CT of Coronary Artery Anomalies (CAA)

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COURSE LEARNING OBJECTIVES

Review:
- Definition and classifications of CAA
- The associated symptoms and clinical significance of the different forms of CAA
- CT imaging techniques to enhance visualization of CAA
- Imaging cases with CAA

WHAT IS A CAA?

Definition:
A CAA is a congenital malformation most often related to the origin or location of the coronary artery. Anomalies of the coronary arteries may be associated with other cardiac pathology including valvular lesions and congenital heart disease (e.g. TOF or TGA)

PREVALENCE OF CAA

- CAA constitute 1-3% of all congenital malformations of the heart
- CAA present in more than 30% of sudden nontraumatic deaths in young people. [1]

WHAT CAUSES CAA?

- There is no known cause of the vast majority of congenital heart defects including CAA
- Maternal transmission of some types, familial clustering, Klinefelter’s syndrome and trisomy 18 have all been suggested or linked in some capacity to CAA. [2]

WHAT ARE THE SYMPTOMS OF CAA?

- Adult symptoms can include: chest pain, dizziness, syncope and heart failure symptoms.
- Pediatric symptoms can include: irritability, poor feeding, poor growth, difficulty breathing, wheezing, sweating, gray or pale skin and heart failure


## Diagnosing of CAA

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## Classification of Coronary Artery Anomalies

### High Ostium or “High Take-off”

1. Refers to an unusually high origin of either the RCA or the LAD artery from the ascending aorta a point that is located at least 1 cm above the sino-tubular junction in adults.
2. This type of anomaly is without any hemodynamic significance unless acutely angled; however, may be difficult to cannulate during cardiac catheterization.
**ANOMALOUS ORIGIN FROM THE OPPOSITE SINUS**

**Inter-Arterial (Malignant) Course**

1. When either the left or right coronary artery originates from the opposite coronary sinus and takes a course between the aorta and the PA.
2. This course is the most likely to be associated with an adverse outcome, including death.

**TRANSSEPTAL COURSE**

1. Where the LMC or LAD runs anteriorly and inferiorly into the septum (subpulmonic) and has an intramyocardial course approx. to the level of the upper to mid sternum.
2. Considered a relatively benign course.

**RETROAORTIC COURSE OF ANOMALOUS CORONARY ARTERY**

1. A retroaortic course is the most frequently encountered anomalous course.
2. This type of course is considered benign or non-malignant.
ANOMALOUS ORIGIN FROM THE OPPOSITE SINUS

Prepulmonic Course
1. In the prepulmonic course, usually the LMC, LAD, or LCX, courses anterior to the PA or RVOT.
2. This anomaly is often seen in patients TOF.

ANOMALOUS ORIGIN FROM THE PA

ALCAPA (Anomalous origin of the left coronary artery from the pulmonary artery) also known as Bland-White-Garland syndrome
1. The ALCAPA syndrome is a rare anomaly that affects 1 of every 300,000 live births.
2. Two types of ALCAPA syndrome: the infant and adult types, each has different manifestations and outcomes.

ANOMALOUS ORIGIN OF THE CORONARY ARTERY FROM THE PA

ALCAPA

ANOMALIES OF INTRINSIC CORONARY ARTERY ANATOMY
CORONARY ARTERY ANEURYSM
1. Is defined as coronary artery dilation more than 1.5 times that of the adjacent normal segment and may be focal or diffuse.
2. Can be non-atherosclerotic or atherosclerotic in origin.
3. Worldwide, Kawasaki disease is the most common cause of coronary artery aneurysms, whereas atherosclerotic disease is the most common etiology in the US.[4]


MYOCARDIAL BRIDGING
1. Occurs when a short segment of the coronary artery enters the myocardium and courses for a variable length before coursing back to the epicardial surface of the heart.
2. Myocardial bridging is considered a relatively benign finding; however, this may rarely cause severe ischemia.

Reference: Tech Vasc Interventional Rad. 2006; 9:210-217

ANOMALIES OF TERMINATION

Reference: Radiology 2009, 252 (3)
CONGENITAL CORONARY ARTERY FISTULA

1. This represents an abnormal connection between a coronary artery and the PA, coronary sinus, or cardiac chamber.
2. Fistulae represent a left-to-right or a left-to-left shunt, depending on where their exit site is. This may also result in dilation of the coronary artery to varying degrees depending on the shunt volume.

TREATMENTS FOR CAA

• Medical: Depending on the type of CAA involved, medications can be utilized, oxygen therapy and activity limitations

• Surgical: Depending on the type of CAA involved, different surgical techniques may be utilized for repair

THE END!