Traumatic Type A Dissection with Intimal Intussusception Managed with Total Arch Repair with Frozen Elephant Trunk

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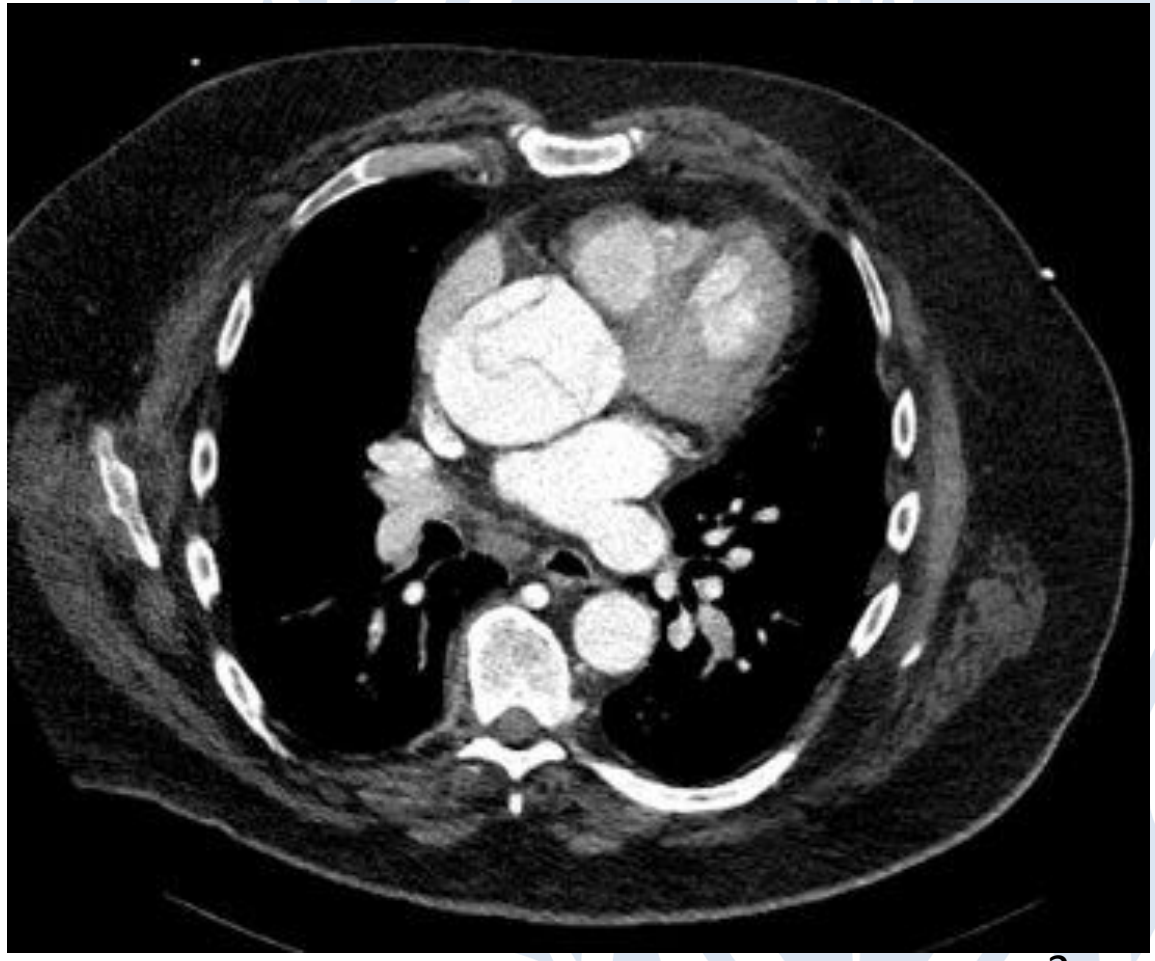
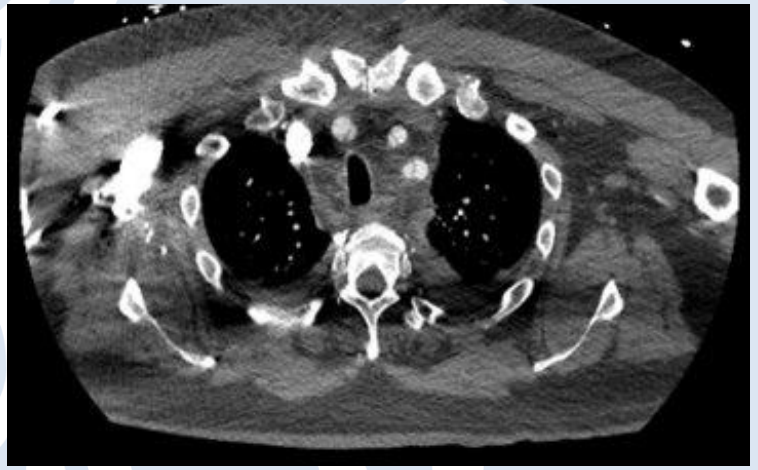
Patient Presentation [1/2]

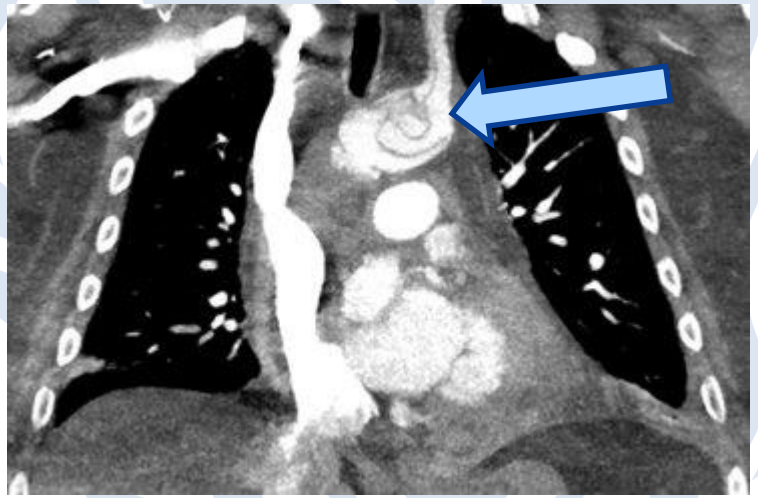
- 58M PMH HTN, HLD, T2DM, obesity, Parkinson's disease, former smoker
- Presented to outside hospital following MVC with LOC
- Imaging revealed traumatic type A aortic dissection
- EKG showed ischemic changes
- Patient underwent hemiarch repair with AVR at outside hospital



Patient Presentation [2/2]

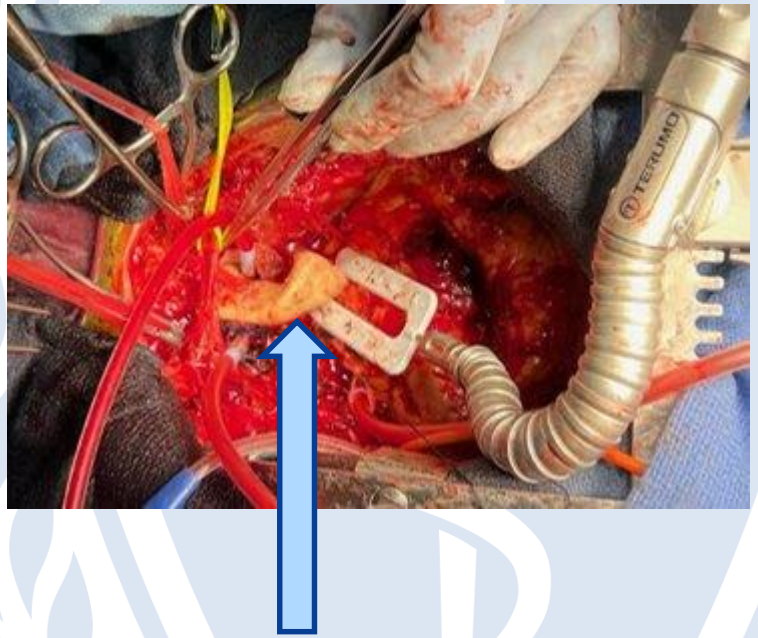
- On post-operative day 2, the patient developed lethargy and LUE weakness
- Imaging revealed residual aortic arch dissection extending to all three branches
- The patient was transferred to our facility for further management
- On further review of imaging, a possible intimal intussusception causing dynamic flow obstruction of the arch vessels was noted
  - see arrow in figure





Operative Technique [1/2]

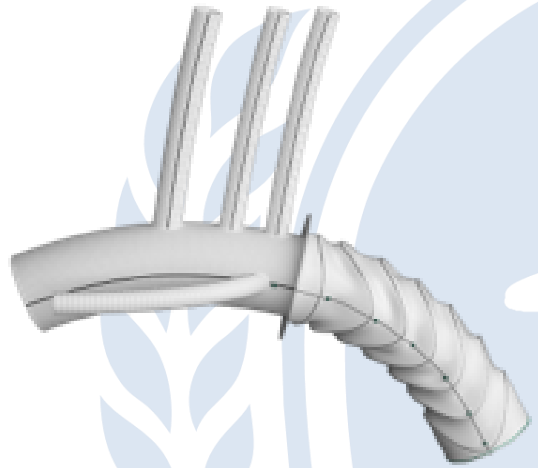
- Peripheral cannulation via right axillary artery, right femoral vein
- Prior aortic graft was excised, the replacement valve was inspected and appeared normal
- The patient was cooled to 26C, innominate artery was clamped, and antegrade cerebral perfusion initiated
- Aorta was resected to between the left common carotid artery and left subclavian artery takeoff
- Antegrade cerebral perfusion cannula was inserted into ostia of left common carotid artery

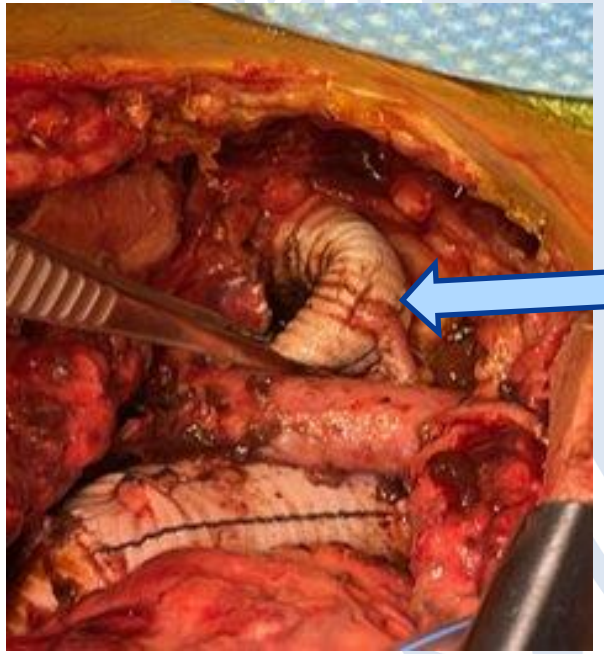


Intima which caused intussusception

Operative Technique [2/2]

- Four-branched FET graft was advanced to the descending aorta via left common femoral artery
- Stent was deployed, anastomosis between device sewing cuff and native aorta completed
- LIMA to innominate graft for left subclavian reperfusion due to fragile tissue quality with large hematoma secondary to MVA injuries and deep anatomic location of the subclavian





LIMA on the innominate graft

Postoperative Course [1/2]

- The patient was extubated on postoperative day 4
- The postoperative course complicated by subarachnoid hemorrhage, left carotid dissection, and vertebral dissection
- The patient was discharged on postoperative day 14 to acute rehab with some neurologic deficits
  - mild left upper extremity weakness
  - left upper extremity pain well-controlled with gabapentin
  - otherwise neurologically intact

Postoperative Course [2/2]

- The patient was discharged home on postoperative day 28 and did well, however experienced continued left upper extremity weakness and numbness with limited ROM
- US demonstrated retrograde flow through left vertebral artery, patent subclavian artery with monophasic waveforms, left upper extremity with low flow and monophasic waveforms
- The patient was readmitted during postoperative week 18 for a subclavian artery bypass to carotid
- The patient's post-operative course from subclavian bypass was uneventful and he was discharged home

Traumatic Type A Dissection

- **Blunt aortic injury most is commonly due to MVC with sudden deceleration**
- **Approximately 80% of patients with blunt traumatic aortic injury die before hospital arrival**
- **Blunt injury to the ascending aorta and aortic arch are uncommon and have a more ominous prognosis than descending aorta or isthmus injuries, and these patients are less likely to reach the hospital alive**

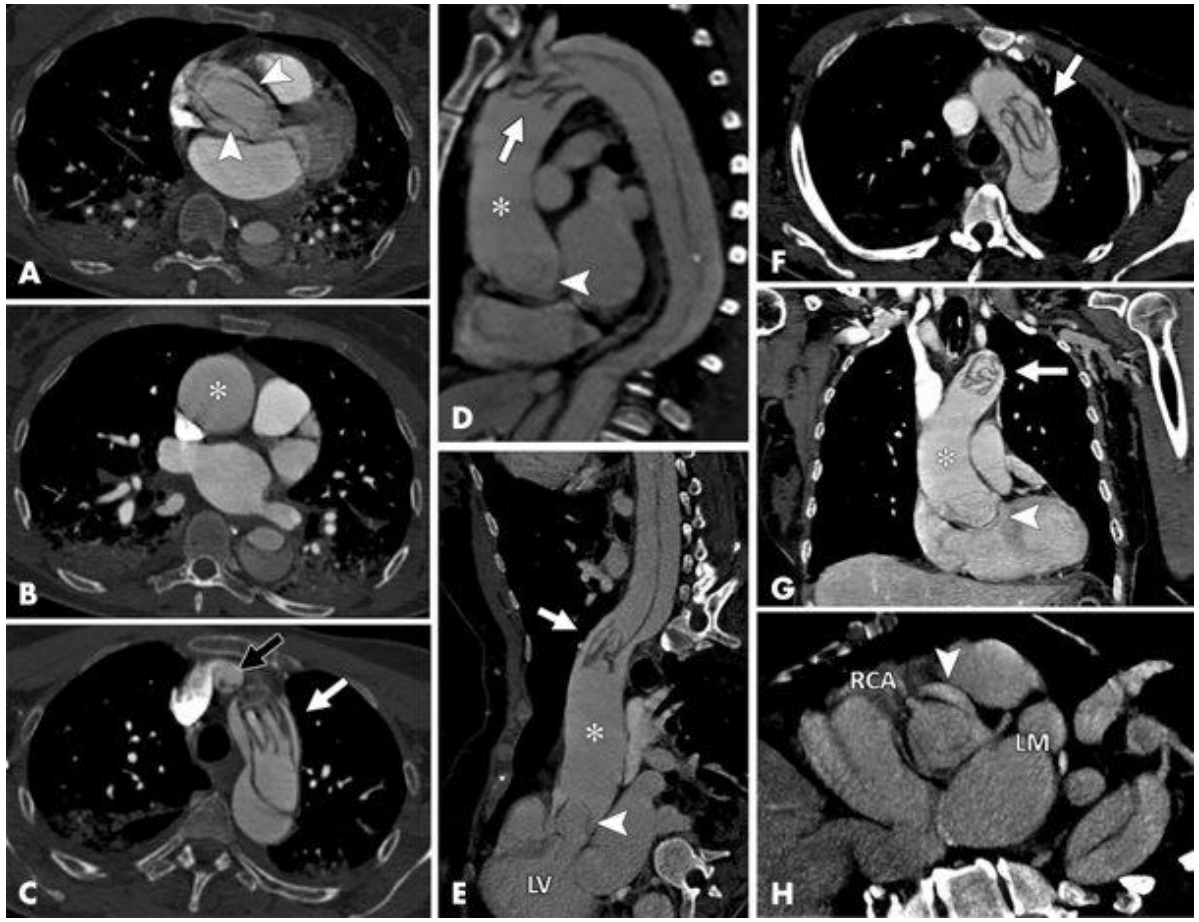
Mosquera et al. *Injury.* 2013

Intimal Intussusception – An Atypical Occurrence [1/3]

- **Challenging to identify because imaging may not demonstrate the classic signs of aortic dissection with an intimal flap**
- **Features to suggest an intimo-intimal intussusception are the combination of:**
  - **a circumferential flap in the aortic arch**
  - **the absence of an intimal flap in the ascending aorta**
- **This can be detected on angiography, CT, or TEE**
  - **diagnosis can still be difficult on imaging**
- **We believe this was missed at the time of our patient's initial surgery**

Touati et al. Eur J Cardiothoracic Surg. 2003.
Nelsen et al. AJR Am J Roentgenology 1994

Intimal Intussusception – An Atypical Occurrence [2/3]



Gomes DeFarias et al. Radiol Cardiothoracic Imaging. 2020

Intimal Intussusception – An Atypical Occurrence [3/3]

- Case reports have described retrograde prolapse of intussusception into the LVOT, causing aortic valve and coronary ostia obstruction
- Other reports describe a phenomena similar to our case where antegrade prolapse caused obstruction of the arch vessels
- One case even demonstrate bi-directional intimo-intimal intussusception
- Nonetheless this remains a rare occurrence and can be challenging to diagnose

Pan et al. J Cardiothoracic Surg. 2021

Conclusions

- Traumatic Type A dissections are rarely encountered by surgeons, as the majority of these patients die before reaching the hospital
- Here we present a case of a traumatic dissection with a rare case of intimal intussusception that led to a dynamic flow obstruction of all three aortic arch vessels
- We suspect the intussusception was missed at the time of initial operative repair at the outside hospital
- Ultimately this was successfully managed with total arch repair with frozen elephant trunk technique using a new generation FET branched graft.
- Additionally, LIMA to subclavian anastomosis was performed, demonstrating feasibility of this approach for revascularization of the upper extremity in a patient with complex injuries.

References

Mosquera VX, Marini M, Muñiz J, Gulias D, Asorey-Veiga V, Adrio-Nazar B, Herrera JM, Pradas-Montilla G, Cuenca JJ. Blunt traumatic aortic injuries of the ascending aorta and aortic arch: a clinical multicentre study. Injury. 2013 Sep 1;44(9):1191-7.

Touati G, Carmi D, Trojette F, Jarry G. Intimo-intimal intussusception: a rare clinical form of aortic dissection. European journal of cardio-thoracic surgery. 2003 Jan 1;23(1):119-21.

Nelsen KM, Spizarny DL, Kastan DJ. Intimointimal intussusception in aortic dissection: CT diagnosis. AJR. American journal of roentgenology. 1994 Apr;162(4):813-4.

Gomes de Farias LD, Santos JM, Teles GB, Baptista LD. Intimointimal intussusception in acute aortic dissection. Radiology: Cardiothoracic Imaging. 2020 Aug 27;2(4):e200023.

Pan H, Sun W. Stanford type A acute aortic dissection with proximal intimo-intimal intussusception: a case report and literature review. Journal of Cardiothoracic Surgery. 2021 Dec;16:1-5.