Coronary Anomalies

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Overview

• Techniques (‘How I do it’)
• Normal
• Interesting cases
• Syndromes associated with coronary anomalies
Techniques

• Prospective ECG gated CTA
  – Target mode
  – Lower extremity IV
  – 2cc per kg (>2.5cc/sec)
  – Bolus track off left ventricle
  – Sedation and Breath-holding (ostial pathology)
Techniques

• Cardiac MRI
  – Navigator triggered 3D-SSFP (Post Gad)
    • Navigator triggered 3D Gradient Echo
  – Ventricular function
  – Delayed enhancement
  – +/- Adenosine Stress
Techniques

Prospective ECG gated CTA

Navigator triggered 3D SSFP

Giant RCA aneurysm
Normal Coronary Arteries
Case 1

- 14 year old boy
- Chest pain on exertion
- Questionable abnormal stress test
- ECHO showed anomalous LCA from right sinus
Intra-arterial and Intramural LCA from Right Coronary Oriface

- Patient referred for unroofing procedure
- Intramural course confirmed at OR
- Asymptomatic at follow-up
Interarterial but ? Intramural

- 15 patients with rad-path correlation
- 11/15 had intramural course at OR
- All patients with an intramural course of the anomalous artery, had
  - slit-like orifice,
  - an acute angle of origin (mean 18.4 ± 3.4°),
  - intramural segment was elliptical shaped cross-section (average vessel height:width = 2.19).

Interarterial and Intramural

Slit-like orifice / acute angle

vessel height : width > 2.19
Case 2

- 14 year old boy
- Chest pain on exertion
- Questionable abnormal stress test
- ECHO showed anomalous RCA from left sinus
Anomalous RCA from Left Sinus
<table>
<thead>
<tr>
<th><strong>Interarterial LCA from Right Sinus</strong></th>
<th><strong>Interarterial RCA from Left Sinus</strong></th>
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</thead>
<tbody>
<tr>
<td>Ischemia/Sudden Death!</td>
<td>Much more common than LCA</td>
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<tr>
<td>Procedure of choice: Unroofing</td>
<td>??Ischemia/sudden death</td>
</tr>
<tr>
<td>Dynamic occlusion</td>
<td>Decision to unroof complex</td>
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<tr>
<td>? Intussusception</td>
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Case 3

• 7 year old male
• Questionable episode of chest pain with exercise
• Echo demonstrated coronary anomaly with single RCA
• Negative exercise stress test
Intraseptal LAD

- ? Pathologic significance
  - ?Benign course
  - Myocardial tunneling
  - AFIP series: 5 deaths attributed to septal LAD
  - Roberts et al: 11 cases of septal LMCA (1 death)
  - Case reports of septal LAD and VT

- Repair with arterial bypass graft
- Catheterization +/- IVUS
Clinical Decision

- Clinically felt to be asymptomatic
- Conservative approach adopted
- Annual follow-up with stress test and CMR
Case 3

- 8 year old referred for ECHO after new murmur on physical exam
- ECHO showed
  - decreased LV function
  - mitral regurgitation
  - normal coronary origins
- Referred for Cardiac MRI
ALCAPA (anomalous LCA from PA)

- Immediate post natal state is high pulmonary resistance
- Blood from PA favors anomalous LCA over lungs
- ~6 weeks pulmonary resistance nadirs
- Blood is sucked out of LCA to lower pressure lungs (Coronary Steal)
- Classic presentation at 6-8 weeks in failure
ALCAPA Repairs

• LCA Reimplantion:
  – Ostium of the anomalous LCA excised from the PA along with a small cuff and sewn to ao root

• Takeuchi procedure:
  – Creation of a tunnel within the pulmonary artery that leads from the aorta to the anomalous LCA
Reimplantation for ALCAPA at 3 months
Case 4

- 17 year old female
- Incidental finding of murmur on routine physical exam
- ECHO demonstrated RCA anomaly
- Referred for MRI
Giant Coronary Fistulas

- Most arise from the RCA and drain to the right heart
- Majority drain into the right atrium or central veins
- Usually asymptomatic
- Conservative management unless there is a large left to right shunt.
Case 6

- 6 week old baby
- Presentation to outside hospital in heart failure
- ECHO: PDA and normal coronary arteries
- Severely depressed cardiac function after PDA repair
Commissural origin of LCA

- Extremely rare
- Only one other case in literature
- Coronary arteries only arteries to receive majority of blood supply during diastole
- Closed cusps during diastole obstruct flow through commissural origin
DORV
RCA from LAD in TOF
Accessory LAD from RCA in TOF
LAD occlusion following PVR
SAM Question

Which of the following congenital heart defects have an increased incidence of coronary artery anomalies?

A. Tetralogy of Fallot
B. Truncus Arteriosus
C. Pulmonary valve atresia with Intact IV Septum
D. Transposition of Great Arteries (dTGA and lTGA)
E. All of the above
E. All of the above

Rationale:
Increased incidence of coronary artery anomalies in congenital heart defects, particularly tetralogy of Fallot, DORV, pulmonary atresia, truncus arteriosus, and transposition of great vessels.