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Case Report

Late Combined Aortic Complication after TEVAR: Proximal Endoleak, False Lumen Progression, and True Lumen Rescue – Case Report

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Abstract

Background: Thoracic endovascular aortic repair (TEVAR) is the preferred treatment for complicated type B aortic dissections. Late complications, particularly in chronic dissections, may combine multiple mechanisms such as proximal type I endoleak, false lumen progression, and true lumen compression, posing significant risks for rupture and malperfusion. ***Case presentation:*** We report the case of a 62-year-old man with a history of TEVAR for ruptured thoracic aneurysm secondary to chronic type B dissection. One year later, he presented with persistent thoracic pain. Computed tomography angiography (CTA) revealed a proximal type IA endoleak, false lumen progression with distal re-entry, and marked true lumen compression in the descending thoracic and abdominal aorta. The left renal artery originated from the false lumen. The multidisciplinary team opted for distal stent graft extension to exclude distal re-entries, depressurise the false lumen, and restore true lumen calibre. ***Discussion:*** This case illustrates the interplay between persistent proximal endoleak, distal re-entries, and false lumen pressurisation leading to adverse remodelling. True lumen compression is a key driver of malperfusion risk and reduced repair durability. Distal extension directly addresses both the haemodynamic and mechanical components of the complication. This approach aligns with the 2024 European Society of Cardiology (ESC) Guidelines, which recommend early reintervention for type I endoleaks in chronic dissections, particularly when associated with false lumen perfusion or malperfusion. ***Conclusion:*** Late combined complications after TEVAR require tailored, anatomy-driven strategies. Distal extension can effectively treat proximal endoleak, false lumen progression, and true lumen compression in a single intervention, improving long-term aortic stability and patient outcomes.

Keywords: TEVAR, proximal type IA endoleak, false lumen progression, true lumen compression, distal extension, chronic type B dissection, ESC Guidelines.

INTRODUCTION

Thoracic endovascular aortic repair (TEVAR) has become the preferred treatment for complicated type B aortic dissections [1], offering lower early morbidity and mortality compared to open surgery. However, late complications remain a significant challenge, particularly in chronic dissections with complex arch morphology [2]. Among these, the combination of a proximal type I endoleak, false lumen progression, and true lumen compression is rare but clinically significant, as it jeopardises both aortic stability and visceral perfusion [3]. We present a case illustrating this triad and discuss the rationale for distal extension as the chosen therapeutic strategy, in light of recent evidence and updated international guidelines [1].

CASE REPORT

A 62-year-old man with a history of hypertension, treated with amlodipine 10 mg daily, had undergone TEVAR one year earlier for a ruptured thoracic aneurysm secondary to a Stanford type B aortic dissection (Figure 1). His past history also included left renal atrophy due to thrombosis of the left renal artery arising from the false lumen. He presented with a two-month history of thoracic pain. On admission, he was haemodynamically stable, with no signs of peripheral hypoperfusion, and neurological and respiratory examinations were unremarkable. Peripheral pulses were present and symmetrical.

CTA of the thoraco-abdominal aorta revealed a proximal type IA endoleak with a false lumen extending

from the origin of the left subclavian artery to the aorto-iliac bifurcation, with a distal re-entry at the left iliac artery (Figure 2). The aortic arch was of the gothic type, with poor proximal stent graft apposition along the lesser curvature ("bird-beak" sign). Critically, there was marked compression of the true lumen by the false lumen, significantly reducing the functional calibre of the descending thoracic and abdominal aorta (Figure 3). The left renal artery originated from the false lumen. Laboratory tests were unremarkable apart from mild anaemia (haemoglobin [Hb] 11.5 g/dL) and a C-reactive protein (CRP) of 2.1 mg/L. Electrocardiogram (ECG) showed atrial extrasystoles and left anterior fascicular block; echocardiography revealed preserved left ventricle (LV) ejection fraction (55 %) with normal wall motion.

The diagnosis was late false lumen progression after TEVAR for chronic dissecting thoracic aneurysm, complicated by a proximal type IA endoleak and significant true lumen compression. The multidisciplinary team decided on a distal extension of the stent graft to exclude distal re-entries, depressurise the false lumen, and restore true lumen calibre.

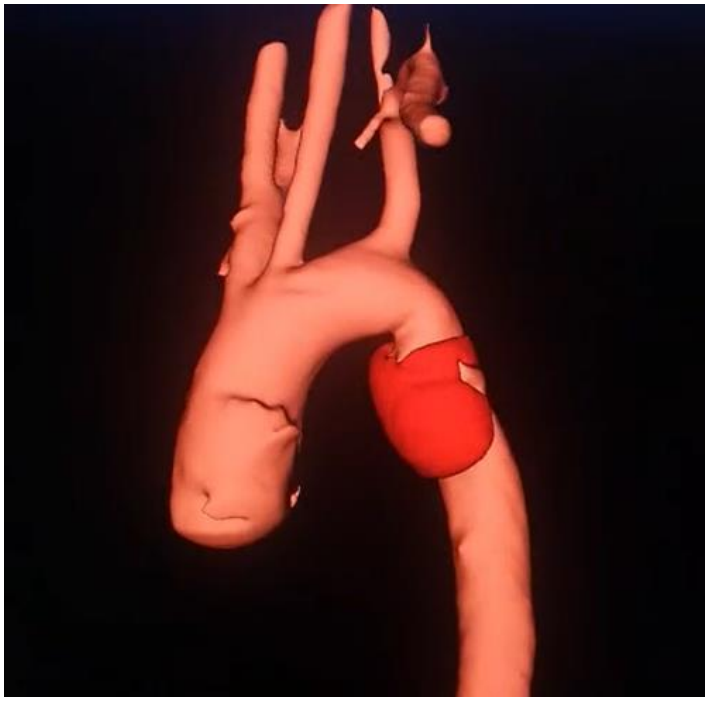

Figure 1: 3D reconstruction of computed tomography angiography (CTA) of the thoracic aorta before TEVAR, showing a large descending thoracic aneurysm involving the aortic arch and proximal descending segment

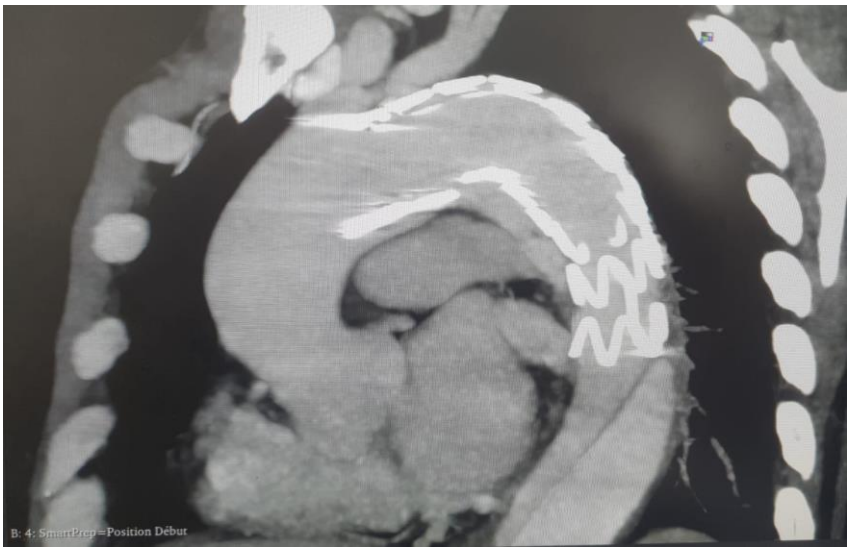

Figure 2: Post-TEVAR CTA demonstrating a proximal type IA endoleak at the lesser curvature ("bird-beak" configuration), with persistent opacification of the aneurysmal sac, consistent with continued false lumen perfusion

Figure 3: Post-TEVAR sagittal CTA showing the stent graft in the descending thoracic aorta, with persistent false lumen extension from the thoracic segment down to the infrarenal abdominal aorta and marked compression of the true lumen

DISCUSSION

This case exemplifies a complex late complication after TEVAR in chronic dissection, where the interplay between persistent proximal type I endoleak, distal re-entries, and false lumen pressurisation leads to progressive aortic remodelling failure [1,3]. The marked true lumen compression observed here is not merely an anatomical finding; it is a pathophysiological driver of malperfusion risk, aneurysmal expansion, and reduced durability of the initial repair [2]. In chronic dissections, the rigid, thickened intimal flap and the persistence of distal re-entries make complete false lumen thrombosis less likely, with reported rates as low as 30 % in some series [4], and reintervention rates approaching 60 % over long-term follow-up [3].

Recent literature underscores that in such scenarios, addressing only the proximal entry tear is insufficient [3,4]. The 2024 ESC Guidelines on aortic diseases recommend early reintervention for type I endoleaks, even if asymptomatic, particularly when associated with false lumen perfusion and signs of malperfusion or rapid aortic growth [1]. They also highlight that in chronic dissections, durable aortic remodelling often requires combined strategies: proximal sealing, distal re-entry closure, and, where indicated, true lumen expansion techniques [2]. Comparative analyses show that distal extension, Knickerbocker, and STABILISE techniques each have merits; however, in cases dominated by distal re-entries and long-segment true lumen compression, distal extension offers a direct, anatomically targeted solution with a favourable risk–benefit profile [4,3], provided spinal cord protection strategies are observed.

Reports by Canaud *et al.,* [3] and more recent series on false lumen embolisation and candy-plug techniques [4,5] confirm that eliminating distal inflow is key to depressurising the false lumen and promoting positive remodelling. However, embolisation alone does not address mechanical compression of the true lumen [3]. In contrast, distal extension re-establishes a uniform true lumen channel, improving visceral and spinal cord perfusion while facilitating false lumen thrombosis [3,4]. This aligns with the evolving consensus that in chronic post-dissection aneurysms, the therapeutic goal is not only exclusion of the aneurysmal

segment but also restoration of normal aortic flow dynamics [1,2].

Our case also resonates with the findings of the INSTEAD-XL trial [4], which demonstrated that promoting true lumen expansion and false lumen thrombosis in type B aortic dissection improves long-term outcomes. The decision to proceed with distal extension was therefore consistent with both anatomical imperatives and current guideline-driven practice [1], aiming to prevent rupture, relieve compression, and enhance long-term aortic stability.

CONCLUSION

Late combined complications after TEVAR for chronic dissecting thoracic aneurysm, particularly the triad of proximal type IA endoleak, false lumen progression and true lumen compression, require a tailored approach. Distal extension of the stent graft can simultaneously address distal re-entries, depressurise the false lumen and restore true lumen calibre, in line with the latest recommendations for comprehensive false lumen management. This case reinforces the importance of lifelong imaging surveillance after TEVAR and of prompt, anatomy-driven reintervention when adverse remodelling is detected.

Key Messages

- Late combined complications after TEVAR for chronic type B dissection can involve proximal type I endoleak, false lumen progression, and true lumen compression.
- True lumen compression is a critical determinant of malperfusion risk and adverse aortic remodelling.
- Distal stent graft extension can simultaneously exclude distal re-entries, depressurise the false lumen, and restore true lumen calibre.
- Current ESC 2024 Guidelines recommend early reintervention for type I endoleaks, especially when associated with false lumen perfusion or malperfusion signs.
- Lifelong imaging surveillance is essential to detect adverse remodelling and guide timely, anatomy-driven reintervention.

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