# Endovascular Treatment of Aortic Dissection due to Suture Line Dehiscence after Aortic Graft Replacement for Type A Aortic Dissection : Two Cases Report

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## Introduction

Aortic anastomotic leak is an uncommon complication after ascending aortic replacement for acute aortic dissection. Redo-surgery is the traditional standard treatment in spite of high mortality and morbidity. Recently, endovascular treatment has been attempted as an alternative approach in a few case reports. Herein, we represent two cases of aortic anastomotic leak due to suture line dehiscence after aortic graft replacement for type A aortic dissection, which were successfully treated by coil with subsequent N-butyl cyanoacrylate embolization and Amplatzer vascular plug.

## Case description

### Case 1

- A 55-year-old male presented with progressive enlargement of false lumen in the aortic arch and descending thoracic aorta. 7 months ago, he underwent ascending aorta and hemiarch replacement for treatment of type A aortic dissection.
- Post op 5 days CT scan showed residual dissection in the aortic arch with contrast leakage at the distal anastomosis site(Fig.1A). It is considered aortic anastomotic leak as a cause of residual dissection in the aortic arch in this patient. 6 months later, follow up CT scan showed progressive enlargement of false lumen due to increased anastomotic leak. As compared to 6 months ago, the diameter of false lumen increased by more than 1cm. There was flow competition in false lumen at the level of distal descending thoracic aorta due to antegrade dissecting flow from anastomotic leak to the descending thoracic aorta with retrograde dissecting flow from reentry point in the left renal artery orifice to the descending thoracic aorta. Because of progressive enlargement of false lumen, endovascular occlusion of the AAL was planned. True lumen aortography showed sluggish dissecting flow due to scanty contrast leakage at the distal anastomosis site just below the brachiocephalic artery(Fig. 1B). An attempt was made to pass the guide wire through the leak point from false lumen to true lumen. The only way to get in false lumen in this patient was a reentry point in the left renal artery orifice. The guide wire was successfully entered into the false lumen through the reentry point. False lumen angiography showed sluggish antegrade dissecting flow in the aortic arch, considered to be due to tiny pinpoint leak at the anastomosis site and flow competition with retrograde dissection from reentry point at the left renal artery orifice(Fig. 1C). Therefore, the coil was used as an embolic agent for occlusion of leak site without worrying about coil migration. After putting the concerato coils and injecting histoacryl to reinforce occlusion effect, final true lumen aortography showed complete occlusion of the anastomotic leak as well as antegrade dissecting flow in the aortic arch(Fig. 1D). Contrast CT scan obtained 5 months after embolization showed occlusion of anastomotic leak as well as complete thrombosis of the false lumen(Fig.1E).

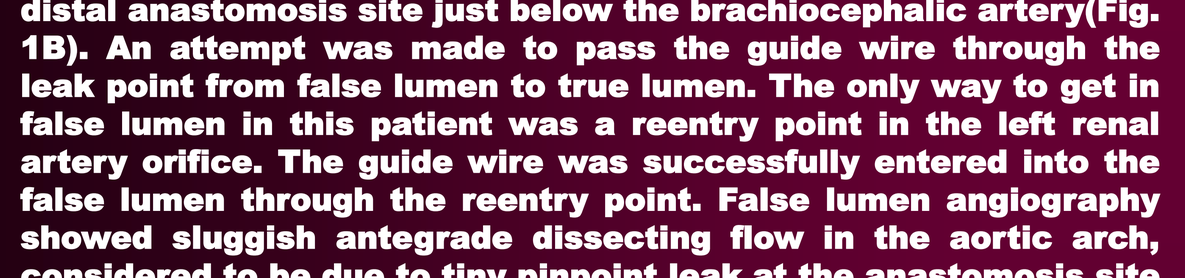


Figure 1 A. Contrast-enhanced CT image obtained 5 days after ascending aortic replacement shows contrast leakage in to the false lumen in the aortic arch (arrow).

B, C. Thoracic aortography shows contrast leak at the distal anastomosis of the aortic graft replacement just below the orifice of right brachiocephalic artery (arrow). False lumen angiography shows sluggish antegrade dissecting flow in the aortic arch.

D, E. Post-embolization thoracic aortography shows occlusion of the aortic anastomotic leak and false lumen flow in the aortic arch. Contrast enhancement chest CT scan obtained 5 months after embolization shows complete occlusion of anastomotic leak and false lumen by coils and N-butyl cyanoacrylate.

### Case 2

- A 52-year-old male presented with same problem as in the first case. He underwent ascending aorta and hemiarch replacement for treatment of type A AD 1 year ago.
- Post-op 1 week CT scan showed residual dissection in the aortic arch and descending thoracic aorta. There was entry point in the distal aortic anastomosis site(Fig. 2A). In this patient, it is considered aortic anastomotic leak as a cause of residual dissection in the aortic arch. Post op 1 year CT scan showed markedly increased dissecting flow. The diameter of entry point in the anastomosis site was increased as well as markedly increased false lumen diameter, therefore endovascular occlusion of the AAL was planned. An attempt was made to advance the guide wire into the true lumen, and true lumen thoracic aortography showed large dissecting aneurysm in the aortic arch(Fig. 2B). Guide wire was advanced into the false lumen to occlude entry point in the arch, and successfully pass the guide wire through the entry point from false lumen to true lumen. Because of fast antegrade dissecting flow in the aortic arch in this patient, AVP2 was used as an embolic agent to avoid migration of embolic agent. After placing the ansel guiding sheath in the true lumen, first thin disk part of AVP type 2 was deployed in the true lumen. And then, gently pull back ansel sheath so that it firmly adheres dissecting flap, then deploy other parts of AVP. The disc portion of the AVP was firmly attached to the dissecting flap. Finally, we gently push the AVP to collapse other parts of AVP in order to completely occlude entry point. Final true lumen aortography showed complete occlusion of the dissecting flow in the aortic arch(Fig. 2C). Follow up CT scan showed complete thrombosis of the false lumen(Fig. 2D, E)


Figure 2 A. Computed tomography angiography shows aortic anastomotic leak in the aortic arch (arrow).D. MIP image shows a pseudoaneurysm and severe athetrosclerotic change.

B, C. Thoracic aortography (right) shows large dissecting aneurysm in the aortic arch (arrow). Thoracic aortography after deployment of AVP type II shows complete occlusion of aortic anastomotic leak (arrow) as well as dissecting false lumen in the aortic arch

D, E. Computed tomography angiography obtained 10months after deployment of AVP type II shows complete occlusion of aortic anastomotic leak by AVP type II (arrow) and thrombotic false lumen in the descending thoracic aorta,

## Discussion

Aortic anastomotic leak (AAL) is defined as a direct forward blood flow from the distal anastomotic site to the false lumen after ascending aortic replacement for acute aortic dissection. Several risk factors may lead to AAL include degeneration of the aortic wall, patent false lumen, surgical procedure type such as the use of biologic glue to reinforce the dissected aortic layer, which is associated with a certain amount of risk of aortic wall necrosis, infection, and underlying Marfan syndrome. Additionally, after a surgical aortic replacement, it may be seen when a suture line dehiscence between the aortic prosthesis and the native aorta.
Surgical repair of AAL has been considered as the standard therapy. However, in case of presence of a persisting false lumen in the aortic arch, these surgical procedures are considered to be high risk. Recently, several interventional approaches to AAL closure have been attempted, such as stent-graft, trans-catheter embolization, and closure devices. In the case of stent-graft, the landing zone may be limited because AAL tends to occur mainly in the ascending aorta, approaching aortic arch branches. Trans-catheter embolization using coils has been shown to be effective in AAL, but coil migration could occur due to a lack of radial force. The use of Amplatzer occluders for AAL trans-catheter closure requires careful consideration of several factors. The distance between the leak and other important structures such as the aortic valve, coronary artery, and aortic arch branches must be sufficient. Additionally, the size and flexibility of the delivery system should be considered, as the AAL is small and inelastic. Fabric devices such as VSO and ADO I require large delivery sheaths, which can be difficult to cross the leak. In contrast, fabric-free occluders such as ADO II and the AVP family allow for small delivery sheaths, making them more suitable for small AALs. In the first case, it was possible to use a coil, because there was sluggish antegrade dissecting flow in the aortic arch, considered to be due to tiny pinpoint leak at the anastomosis site and flow competition with retrograde dissection from reentry point. In the second case, there was fast antegrade dissecting flow in the aortic arch, therefore AVP2 was used as an embolic agent to avoid migration of embolic agent, instead of coil.

## Conclusion

Transcatheter closure using AVP and coil with histoacryl appears to be a feasible and effective alternative treatment of AAL. The choice of optimal embolic agent depends on size of leak point and antegrade flow velocity.