Cardiac CT Angiography of an Anomalous Intramuscular Left Main Coronary Artery

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A 13 YEAR-OLD GIRL WITH TALL STATURE AND increased flexibility underwent evaluation for Marfan's Syndrome. Echocardiography showed no evidence of Marfan's-related cardiac pathology, but incidentally demonstrated that the **left main coronary artery (LMCA)** arose anomalously from the right sinus of Valsalva and apparently passed between the aortic root and the main pulmonary artery. This course is considered 'malignant' because of an association with myocardial ischemia and **sudden cardiac death (SCD)**.[1,2] Cardiac catheterization was subsequently performed. Based on the morphology of the vessel and its early rapid downward descent—presumably into the interventricular septum—the anomaly was felt at angiography to actually represent a more benign variant. Initial restrictions on the patient's activities were lifted.

More recently, the now 21 year-old-woman was referred for **cardiac CT angiography (CCTA)** for definitive clarification of the three-dimension spatial relationships of the great vessels, coronary arteries, and myocardium (Figure 1). The LMCA is four cm long, arises from the right sinus of Valsalva, and clearly courses through myocardium (crista supraventricularis) on its way to the anterior interventricular groove where it gives rise to a small **left anterior descending coronary artery (LAD)**, the circumflex CA, and two ramus intermedius branches.

Discussion

The prevalence of congenital coronary artery anomalies is estimated at one to two percent.[3] Most anomalies are considered benign and require no intervention. However, if the anomalous vessel passes between the ascending aorta and main pulmonary artery the patient is at increased risk for SCD or ischemia and surgical reimplantation may be indicated. Several possible factors have been proposed to explain these risks, including compression by the great vessels, a slit-like, hypoplastic orifice of the anomalous vessel (which can be challenging to appreciate on selective coronary angiography), and acute angulation of the proximal vessel segment.[4] We present a case of a young patient where at first glance the anomalous LMCA appears to take a malignant course but is subsequently shown—first at conventional angiography and then at CCTA—to have a more benign, intramuscular path.

Recent remarkable advances in computed tomography technology now permit highly detailed, stop-action imaging of the heart. With a spatial resolution of ~0.5 mm, CCTA now provides accurate, non-invasive imaging of the coronary arteries. Because CCTA acquires three-dimensional volumetric data, spatial relationships are readily depicted, and this modality has quickly become the gold standard for imaging known or suspected coronary artery anomalies.[5] Moreover, owing to its remarkably high negative predictive value (~99%) for the detection of significant coronary artery disease, CCTA has rapidly emerged as a useful tool in the assessment of low to intermediate risk patients with chest pain or equivocal stress tests.[6]

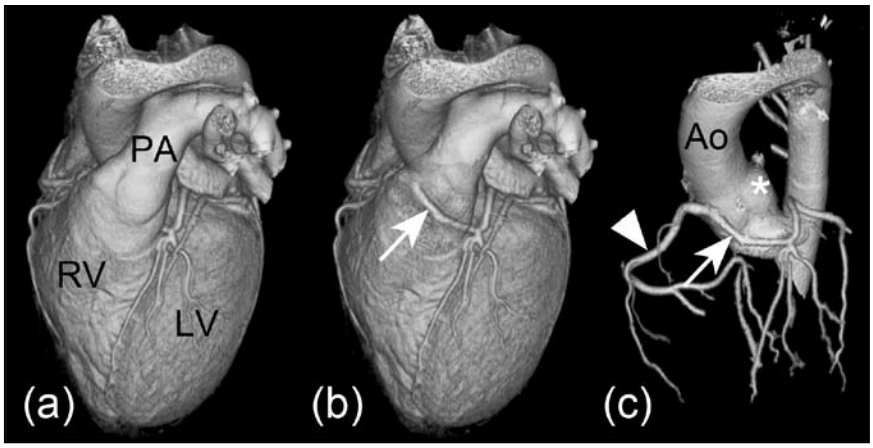

Figure 1. (a) Volume rendered CCTA image showing left and right ventricles (LV/RV) and main pulmonary artery (PA). (b) Same image as (a) with RV outflow tract removed showing anomalous LMCA (arrow). (c) Virtual dissection showing aorta (Ao) and coronary arteries, including the right coronary artery (RCA, arrowhead) and anomalous LMCA (arrow). The asterisk indicates the normal LMCA ostium location. (d-e) Curved reconstructions of the LMCA (arrow) and RCA (arrowhead). Notice that the LMCA is surrounded by interventricular septal muscle and the RCA is surrounded by lower density (darker) epicardial fat, which is normal.

References

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Ingested Foreign Body in the Sigmoid Colon: Detection and Localization by CT Colonography

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A seventy-six year old female presented to her gastroenterologist for a workup of iron deficiency anemia, hematochezia, and newly diagnosed celiac disease. Other symptoms included fecal incontinence and anal discomfort thought to be related to hemorrhoids as well as mild bilateral lower abdominal pain. A colonoscopy revealed an endoluminal tubular foreign body firmly embedded at either end in the colonic wall approximately 18 cm from the anal verge. At this point the risk of perforation with immediate colonoscopic foreign body retrieval was deemed to be high and removal was deferred until after a surgical consultation was obtained. CT colonography was ordered for preoperative evaluation prior to planning for a combined endoscopic and laparoscopic approach to foreign body removal.

CT colonography (virtual colonoscopy) demonstrated a five cm long radiodense linear foreign body traversing the lumen of the distal sigmoid colon (Figures 1 and 2). The foreign body was calcific in density with the morphology of an ingested bone. Both ends of the foreign

Figure 1. Coronal Slab Maximum Intensity Projection (MIP) from a CT Colonography demonstrating a 5 cm curvilinear radiodense foreign body traversing the lumen of the distal sigmoid colon (white arrows). Both ends of this foreign body are deeply embedded in the focally thickened colonic wall. Inset image in the upper right corner shows the ingested bone in more detail.

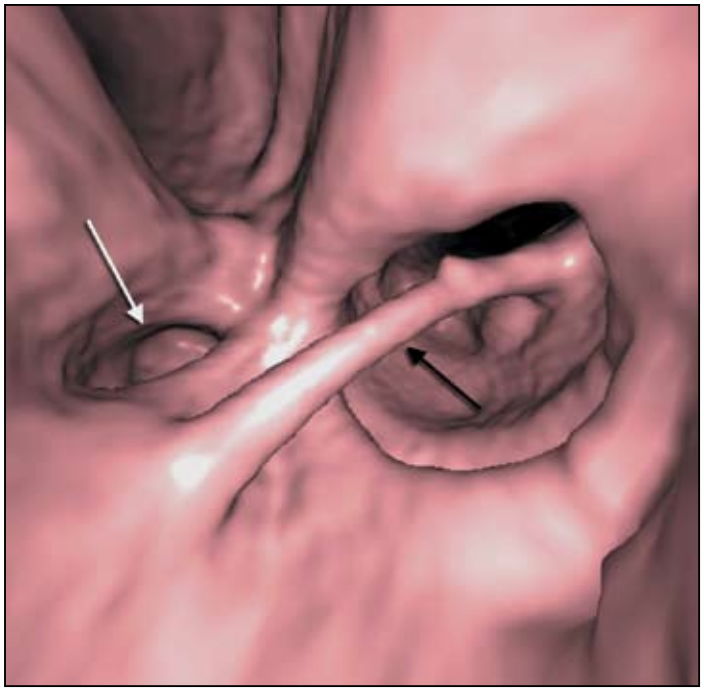

Figure 2. 3D Endoluminal Volume Rendering from the CT Colonography showing the ingested bone lodged transversely within the lumen of the distal sigmoid colon (black arrow). There are also multiple adjacent diverticuli (white arrow points to an adjacent diverticulum).