

### From spontaneous to iatrogenic Acute Aortic Dissection in a young patient undergoing double aortic surgery.

Pietro Pitrone<sup>1</sup>, Simona Caloggero<sup>1</sup>, Alessia Maria Romeo<sup>2</sup>, Agatino Cacciola<sup>2</sup>, Annalisa Cracò<sup>2</sup>, Giampiero Mastroeni<sup>1</sup>

1) Radiology Unit, "Papardo" Hospital, 98158 Messina, ME, Italy.

2) Diagnostic and Interventional Radiology Unit, BIOMORF Department, University Hospital.

#### INTRODUCTION

A 48-year-old man with a history of anabolic steroid consumption and thoraco-abdominal pain is admitted to another Hospital, where a contrast-enhanced CT demonstrates a type-A acute aortic dissection, extending from the aortic bulb to the brachiocephalic trunk and the common iliac arteries (figure 1). The patient is transferred to the Cardiac Surgery Department of our Hospital, where replacement of the ascending aorta, aortic root, valve, and arch and prosthesis release in the proximal descending aorta is performed.

#### AIM

To highlight the close relationship between aortic dissections and stent grafts, the latter playing a crucial role both in the treatment and (unfortunately) in the development of new ADs.

#### METHODS

A follow-up contrast-enhanced CT on day 3 shows a type-B acute aortic dissection caudally to the landing zone of the prosthesis (figure 2), extending to common iliac arteries, due to the development of a new entry tear. Another larger stent graft is thus placed within the descending aorta, with its landing zones beyond those of the previously placed prosthesis (at the level of the isthmus and mid-thoracic aorta). Nevertheless, follow-up contrast-enhanced CT at day 20 demonstrates, cranially to the proximal landing zone of the second prosthesis, the persistence of a dissection flap within the brachiocephalic trunk and, most importantly, the development of an evident "entry tear" which leads to the formation of discrete hemopericardium (figure 3). Moreover, acute aortic dissection caudally to the landing zone of the prosthesis persists, with an even more evident compression of the false lumen towards the true lumen.

#### RESULTS

After the first intervention, our patient experienced distal stent graft-induced new entry (dSINE), a new entry caused by a stent graft distal end. When compared with the conventional technique, the Frozen Elephant Trunk technique implies a lower coverage of the downstream aorta, leading to failure in aligning with the aorta natural orientation and creation of a sharp angle between the stent graft and downstream aorta, which favors pathological flow patterns towards the aortic wall and dissection membrane perforations. Moreover, chronic radial force and subsequent thinning of the media can favor dissection, which might have occurred after the second stent graft release. Finally, the progression of the underlying aortic pathology might contribute to aortic dissection. As for the dissection of the brachiocephalic trunk after surgery, this represents a frequent complication that can be due to surgical manipulation (such as cannulation, clamping, or incisions) of the intima.

#### CONCLUSIONS

Aortic dissection represents a frequent condition in young patients with a history of anabolic steroid consumption due to the weakening of connective tissues. Considering that any prosthesis may damage the media favoring aortic dissection, the Frozen Elephant Trunk technique in particular is associated with distal stent graft-induced new entries.

#### BIBLIOGRAPHY

- 1) Kreibich M, Berger T, Walter T, Potratz P, Discher P, Kondov S, Beyersdorf F, Siepe M, Gottardi R, Czerny M, Rylski B. Downstream thoracic endovascular aortic repair following the frozen elephant trunk procedure. *Cardiovasc Diagn Ther.* 2022 Jun;12(3):272-277. doi: 10.21037/cdt-22-99. PMID: 35800359; PMCID: PMC9253175.
- 2) Alattab N, Althobaiti SA, Alwehaibi NS, Mahjoub ST. Brachiocephalic Artery Dissection Following Type A Aortic Dissection Repair. *Cureus.* 2023 Dec 31;15(12):e51379. doi: 10.7759/cureus.51379. PMID: 38292995; PMCID: PMC10825813.
- 3) Heydari A, Asadmobini A, Sabzi F. Anabolic Steroid Use and Aortic Dissection in Athletes: A Case Series. *Oman Med J.* 2020 Sep 30;35(5):e179. doi: 10.5001/omj.2020.120. PMID: 33083037; PMCID: PMC7568822.

#### ACKNOWLEDGEMENTS

Funding: none.



Figure 1: Contrast-enhanced CT axial scans at different levels and multiplanar reconstructions demonstrating a type-A acute aortic dissection, extending from the aortic bulb to the brachiocephalic trunk and the common iliac arteries. An evident predominance of the false lumen (red asterisk) over the true lumen is observed at all levels.

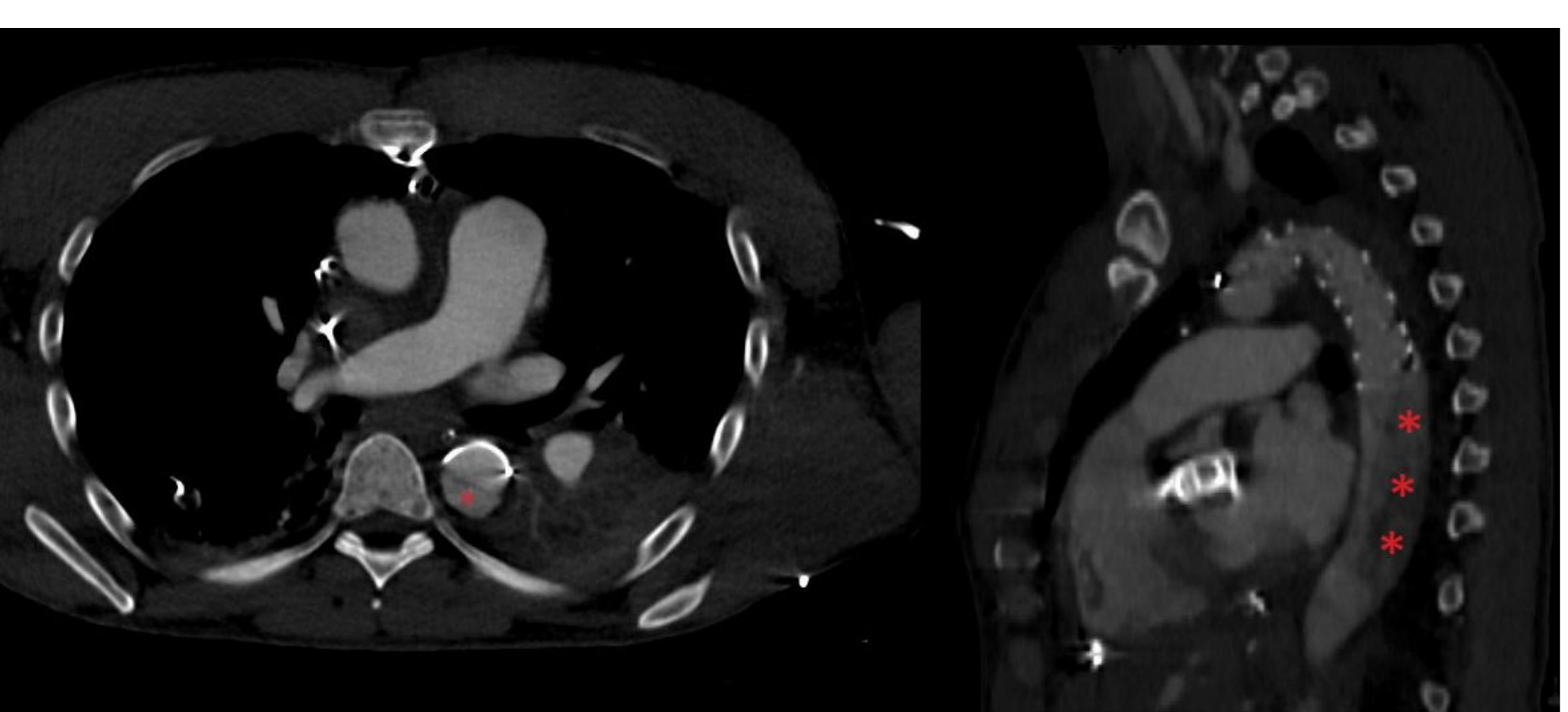


Figure 2: Axial scan and sagittal reconstruction from contrast-enhanced CT performed 3 days after replacement of the ascending aorta, aortic root, valve, and arch and prosthesis release in the proximal descending aorta. A type-B acute aortic dissection caudally to the landing zone of the prosthesis (false lumen: red asterisk) is seen.

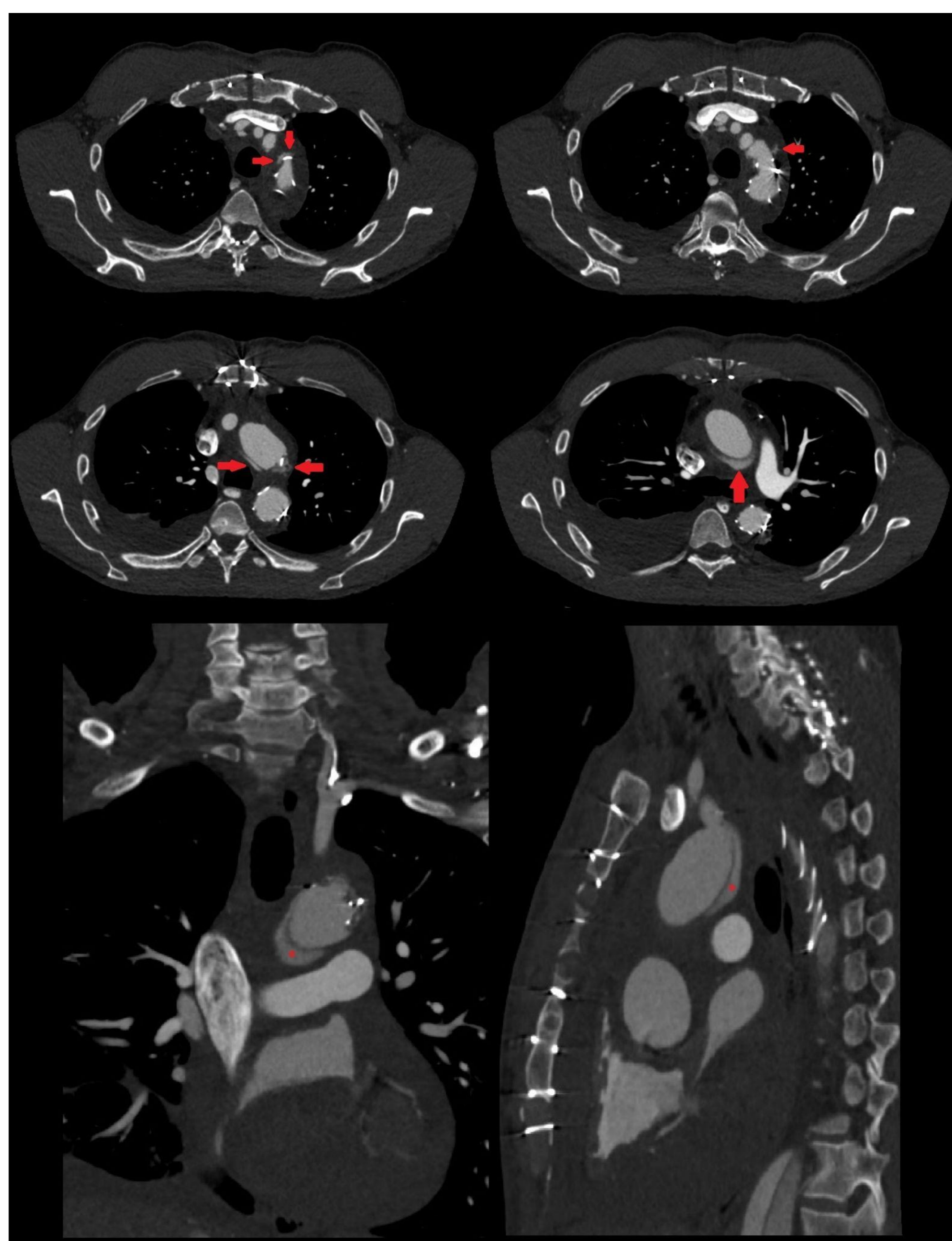


Figure 3: Axial scans and multiplanar reconstructions from contrast-enhanced CT performed at day 20, after placement of a larger stent graft within the descending aorta (landing zones at the level of the isthmus and mid-thoracic aorta). A new "entry tear" develops cranially to the proximal landing zone, with active bleeding (red arrows) into the pericardium.