De novo abdominal aortic dissection following thoracic endovascular repair, a diagnostic challenge in CT angiography. A case report

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Background: Aortic dissection is the most common form of acute aortic syndrome. Approximately 80% of patients die before reaching a hospital, and mortality without surgical intervention reaches 60%. We present a case of a 54-year-old man with precordial pain and dyspnea, with a history of hypertension and aortic endoprosthesis placement in 2023 for descending aortic dissection. Aortic CT angiography demonstrated an intimal dissection of the abdominal aorta, associated with a thrombus within the false lumen. The patient's clinical outcome is unknown.

Keywords: Aortic dissection, Arterial Hypertension, Acute aortic syndrome, aortic CT angiography.

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Case Report

Radiology

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Aortic dissection occurs when blood enters the medial layer of the aortic wall through an intimal tear or penetrating ulcer and propagates longitudinally through the media, creating a second blood-filled channel (the false lumen) within the vessel wall (1). Approximately 80% of patients are estimated to die before receiving medical attention, and mortality without surgical intervention reaches 60%. The estimated prevalence is 4.4 cases per 100,000 people per year.The diagnostic modality of choice is computed tomography angiography of the aorta, which can not only diagnose and classify the dissection but also assess distal complications (1). Treatment consists of aggressive blood pressure control with beta-blockers, as they reduce both blood pressure and heart rate, thereby decreasing additional stress on the aortic wall. Immediate surgical repair is indicated for Stanford type A dissections or complicated type B dissections (1,3).

Case report

A 54-year-old man presented to the emergency department with severe precordial pain, rated 10/10 on the pain scale, radiating to the left shoulder and accompanied by diaphoresis. He subsequently developed perioral cyanosis and took 1 g of acetaminophen without improvement, prompting him to seek emergency medical care. The patient had a history of poorly controlled hypertension due to nonadherence to treatment and underwent vascular endoprosthesis placement in 2023 for Stanford type B descending aortic dissection.

On admission, physical examination revealed generalized pallor and a capillary refill time of 3 seconds. Vital signs were within normal limits: blood pressure, 100/60 mmHg; heart rate, 85 bpm; respiratory rate, 18 breaths/min; oxygen saturation, 97%; and temperature, 36.7°C. Laboratory tests showed a white blood cell count of 12.00 × 10^3/µL, hemoglobin of 17 g/dL, troponin I of 0.09 ng/mL, and proBNP of 52 pg/mL.

The patient was admitted to the emergency department, where the treating physicians requested a chest radiograph as the initial imaging study. Anteroposterior and left lateral views were obtained, demonstrating a vascular endoprosthesis at the level of the aortic arch and descending aorta, elongation of the aortic arch, and bilateral interstitial pulmonary infiltrates.

The treating physicians suspected that the patient's symptoms were due to a possible stent-related complication and therefore requested computed tomography angiography of the aorta. The study was performed in a non-contrast phase followed by an angiographic phase after intravenous administration of contrast material. Vascular reconstructions were obtained at 1-mm thickness, including multiplanar reformatted images.

On computed tomography angiography, an endovascular graft stent is identified, located distal to the origin of the left subclavian artery and extending to the distal third of the descending aorta at the level of

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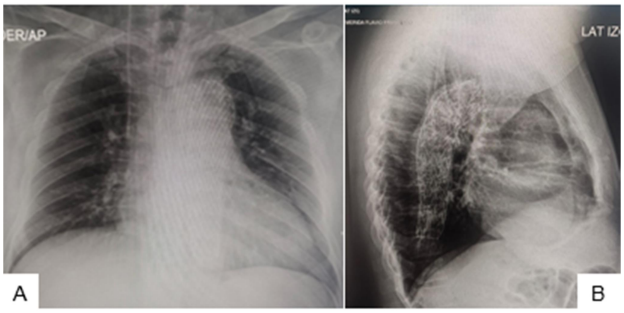


Figure 1. Chest radiographs in **A)** anteroposterior and **B)** left lateral projections demonstrate a thoracic aortic stent graft at the level of the aortic arch and descending aorta.

T9. The stent is patent and structurally intact, with no evidence of contrast media leakage. Dilatation of the abdominal aorta is also observed, beginning immediately inferior to the distal end of the stent and extending to the origin of the celiac trunk. Inferior to the diaphragm, at the level of T12, an area of intimal dissection of the aortic wall is visualized, representing the entry point and resulting in the formation of a second channel (false lumen), which contains thrombus. These findings are consistent with acute recurrent Stanford type B aortic dissection.

Based on these findings, the treating physicians decided to refer the patient to Guatemala City for specialized management. However, the patient requested discharge against medical advice, and therefore, no further information regarding the clinical course is available.

Discussion

The findings in this case demonstrate a new, independent abdominal aortic dissection in a patient with a history of Stanford type B dissection previously treated with an endovascular stent graft, representing an uncommon but clinically relevant scenario. Unlike the usual progression of thoracic dissection into the distal aortic segments, this patient had a new entry point at the abdominal level, with formation of a double lumen, a re-entry point, and partial thrombosis of the false lumen. These findings confirm that aortic disease in patients with a history of dissection may not only progress but may also present as independent events involving different segments of the aorta (3,4).
An important aspect of this case is the integrity and patency of the thoracic endovascular stent graft, with

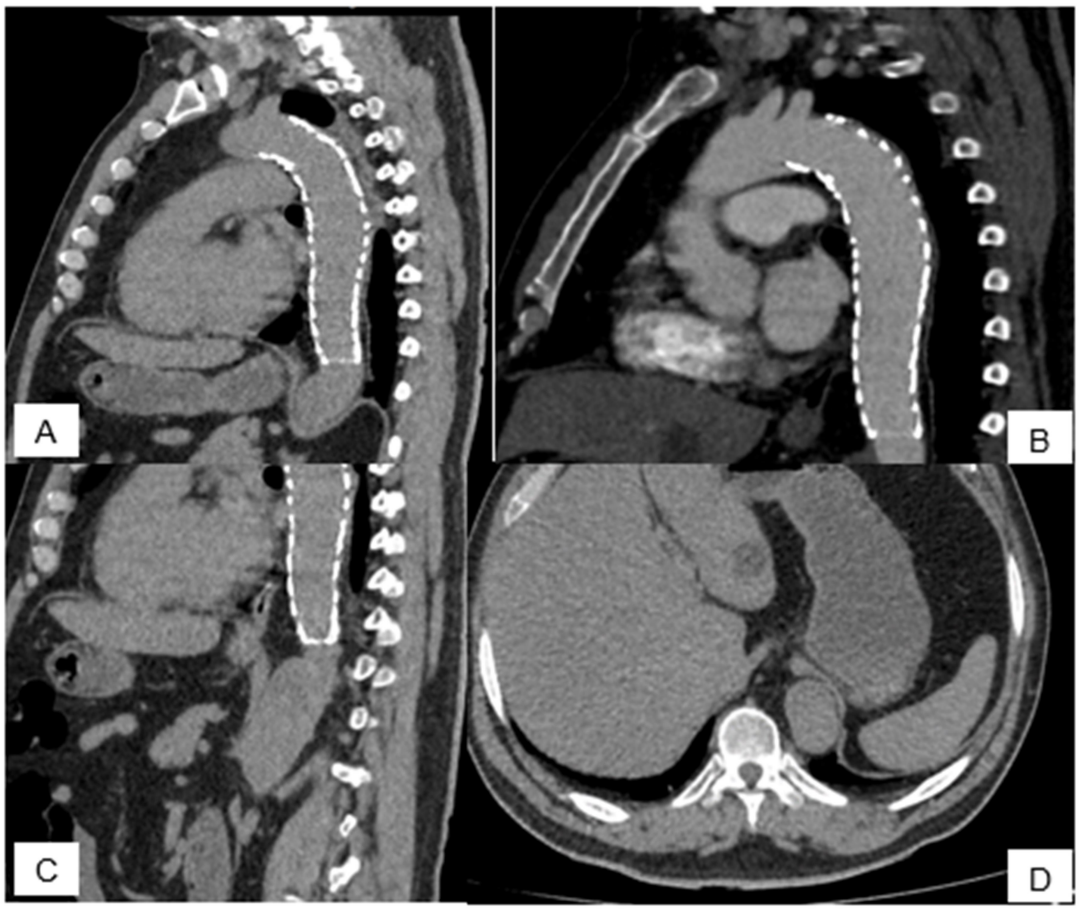


Figure 2. Sagittal and axial CT images obtained during the non-contrast and CT angiographic phases. **A)** The endovascular stent graft is positioned distal to the origin of the left subclavian artery and extends to the distal third of the descending thoracic aorta at the T9 level, above the diaphragm. **B)** Following intravenous contrast administration, the stent graft is patent and structurally intact, with no evidence of an endoleak. **C)** Sagittal and **D)** axial images demonstrate dilatation of the abdominal aorta beginning distal to the inferior margin of the stent graft and extending to the origin of the celiac trunk

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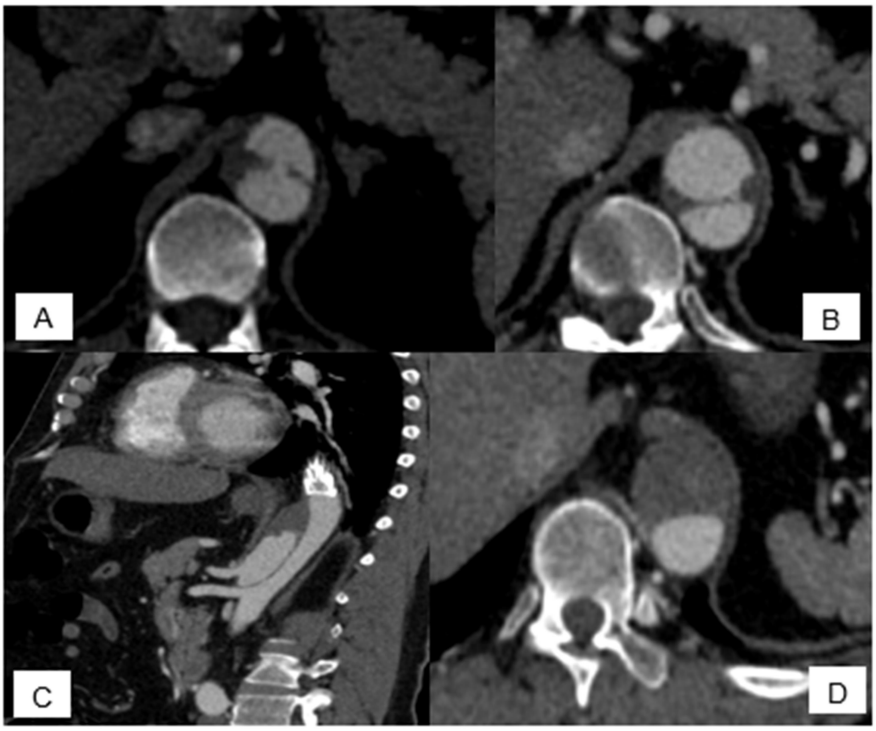


Figure 3. Axial and sagittal CT angiographic images. **A)** An intimal tear (entry tear), measuring 5 mm in diameter, is identified below the diaphragm at the T12 level. **B)** The re-entry tear is located at the T10 level, 3.0 cm proximal to the entry tear in a retrograde direction. **C)** Blood extends into the aortic media while the adventitia remains intact, creating a second channel (false lumen) measuring 5.5 cm in length and 3.3 cm in diameter. The false lumen is larger than the true lumen and displaces it posteriorly. **D)** A non-enhancing area within the false lumen following intravenous contrast administration is consistent with partial thrombosis.

no evidence of endoleak, which allows a direct device-related complication as the cause of the new dissection to be excluded. In contrast to other reports in which recurrent dissection is often associated with complications of previous treatment, such as endoleaks or stent-graft failure, no such abnormalities were identified in this case, making it a relevant contribution by demonstrating an independent presentation (3,5).

This finding supports the possibility of an independent pathological process, likely promoted by poorly controlled hypertension, as in our patient, which has been identified as the main risk factor in the literature (6). Likewise, the tomographic identification of a false lumen with a greater diameter than the true lumen and partial thrombosis represents a marker of instability associated with an increased risk of complications such as aneurysmal expansion or rupture. Furthermore, the abdominal location, with involvement near the celiac trunk, adds complexity because of the potential risk of visceral branch involvement, which should be carefully assessed during treatment planning (5).

From a radiological perspective, CT angiography not only confirmed the diagnosis but also allowed precise characterization of the key features of the dissection, including the location of the intimal tear, longitudinal extent, relationship between the true and false lumens, and presence of thrombus. This approach is consistent with the literature, which establishes CT angiography as the imaging modality of choice because of its high sensitivity and specificity, as well as its ability to assess associated complications and guide treatment planning (3,6).

Based on the presented case and the reviewed literature, strict and continuous imaging follow-up should be recommended for patients with aortic dissection, even in the absence of clear symptoms, given the risk of recurrence or new aortic events. Adequate control of cardiovascular risk factors, particularly hypertension, is also essential (6).

Conclusion

Patients with a history of aortic dissection may develop new, independent dissection events in different segments of the aorta, which do not necessarily represent progression of a previous dissection into distal segments. This is particularly relevant in patients previously treated with an endovascular stent graft, in whom a new dissection could be related to device-related complications. In the absence of abnormalities involving the endoprosthesis, independent etiologic factors should be considered as potential triggers of the new event, including poorly controlled hypertension, which is recognized as one of the major risk factors for aortic dissection.

Conflicts of interests

None declared by the authors

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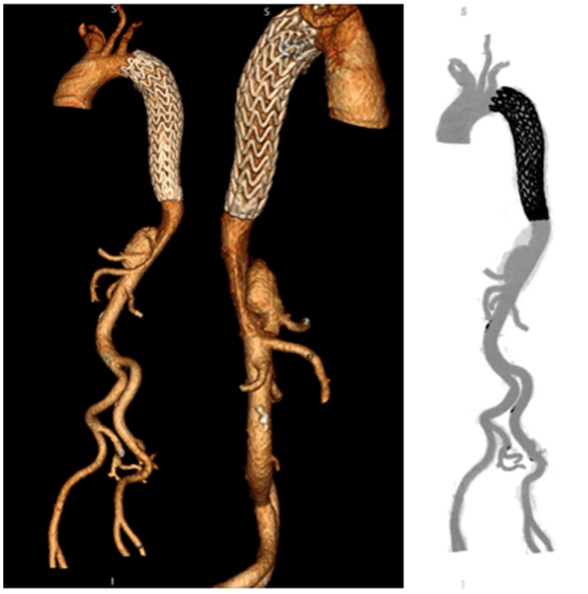


Figure 4: Three-dimensional (3D) reconstructions demonstrating the abdominal aortic dissection and the endovascular stent graft.

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