Coronary artery anomalies requiring intervention: Pre and Post-Op imaging

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Learning Objectives

- Anomalous origin of coronary artery from pulmonary artery
- Interarterial coronary artery
- Coronary artery fistula

- Imaging findings
- Hemodynamics
- Operative strategies
- Post-op complications
Anomalous origin of coronary artery from pulmonary artery

Infants and children
Anomalous origin of coronary artery from pulmonary artery

22 year old male with syncopal event during soccer
Anomalous origin of coronary artery from pulmonary artery

22 year old male with syncopal event during soccer

- Coronary artery origin from the main pulmonary artery
- Dilated, tortuous coronary arteries with collaterals
- Ischemia and steal:
  - Ventricular dilatation and dysfunction
  - Mitral valve insufficiency and prolapse
  - Perfusion defects and delayed enhancement in the affected territory on MRI
Hemodynamics

- Single coronary system
Treatment

Single coronary system

Aim of surgery is to create a 2 coronary system

Operative strategies

Treatment of choice

Coronary button transfer

Bypass graft with proximal ligation of anomalous artery

Takeuchi repair
Takeuchi repair
NORMAL POST-OPERATIVE APPEARANCE OF TAKEUCHI REPAIR
Complications of Takeuchi procedure

- Baffle obstruction
- Baffle leak
- Supravalvular pulmonary stenosis
Supravalvular pulmonic stenosis
Interarterial coronary artery

- Sudden cardiac death
- High risk imaging features:
  - Interarterial course particularly of the left coronary
  - Specifically if associated with intramural segment in the aortic wall
Imaging findings

- Slit like orifice
- Acute angle takeoff
- Elliptical cross-section through the intramural segment of the anomalous vessel
Computed tomographic angiography identification of intramural segments in anomalous coronary arteries with interarterial course

John A. Miller · Nandan S. Anavekar · Malek M. El Yaman · Harold M. Burkhart · Andrew J. Miller · Paul R. Julsrud

N=15
Compared presence or absence of intramural segments
Cross-section: elliptical or round
CT could recognize 100% of cases
When to treat?

• Decision making:
  - Type: Left arising from right
  - Age of the patients
  - Symptoms

Scenarios:
- Symptomatic patients are candidates for repair
- If asymptomatic:
  Surgical repair is justifiable for patients with interarterial left coronary artery
- Asymptomatic interarterial right coronary artery is controversial.

Interarterial right with no evidence of ischemia, high risk anatomy or perfusion defect do not typically undergo elective surgery.
Treatment options

- Coronary Unroofing
- CABG
- Reimplantation
Anomalous LCA arising from right coronary sinus with intramural course.
Coronary unroofing

Complication: Aortic regurgitation
Coronary artery bypass grafting (CABG)

Image Courtesy Smita Patel, MI
Coronary artery fistula

- Direct precapillary connection between a coronary artery branch and the lumen of a cardiac chamber, coronary sinus, superior vena cava, or a pulmonary artery or pulmonary vein.

- Most common etiology is congenital

- Dilated, tortuous coronary arteries
- Abrupt change in caliber distal to the fistulous communication
Imaging findings

LA
RA
RV
LV
RCA
RCA
RCA
Hemodynamics

- Shunt

- Ischemic symptoms are caused by coronary steal
Treatment

ACC/AHA Guideline

ACC/AHA 2008 Guidelines for the Management of Adults With Congenital Heart Disease: Executive Summary


Treated if large
If small-moderate and associated with other features

- Transcatheter embolization
- Surgical repair
ALCAPA: Dilated coronaries with collaterals

Takeuchi can lead to supra valvular PS

Interarterial: evaluate for intramural (aortic wall) segment

Unroofing can lead to aortic regurgitation

Bypass grafting of anomalous vessel without proximal ligation can lead to occlusion

Coronary artery fistula: Shunt and ischemia

Take home points
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