

Aortic arch stent-graft implantation due to an endovascular leak as the fourth aortic intervention in a challenging patient

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We present a 69-year-old female, former tobacco smoker, with hypertension, diabetes, and a history of aortic aneurysm, qualified for a novel procedure of branched aortic arch stent-graft implantation, as her fourth intervention on the aorta.

She underwent supra coronary ascending aorta replacement due to a large aneurysm (70 mm) and right lung upper lobe resection due to lung planocellular cancer four years earlier. After a year, a thoracoabdominal stent graft with visceral branches was implanted, followed by a thoracic stent graft below the left subclavian artery due to aortic aneurysm (Figure 1A).

Due to type IA endoleak, which occurred at the proximal end of the graft and resulted in persistent flow into the sac of the thoracic aneurysm (Figure 1B), the patient was qualified for another intervention involving implantation of a special stent graft with a branch to the brachiocephalic trunk.

Occlusion of the inflow towards the left common carotid artery and the left subclavian artery after implantation would have led to stroke and ischemia of the left upper limb; therefore, the patient underwent a carotid-carotid-subclavian bypass, one month before the procedure.

However, due to transient left-sided chest pain and exertional dyspnea, it was necessary to extend cardiac diagnostics. Fortunately, the resting electrocardiogram did not reveal ischemic changes, and troponin levels were not increased. Transthoracic echocardiography revealed proper function of the aortic valve, normal flow in the ascending aorta graft (Figure 1C, Supplementary material, Video S1) and aortic arch, and normal left ventricular

ejection fraction (60%). Gated single-photon emission computed tomography with dipyridamole confirmed adequate coronary flow reserve.

Finally, a novel single-branched stent graft (Nexus) was safely implanted in the aortic arch and brachiocephalic trunk (Figure 1D), which eliminated the leak and protected the patient against further growth of the aneurysm (Figure 1E). The patient, with three implanted aortic stent grafts (Figure 1F) was discharged in good condition after 5 days.

The Nexus system is indicated for patients with aortic arch pathologies, including aneurysms, dissection, pseudoaneurysms, or penetrating ulcers. Planer et al. [1] described initial evaluation of the Nexus system in 28 patients. The thirty-day mortality rate was 7.1%, stroke rate was 3.6%, and one-year mortality was 10.7%, without device or aneurysm-related deaths.

In the described case, the Nexus system was used due to a type IA leak. Endovascular leaks are the most common complications after aortic stent-graft implantation, which may lead to the expansion of the aortic aneurysm or even to its rupture [2].

Surgery-related risk estimation indicates an approximately 30-day risk of cardiovascular death, myocardial infarction, and stroke [3]. Endovascular abdominal aortic aneurysm repair is an intermediate surgical risk intervention (1%–5%), while aortic arch interventions are procedures with a higher risk of complications, including stroke or aortic valve injury [4].

Our patient was challenging because of the history of previous ascending aorta surgery, two aortic stent-graft implantations, and a planned intervention on the aortic arch.

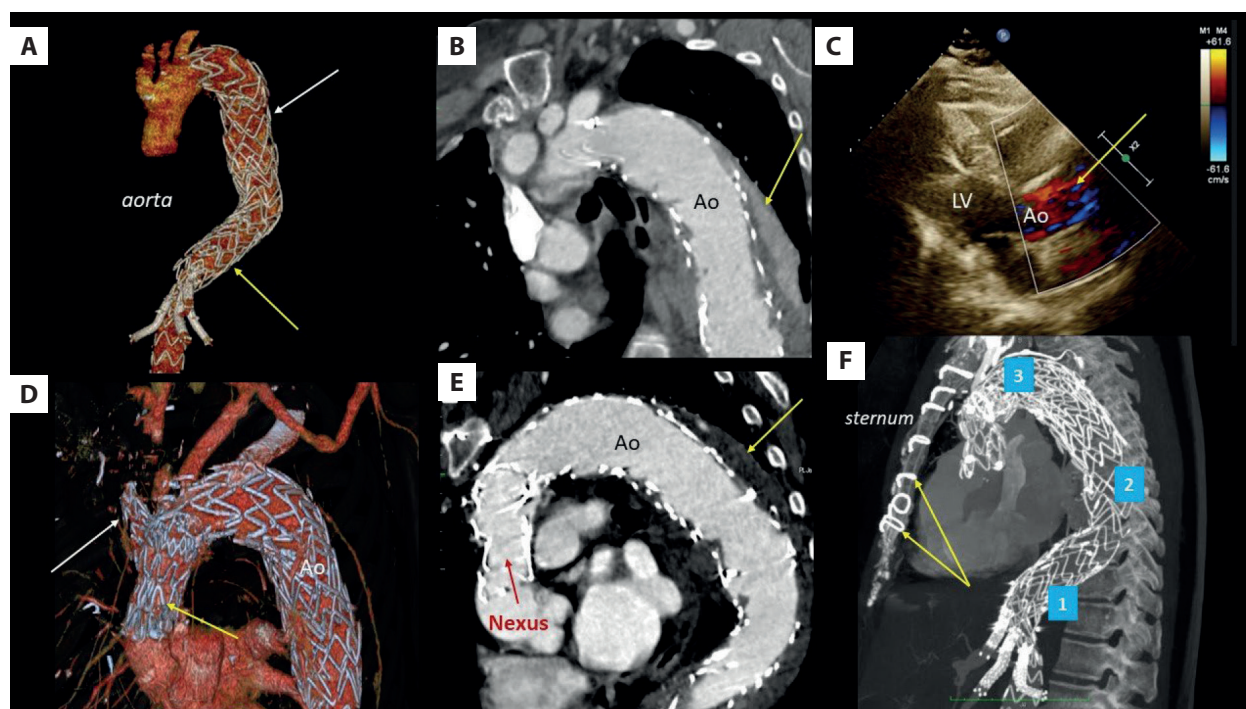


Figure 1. Computed tomography angiography and transthoracic echocardiography in a patient with a history of four procedures on the aorta. **A.** Computed tomography angiography of the aorta in 3D option: thoracic stent graft below the left subclavian artery (white arrow) and thoracoabdominal stent graft with visceral branches (yellow arrow). **B.** Computed tomography angiography: endovascular leak (arrow). **C.** Transthoracic echocardiography (color Doppler, long axis view): blood flow in the ascending aorta graft (arrow); see also Supplementary material, *Video S1*. **D.** Computed tomography angiography of the aorta in 3D option after the procedure: Nexus aortic arch stent graft (yellow arrows) and a branch to the brachiocephalic trunk (white arrow). **E.** Computed tomography angiography after the procedure: no endovascular leak (arrow). **F.** Computed tomography angiography: three aortic stent grafts in one patient (1–3); metal sutures on the sternum after cardiac surgery (arrows)

Abbreviations: Ao, aorta; LV, left ventricle

Biomarker measurements and noninvasive cardiac imaging were required because of transient unexplained symptoms in that high-risk patient [3]. O'Driscoll et al. [5] showed that echocardiographic indices obtained electively before surgery were more important in predicting outcomes than conventional risk factors in patients undergoing endovascular abdominal aneurysm repair.

It seems reasonable to assess individually all cardiologic patients before aortic endovascular interventions because they are often a challenge and require comprehensive evaluation.

Article information

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