 mm, 80 cm. Perouse, PFTR0880). via bilateral femoral incisions under general anesthesia, new endovascular graft (40X40, 200 mm, Medtronic TF4040C200X) was placed as the new PLZ between truncus brachiocephalicus (TB) and LCA (Fig. 2) No additional procedure was performed for LSA as there were no symptoms in left upper extremity.

The operation and the postoperative follow-up were uneventful. The patient was discharged on

postoperative day 4 without any problem after the control contrasted CT was seen (Fig. 3).

Discussion

As new techniques and methods have developed, mortality rates have decreased to 2–3% in open surgery but in older and high risk patients, mortality rates still remain high in thoracic aortic aneurysms [1]. Open surgery was the first choice in the past but with developing technologies, endovascular approaches became superior to open surgery. TEVAR is the safer and effective treatment method in the proper and selected patients especially with descending TAA [2]. As the indications for TEVAR are almost the same [4] with open surgery, TEVAR has become the first choice of treatment because of low mortality and morbidity rates compared with open surgery [3–7].

Moreover, limitations of both open surgery and TEVAR begin with the aortic arc involvement. Freezor et al. [8] reported LSA involvement as over 40% for the patients who had undergone TEVAR for TAA. Reports have shown that in-patients who had undergone TEVAR and LSA coverage, the incidence of arm, spinal cord and vertebrobasilar ischemia is 6%, 4% and 2%, respectively. These patients also have 5% risk for anterior circulation stroke and 6% for death [8]. Despite these adverse outcomes, some practitioners agree to perform LSA revascularization in some situations, particularly when there is a dominant left vertebral artery (60%), a previous left internal mammary coronary artery bypass graft or when the distal right vertebral segment is absent [9]. When LCA and TB are both included in aneurysms, hybrid procedures (TEVAR + complementary surgeries) come into consideration [3,10]. Hughes et al. [10] performed proximal ascending aorta based debranching with TEVAR in 12 patients with an adequate PLZ in ascending aorta, carotico-carotid bypass with TEVAR in twelve patients with adequate PLZ between TB and LCA. Johnston et al. [11] have reported that staged hybrid approach for extensive TAAs combining proximal TEVAR with open distal TAA repair is safe and appears to be an effective alternative to traditional open repair and may decrease morbidity. Both Johnston and Hughes reported technical success at 100% and mortality at 0%.

When the aortic wall loses unity (aortic dissection or an external injury), TEVAR's late complications are more frequent. Four open re-interventions were needed in Fernandez et al. 20

patients' series of aortic injury [6]. Fernandez et al. also reported a lack of proximal device-wall apposition in eight patients (40%), intragraft mural thrombus formation during the first six months in seven patients (35%), and an asymptomatic fracture of the longitudinal reinforcing bar of the stent graft four years later in one patient (5%). Similarly, Beregi et al. [12] reported that the use of endografts in aortic dissection differs from that of degenerative aneurysm in that the expanding stent may perforate the dissecting flap, causing re-entry of flow, and enabling the false lumen distal from the stent graft to remain patent. No or incomplete thrombosis of the false lumen was observed in 14% of patients with aortic dissection in this study. Leurs et al. [13] published a 443-case series of TEVAR, reporting endoleak and secondary intervention rates as 4.2% and 5.2% (respectively) for the aortic aneurysm group and 1.5% and 1.5% (respectively) for the aortic dissection group.

It can be said that TEVAR is superior in selected cases and emergency situations where mortality and morbidity rates are higher in open surgery. But it should be kept in mind that TEVAR is frequently compelling for surgeons in late interventions. It would be the third approach for the same anatomical site and PLZ would be between LCA and TB in our case. We did not perform a complementary operation for the left arm in the first session five years ago as the patient had no complaint in the five years we did not revascularise the left arm in this third approach. But to achieve the adequate flow of the brain, we performed right to left carotico-carotid bypass. We believe that in TAAs that involve LCA and LSA, closure of the native orifices with endovascular grafts and performing extra-anatomic bypasses (especially for carotid artery) would be a better way either to prevent type 1 proximal leaks or to achieve enough blood flow of the brain. In this method, LCA must be bypassed extra-anatomically in the same session with TEVAR, but LSA may be followed and shall be bypassed if left arm symptoms occur.

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