Giant Coronary Artery Aneurysm Masquerading as an Anterior Mediastinal Mass

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Abstract

Coronary artery aneurysms are exceedingly rare and tend to be found incidentally on angiography. We present the case of a 6cm giant coronary artery aneurysm discovered in a 25 year old man. Subsequent workup included cardiac gated MRI, CT angiography and left heart catheterization. Imaging revealed a 6.7 x 6.2 x 6.0 cm aneurysm involving the mid LAD subsequent to the takeoff of a large septal perforator. He was taken electively for operative repair during which the aneurysm was opened, unroofed and ligated at the ostium while taking care to ensuring normal flow in the septal perforator that supplied multiple small collaterals. In this unique case, a coronary artery aneurysm of considerable size was encountered in the LAD of a healthy young adult in which the size of the aneurysm precluded distal revascularization via bypass grafting. Multiple imaging modalities were used to characterize this finding and aid in surgical planning.

Manuscript (900/1500 words)

Introduction

Giant coronary artery aneurysms (CAA) are a rare entity with a reported incidence of around 0.02%. They are typically discovered incidentally on angiography. Though they have no singular accepted definition, they tend to be understood as coronary aneurysms greater than 20mm and occur most often in the right coronary artery (RCA). Up to 50% of cases are attributed to atherosclerosis, followed by congenital causes (17-30%), and sequelae of Kawasaki disease (10%) with other rare etiologies including vasculitides and connective tissue disorders (1). Due to the rare and heterogeneous presentation of coronary artery aneurysm, there are no uniform guidelines with respect to medical or interventional management (2). In this report, we present a case of an incidentally found giant left anterior descending artery (LAD) aneurysm in a young healthy male, the imaging modalities used for diagnosis and operative planning, and the surgical approach utilized.

Case Description

A twenty-five year old man presented to the emergency department with chest pain and was found to have a spontaneous pneumothorax on chest x-ray. His past medical history was significant for prior bilateral spontaneous pneumothoraces in 2012 and 2013 treated with tube thoracostomy and uniportal VATS pleurodesis. He was admitted overnight for observation and serial x-rays. An irregular contour of the left superior heart border was noted on plain films, which prompted review of imaging from the patient's previous hospitalizations in 2012 and 2013. A similar abnormal cardiac silhouette was noted at that time. The patient did undergo a non-contrast CT scan in 2013 however no definite abnormality was noted, likely due to lack of contrast. He did not obtain additional imaging in the interim. A CT scan with contrast was subsequently obtained which revealed a 5.4 x 6.6 x 6.3 cm anterior mediastinal mass with heterogeneous attenuation superior to the left ventricle. Initial workup did include germ cell tumor markers and testicular ultrasound to rule out malignancy. His apical pneumothorax remained stable without need for additional intervention and he was discharged home for continued outpatient workup. Because of concern for potential invasion

of the heart, a cardiac gated MRI was obtained which demonstrated that the cystic mass was exhibiting mass effect on the anterior wall of the left ventricle, the aortic root and the main pulmonary artery (Figure 1). It appeared to be in communication with the vasculature however the origin was unclear on this study. Subsequent coronary CT angiography demonstrated a diffusely dilated LAD measuring 7mm x 6mm which was contiguous with the superior aspect of the mass. (Figure 2a) It was again characterized as a separate entity from the left ventricular wall, ruling out LV aneurysm. The aneurysm was confirmed to arise from the proximal-mid LAD after the takeoff of a large septal perforator. The distal/apical LAD was not visualized. A dominant right coronary artery appeared unremarkable, and no additional coronary anomalies were observed on subsequent coronary angiography (Figure 2b). A planned surgical approach was discussed with the patient including aneurysmal ligation and coronary artery bypass bypass, and he elected to proceed. Operative intervention was performed with a median sternotomy and myocardial arrest. A large aneurysm arising from the proximal LAD was identified (Figure 3). After myocardial arrest, the aneurysm was opened in its entirety from its origin at the proximal LAD down to the base, taking care to preserve a large septal perforator and smaller collateral vessels. The LAD was ligated and the remainder of the aneurysm sac was dissected off the heart exposing raw myocardium. Upon careful inspection, there was no continuation of the distal LAD that would be an appropriate target for bypass grafting or patch repair. The patient was weaned off cardiopulmonary bypass without much difficulty and discharged home on post-operative day 3 without any perioperative complications.

Discussion

Giant coronary artery aneurysms (CAA) are exceedingly rare, and multiple imaging modalities are often performed to obtain the correct diagnosis and aid preoperative planning. (3) They are typically associated with atherosclerosis but can be seen in patients with familial aortopathy or autoimmune disorders. Our patient did not have any personal or family risk factors and imaging characteristics in this case favored congenital etiology. Coronary angiography, which continues to be a gold standard for coronary imaging, may not provide all the information necessary in this setting because of selective propagation of the dye into the CAA as opposed to highlighting the terminal vessel. Coronary CTAs can be invaluable evaluate the distal coronary artery as a potential target for bypass. While the absolute risk of adverse events is unknown, development of myocardial infarction and coronary rupture is described and thus semi-urgent surgical intervention in this stable patient was favored. In young patients, coronary aneurysms are most often encountered as sequelae of Kawasaki's disease, in which subsequent surgical intervention with CABG represents a more favorable outcome compared to PCI (4). They are predominantly encountered in the RCA. Surgical approaches described vary, and include both patch repair and IMA bypass. This particular report is unique in multiple ways. First, a coronary artery aneurysm of considerable size was incidentally found in a healthy young adult. Second, this giant aneurysm involved the LAD, and multiple imaging modalities were important to help characterize its extent and anatomic involvement. Lastly, this is the first report that we know of in which the size of the aneurysm precluded distal revascularization via bypass grafting. Extensive workup and understanding of the anomaly allowed for complete surgical excision and favorable outcome.

Author Contributions: Resident RD was involved in initial inpatient workup and contributed to the manuscript with assistance from resident LE. OO was the attending surgeon during initial presentation and facilitated the patient's workup and subsequent diagnosis. IS was attending surgeon for the operation. AK assisted with workup and operative planning. All authors contributed to edits and revisions and approved the final submitted manuscript.

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Figures and Figure Legends

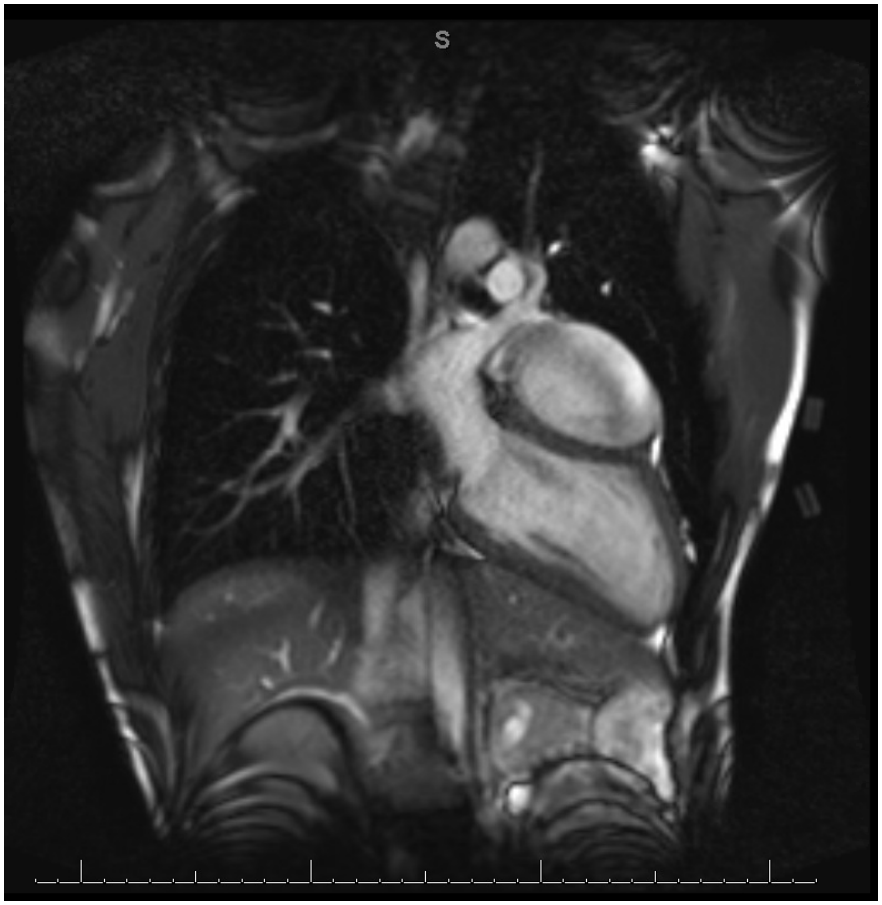

Figure 1. Cardiac Gated MRI of aneurysm

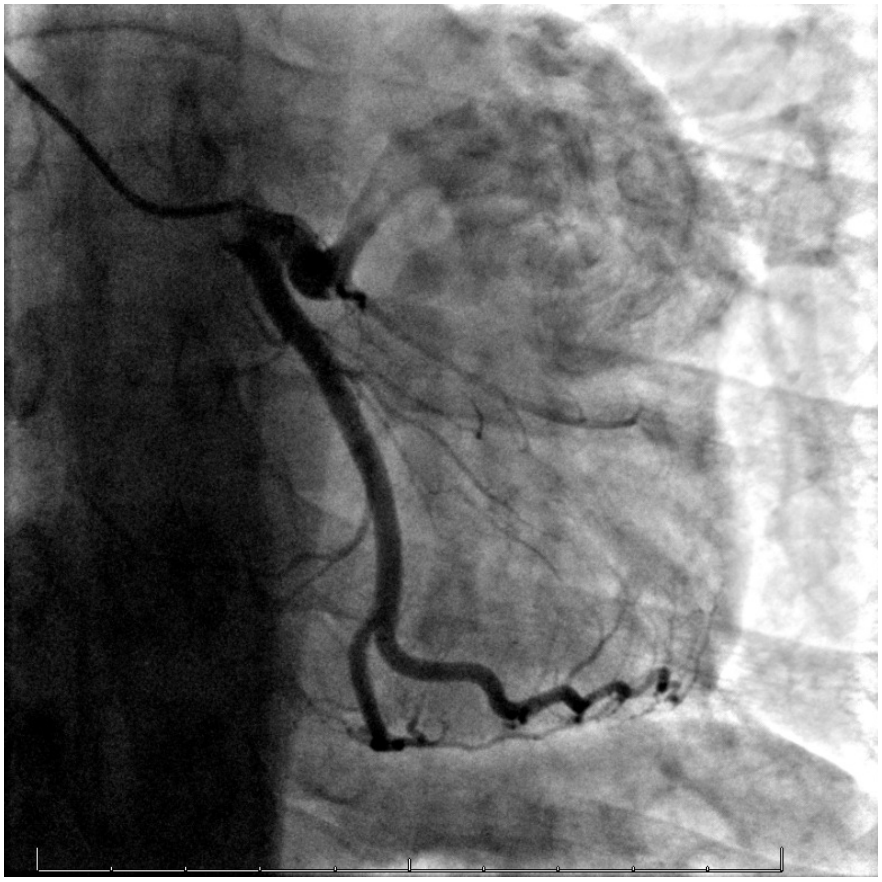

Figure 2a (left). CT coronary angiography demonstrating aneurysm contiguous with LAD.

Figure 2b (right). Coronary angiogram demonstrating aneurysm origin from left main without distal filling

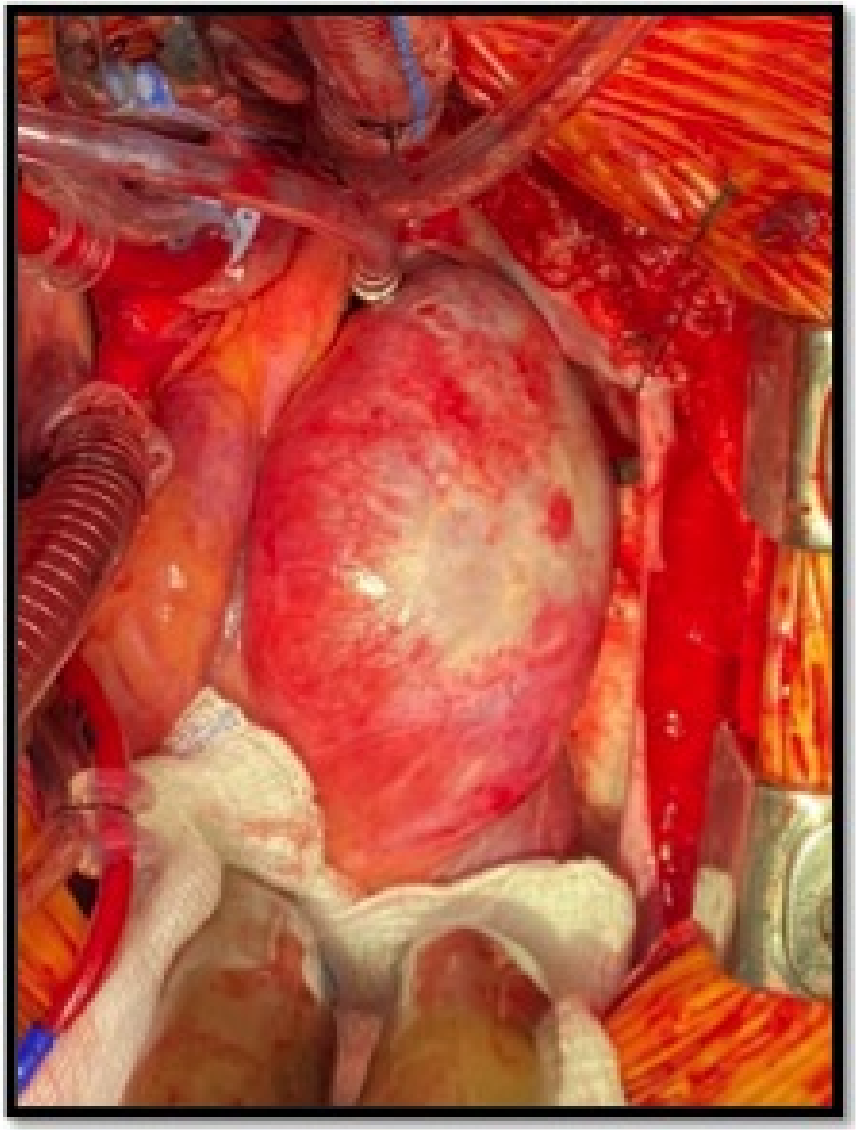

Figure 3. Intraoperative Image of LAD Giant Coronary Aneurysm