CIRA Case of the Week

Case Courtesy of Drs. Abdul Aziz Qazi, K. T. Tan and Arash Jaberi

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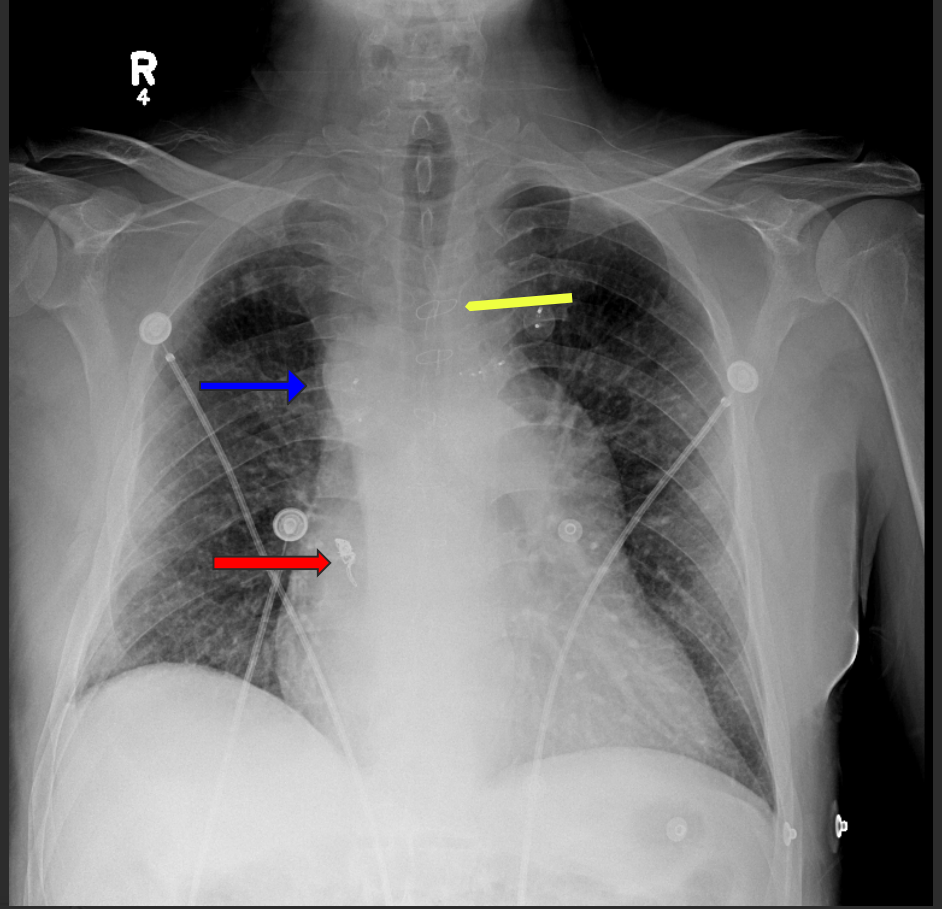
Case Presentation

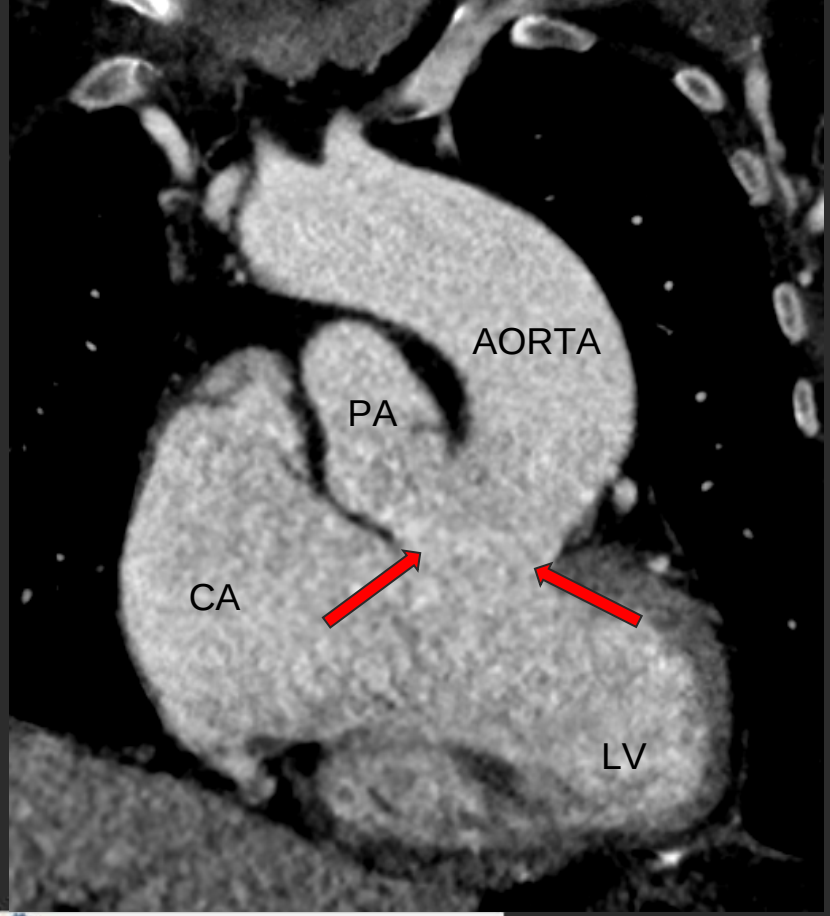
- 47 year old male with surgically corrected congenital heart disease
- Presented with recurrent hemoptysis
- Chest x-ray and outside CT were reviewed for pre-operative planning

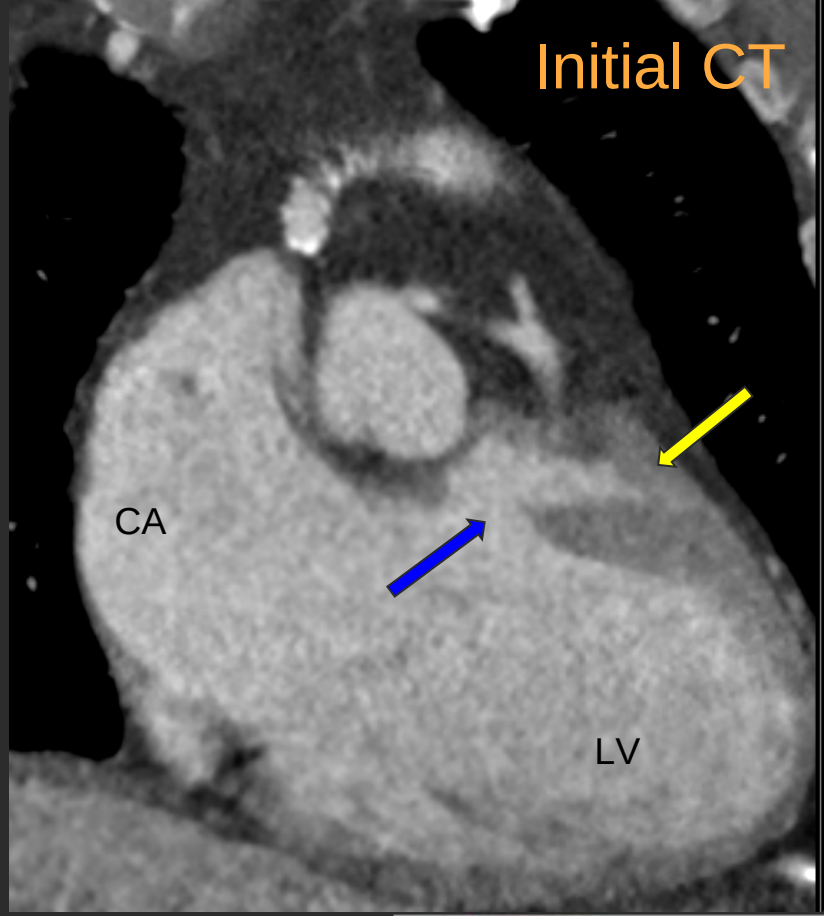
Initial X-ray



Initial X-ray

- Situs solitus
- Prior sternotomy for surgical correction of congenital heart disease
- Right-sided aortic arch
- Embolization coils in right internal mammary vein
- No significant parenchymal abnormality





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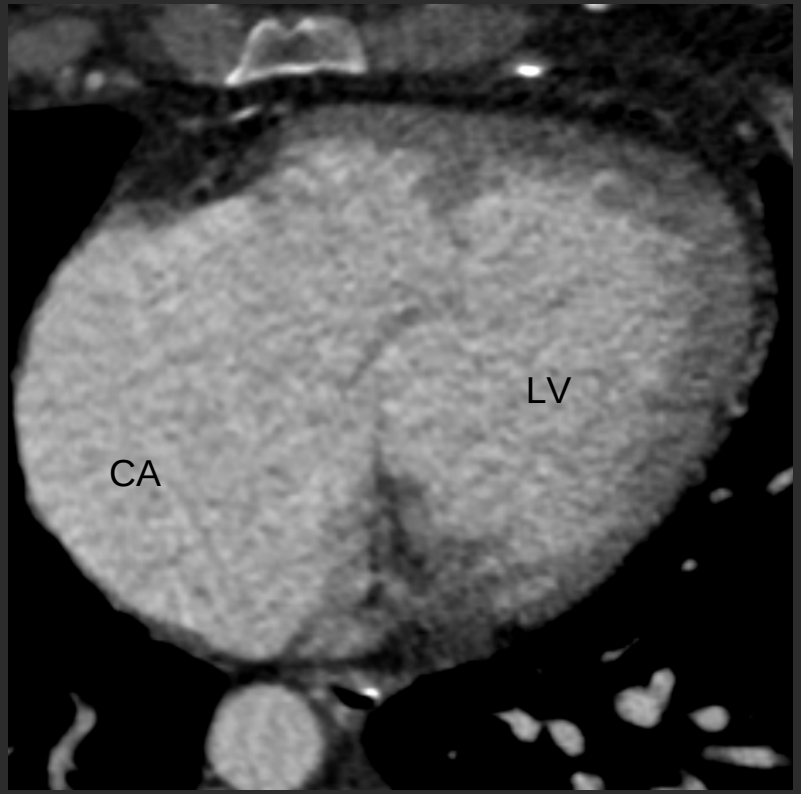
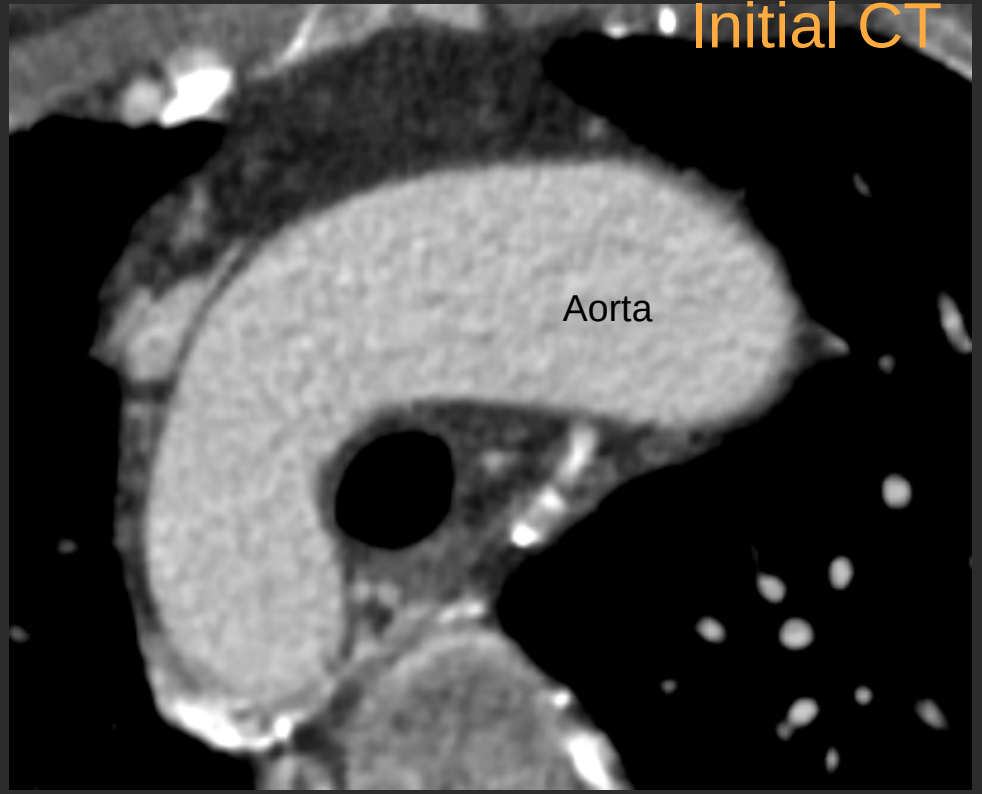
Initial CT

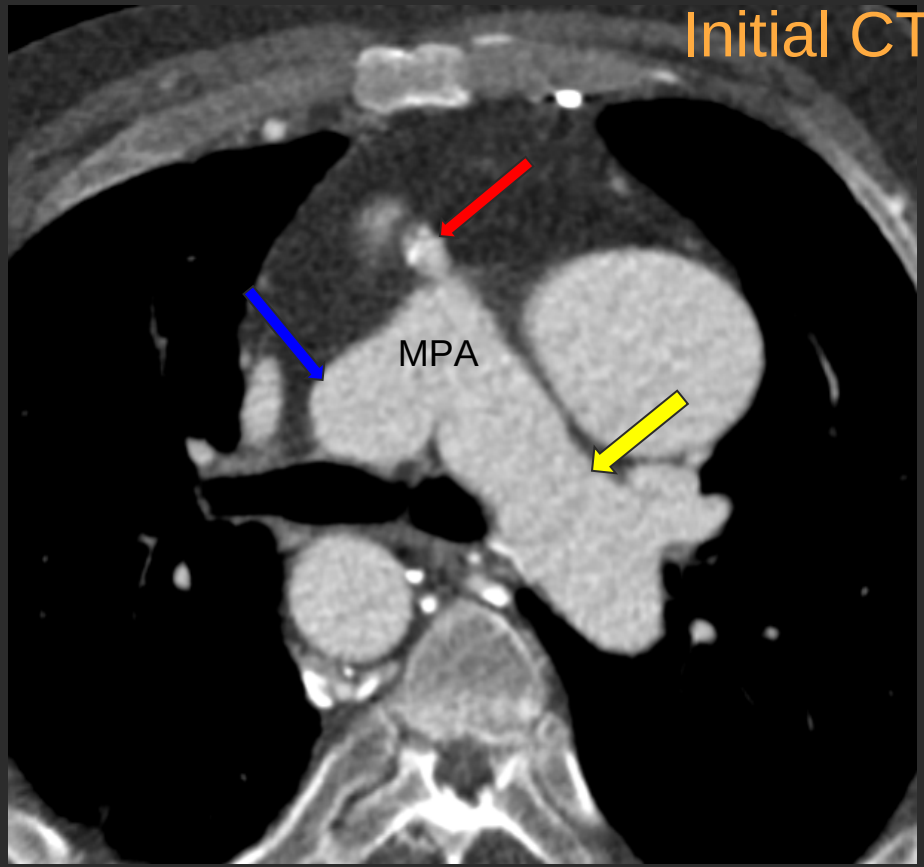




Initial CT

- Aorta and pulmonary artery (PA) arise from left ventricle (LV) "Double outlet left ventricle"
- Hypoplastic right ventricle
- Large ventricular septal defect (VSD)
- Single common atrium (CA) - atrial septectomy
- Right aortic arch

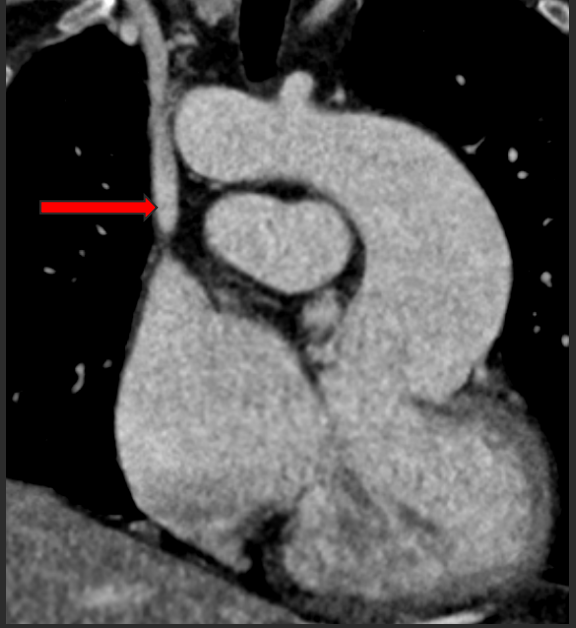
Initial CT

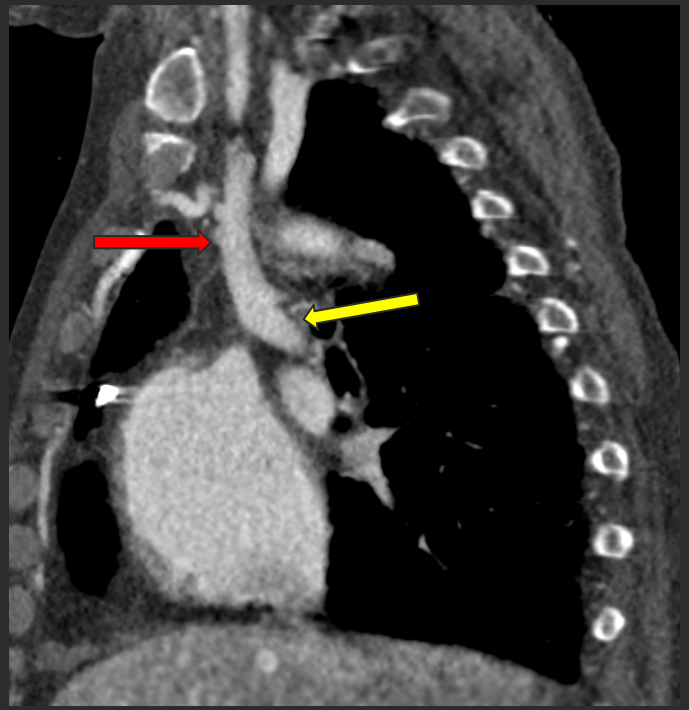


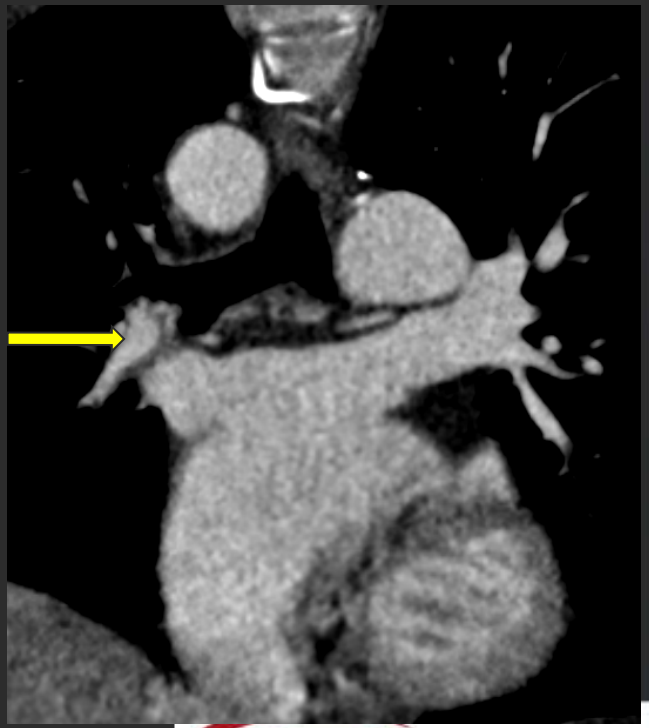
Initial CT

- Partially thrombosed conduit from main pulmonary artery to proximal aorta
- Ligated right pulmonary artery
- Left pulmonary artery communicates with MPA

Initial CT

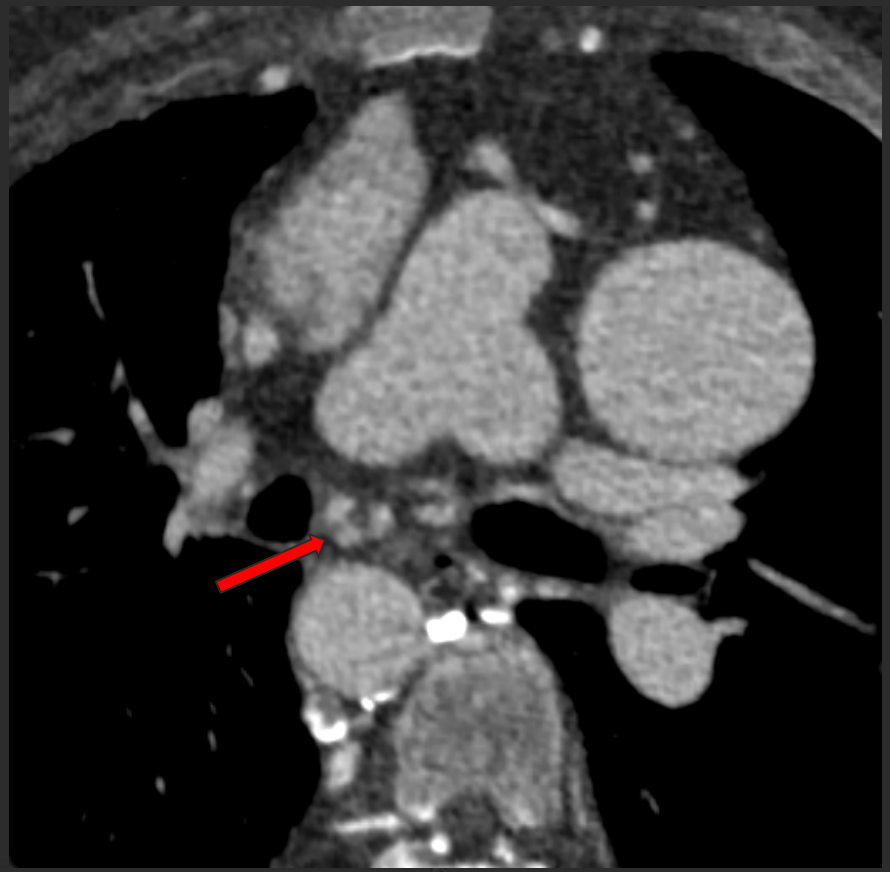


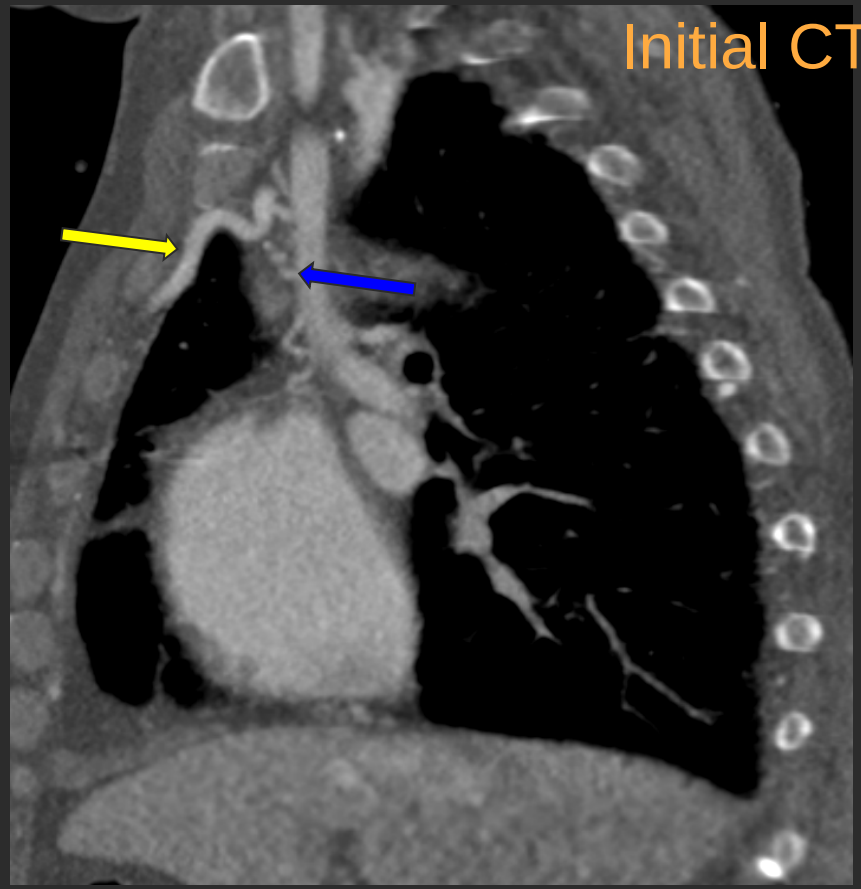




Initial CT

- Classic Glenn shunt
- Superior vena cava (SVC) connected to the right pulmonary artery
- Reduced caliber of SVC
- Blood flow within shunt was 620 cc/min vs left pulmonary artery 7.2 L/min





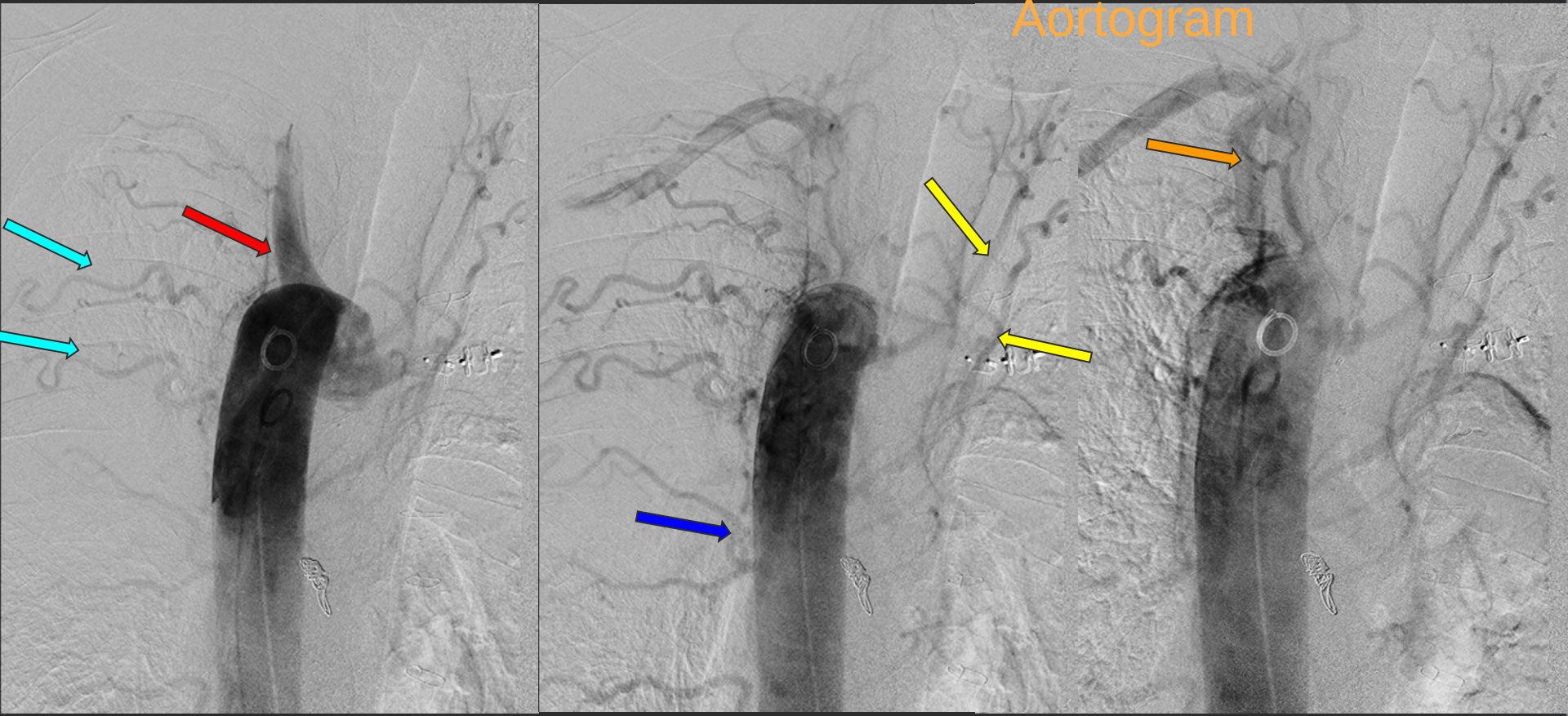
Initial CT

Initial CT

Initial CT

- Hypertrophied bronchial arteries with collaterals
- Collaterals from right internal mammary artery
- Numerous veno-venous collaterals within the abdominal wall

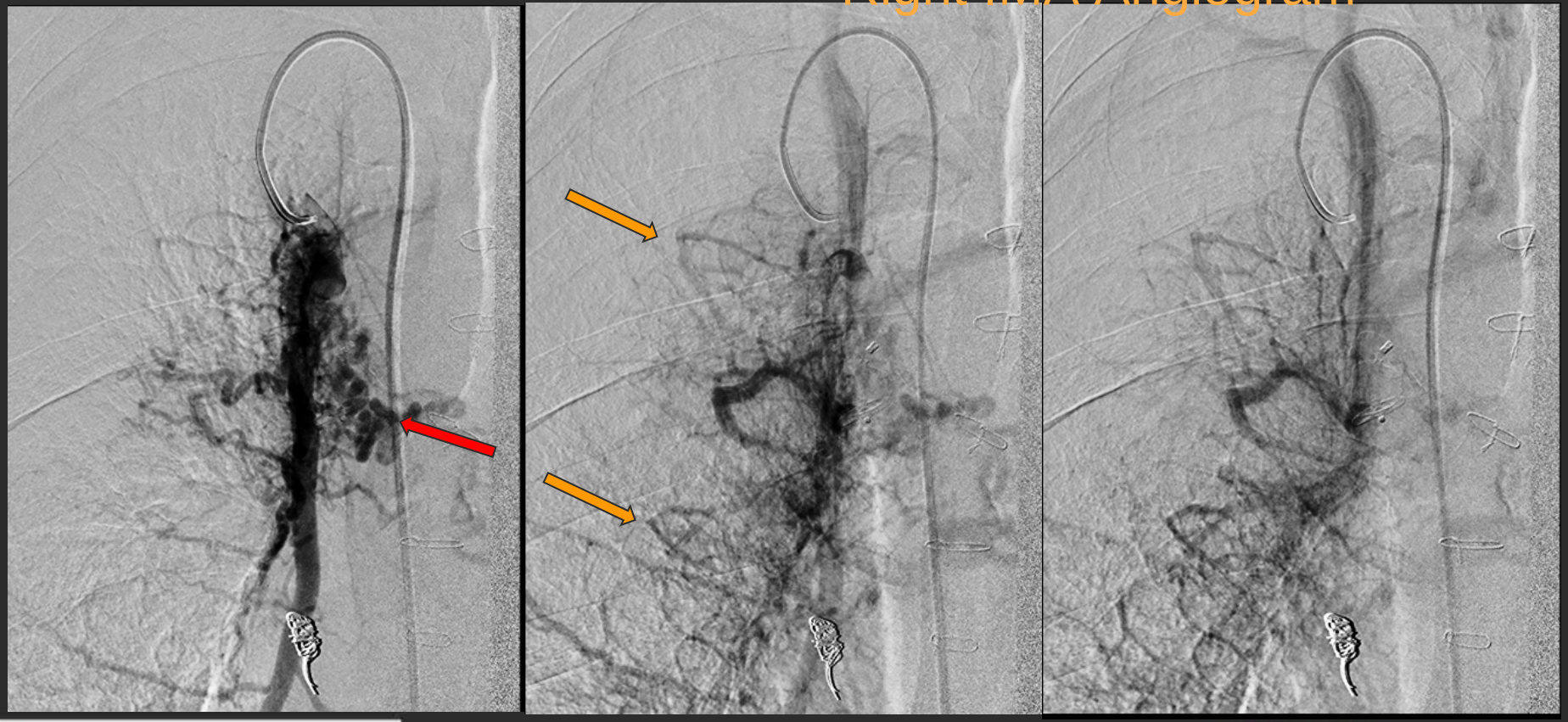
Aortogram



Aortogram

- Aortogram performed using 5F pigtail catheter
- Great arch vessels identified (mirror imaging), right bronchial artery and right internal mammary artery
- Left bronchial arteries were also visualized
- Numerous hypertrophied intercostal arteries

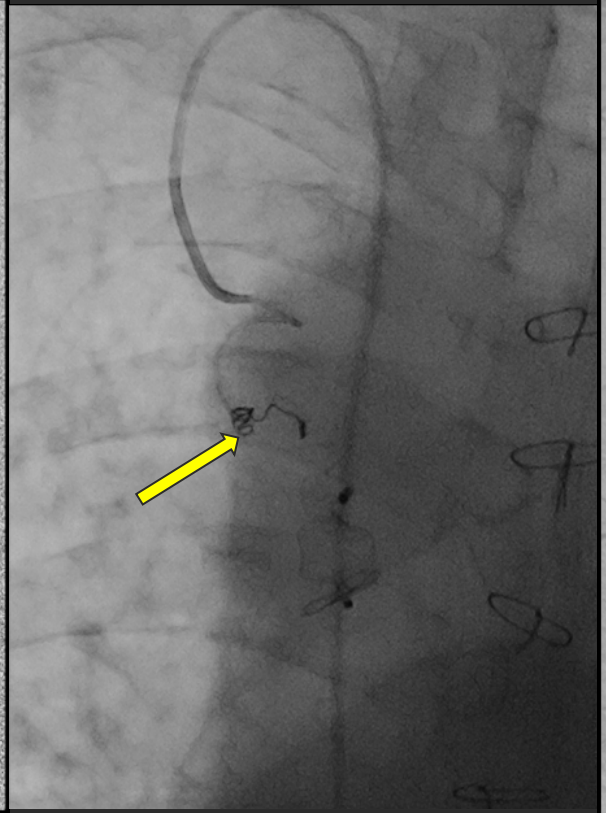
Right IMA Angiogram



Right IMA Angiogram

- 5 Fr Kumpe catheter and stiff angled glidewire used to select right IMA
- Redemonstrated hypertrophied and tortuous IMA collaterals
- Evidence of left-to-right shunt with aorta-pulmonary collaterals

Protective Coiling



Protective Coiling

- 2.4F microcatheter and 0.018'' glidewire used to select large IMA collateral

- 2 microcoils were used protect smaller collateral with numerous communications

Right IMA Embolization

Right IMA Embolization

- Embolization was performed using 150-250 µm and 250-355 µm polyvinyl alcohol (PVA) particles
- Comparison of pre- and post-embolization runs demonstrated adequate stasis
- A more proximal branch of the IMA could not be selected

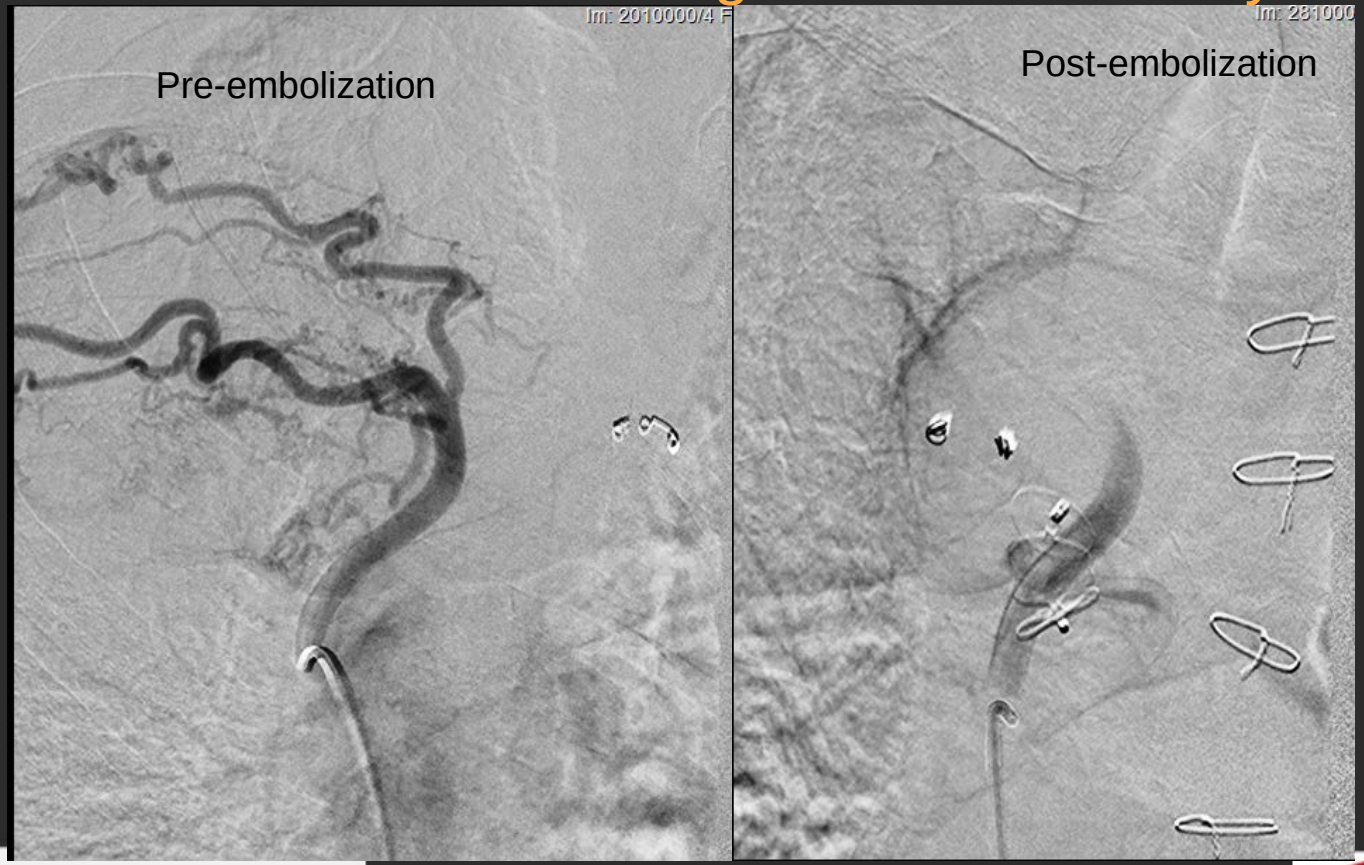
Right Bronchial Artery Angiogram

Right Bronchial Artery Angiogram

- Right bronchial artery selected using 5Fr C2 catheter
- Numerous hypertrophied bronchial collaterals were identified

Right Bronchial Artery Angiogram

Right Bronchial Artery Embolization



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Right Bronchial Artery Embolization

- 2.4F microcatheter and glidewire used to gain distal access in bronchial collaterals
- Neovascularity and hypervascularity of the collaterals
- Branches were embolized using 250-350 µm PVA particles
- Pre- and post-embolization runs demonstrate adequate stasis

Post Procedure X-ray

- Patient tolerated the procedure well
- No evidence of recurrent hemoptysis within 30 days

Discussion

Table 2: Conotruncal Abnormalities Associated with MAPCAs

Pulmonary atresia with ventricular septal defect (a severe form of tetralogy of Fallot and the most common disease associated with MAPCAs)
Tetralogy of Fallot
Transposition of the great arteries
Double-outlet right ventricle
Truncus arteriosus

MAPCA: Major aortopulmonary collaterals

Discussion

- Collaterals pathways:
  - Descending aorta
  - Bronchial arteries
  - Subclavian artery
  - Coronary fistulas

Discussion

- Protective coiling prevents non-target embolization
- Balance of decrease blood flow but preventing pulmonary infarction
- Inadvertent embolization of coronary anastomoses

Discussion

Angiographic findings for massive hemoptysis:

- Hypertrophied and tortuous bronchial arteries
- Neovascularity
- Hypervacularity
- Shunting into pulmonary artery or vein

Extravasation is very specific but rare (3.6 -10.7%)

References

- Burke CT, Mauro MA. Bronchial Artery Embolization. *Seminars in Interventional Radiology*. 2004;21(1):43-48
- Yoon et al. Bronchial and Nonbronchial Systemic Artery Embolization for Life Threatening Haemoptysis: A Comprehensive Review. *Radiographics*. 2002; 22:1395-1409
- Triedman et al. Prevalence and risk factors for Aortopulmonary collateral vessels after fontan and bidirectional glenn procedures. American College of Cardiology. 1993- 207-15