




## Case Report

## Fistula Coronary and Coronary Steal Syndrome: A Case Report

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## ABSTRACT

A coronary artery fistula (CAF) is an aberrant vascular contact of coronary arteries with cardiac chambers or any section of the pulmonary or systemic circulation, which accounts for 0.3% of congenital heart disorders. CAFs have been observed to be as common as 0.9% at computed tomographic (CT) angiography, which is greater than the previously estimated prevalence of 0.002 – 0.3% at invasive angiography. **Case Summary:** A 76-year-old woman reported with repeated episodes of chest pain. A considerable diameter of fistula from the proximal LAD and proximal RCA to the MPA was discovered on CT angiography, which could be the cause of coronary steal syndrome. Microflex10 7 mm/22 cm was used to perform coil embolization at the proximal RCA. After the procedure, the patient had no more chest pain. **Discussion:** CT angiography is useful for determining coronary architecture and guiding therapeutic intervention. CAF data was gathered during pre- and post-procedural CT angiography evaluations.

## Introduction

Cardiovascular computed tomography, which can rule out coronary artery disease and reveal other coronary anomalies, could be used as a first-line test in low-intermediate risk individuals. Coronary artery fistulas (CAF)s are rare coronary artery anomalies that make up 0.3% of all congenital heart disorders. The prevalence of CAFs found during computed tomographic (CT) angiography has been reported as high as 0.9%, which is higher than the previously estimated prevalence of 0.002–0.3% during invasive angiography. In adults, CAFs can alter hemodynamic parameters and cause problems such as heart failure, myocardial

ischemia, infective endocarditis, and arrhythmia <sup>[1,2]</sup>.

CT coronary angiography (CTCA) has developed as a rapid, accurate, reliable, and noninvasive three-dimensional imaging method for simultaneously examining coronary artery anatomy and surrounding tissues, thanks to significant advancements in temporal and spatial resolution.<sup>[3]</sup>

CAFs are a rare source of chest pain; they're usually asymptomatic and discovered by chance, thus the existence of symptoms can make diagnosis more difficult <sup>[4]</sup>. B-blockers and calcium channel blockers may help reduce symptoms in

symptomatic patients with myocardial ischemia by lowering myocardial oxygen demand. Patients experiencing symptoms of a left-to-right shunt and consequences such as myocardial ischemia, congestive heart failure, pulmonary hypertension, dysrhythmias, and infective endocarditis should have an interventional procedure performed [5]. Patients with a single narrow drainage site, a proximal fistula origin, no multiple fistulas or large branch vessels, and/or no associated cardiac problems are increasingly opting for coil embolization for Complex Coronary artery to Pulmonary artery fistulas.[6]

### Case Illustration

A 76-year-old woman was seen at the clinic with recurring episodes of chest pain and a history of hypertension and hyperlipidemia. Her chest pain featured both normal and atypical angina symptoms. Her vital signs were normal, and her physical examination revealed nothing unusual. There were no abnormal Q waves, ST segment, or T wave alterations on electrocardiography. With an ejection fraction of 65 percent, echocardiography showed normal left ventricular function, modest concentric left ventricular hypertrophy, and global normokinetics. Cardiac CT Angiography revealed non-significant stenosis in the proximal LAD and RCA; a considerable diameter of fistula from the proximal left anterior descending artery (LAD) and right coronary artery (RCA) to the main pulmonary

artery (MPA) could result in coronary steal syndrome. Cardiac catheterization revealed a high caliber of fistula communicating from the proximal LAD to the proximal RCA, as well as a Coiling fistula at the proximal RCA using Microflex10 7 mm/22 cm. There was no evidence of significant atherosclerosis in the coronary arteries. After the treatment, the patient was pain-free in the chest.

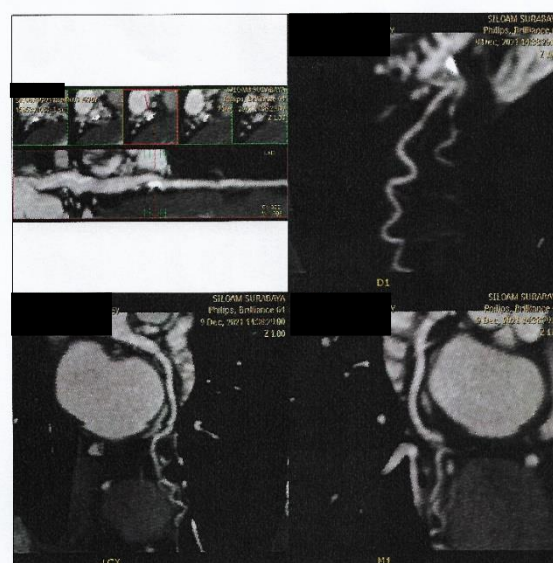
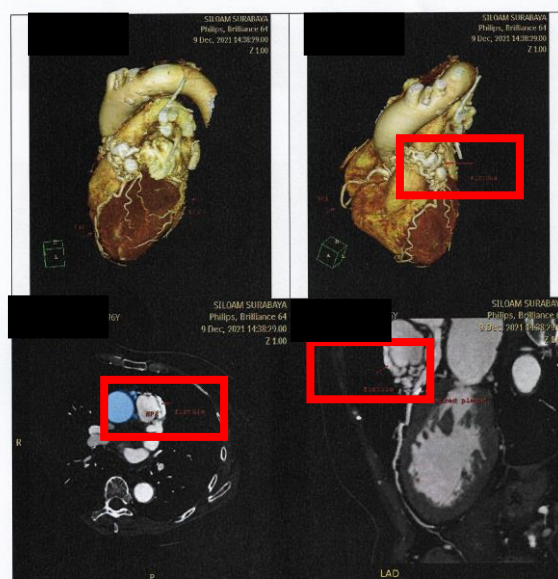




Figure 1. Cardiac CT Angiography. LMS was patent without any stenosis. LAD was mixed plaque in the proximal LAD causing 20% stenosis. Diagonal branch were patent throughout its course. LCx and OM branches were no evidence of stenosis. RCA was a dominant artery. Mixed plaque in the proximal RCA causing 10-20% stenosis RVB, PDA, and RPLB were patent. Fistula from proximal LAD and proximal RCA going to MPA with diameter 6 – 6.5 mm respectively

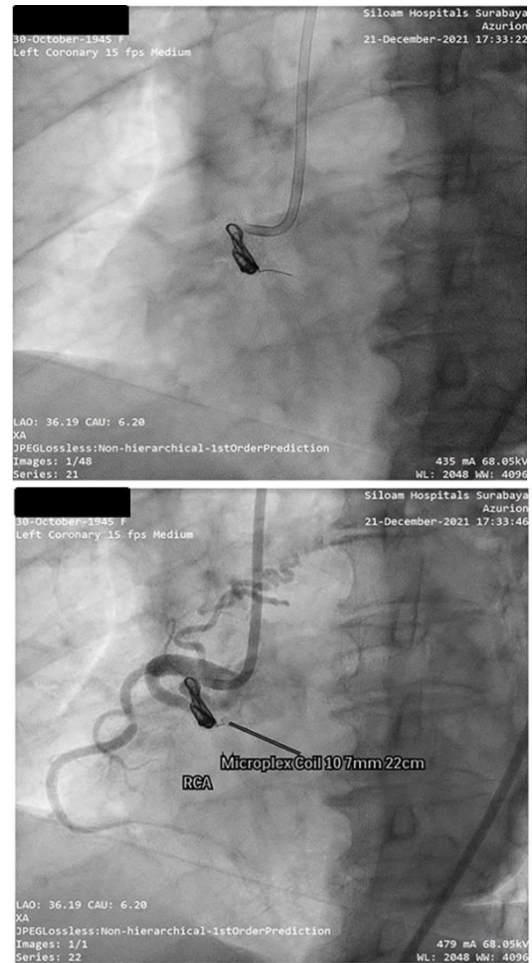


Figure 2. Cardiac catheterization was performed which revealed a large calibre of fistula communicating from proximal LAD and proximal RCA. Coiling fistula at Proximal RCA with Microflex10 7mm/22cm.

### Discussion

The RCA appears to be responsible for 55 percent of coronary fistulas, whereas the left coronary artery is responsible for 35%, and both are responsible for 10%. Coronary artery fistula patients are typically asymptomatic. Angina pectoris, palpitations, syncope, congestive heart failure, and even sudden cardiac death are some of the symptoms that patients may experience.

Currently invasive coronary angiography is the gold-standard diagnostic procedure. Nevertheless, CTCA is emerging as a new, safer and noninvasive diagnostic approach that also gives three-dimensional anatomical information [1]. Because it can rule out coronary artery disease and reveal other coronary anomalies, cardiovascular computed tomography could be used as a first-line test in low-intermediate risk patients. The origin of the feeder arteries, the course of the implicated vessels, information on the fistula's drainage site, and the presence and character of pre-fistulous dilatation could all be revealed using CTCA. This method can also help detect post-procedural problems such as recanalization, thrombosis, or device migration.[3, 7]

In terms of radiation dose and diagnostic precision, CTCA outperforms cardiac catheterization. CTCA takes less time than catheterization and avoids the hazards and difficulties that come with it. CTCA may be more favorable than conventional coronary angiography for accurate diagnosis and therapeutic planning of coronary abnormalities.[8]

In the examination of CAF, imaging methods have numerous benefits and drawbacks. The benefit of CT angiography includes good spatial and temporal resolution, quick acquisition time, excellent anatomic information obtained by using 3D multiplanar imaging with volume rendering, and a wide field of view that allows for examination of complex anatomy associated with CAFs. On the

other hand, CT angiography's limitations include radiation exposure, iodinated contrast material toxicity, and less hemodynamic information. Another imaging modality in CAF evaluation is invasive angiography. The advantages of invasive angiography are excellent spatial and temporal resolution, good hemodynamic information, and good evaluation of the size and number of fistulous tracts. Diagnosis and treatment can be rendered at the same time.

Furthermore, invasive angiography has limitations such as catheter-related risks, two-dimensional fluoroscopic images that can obscure complex anomalous vessels, radiation exposure, and toxicity of iodinated contrast material.[1]

Various closure methods have been described, including invasive surgical ligation, percutaneous transcatheter coil embolization, percutaneous implantation of covered stents, and percutaneous occluder systems. Coil embolization is generally considered safe if used in appropriate patients. The coils can be spring coils with Dacron fibers for achieving thrombosis or detachable coils (with interlocking detachable systems). The detachable coils are retrievable prior to final deployment and can help to avoid inadvertent embolization. Complications during coiling include rupture of the vessel, coil migration, entrapment of guidewire, and death.[4, 9, 10]

Transcatheter embolization and surgical ligation had equal early efficacy, morbidity, and mortality. The essential criteria for embolization were the proximal placement of the fistulous vascular, older patient age, extra-anatomic termination of the fistula away from the normal coronary arteries, a single drain site, and the absence of accompanying cardiac tissues requiring surgical intervention.<sup>[1,9]</sup>

Specialized imaging, such as cardiac CT, helps determine coronary architecture and guides therapeutic intervention. CAF data was gathered during pre- and post-procedural CT angiographic evaluations. Prior to the procedure, the number and location of fistula sources, fistula drainage sites, the course and size of the fistulous tract, and fistula complexity, which includes angulations, tortuosity, concomitant linkages with other structures, and other associated anomalies, are all assessed. Postoperative residual leakage or recanalization, aneurysmal change or persistent dilatation of the coronary artery and ostium, thrombus formation, coil or device migration, myocardial ischemia or infarction, catheter-related complication, coronary artery spasm, dissection, or perforation are all things that CT angiography can detect.

Our patient showed signs of coronary steal syndrome; thus, an intervention was necessary. Historically, coronary artery fistulas were treated with surgery, especially if the patient had coronary artery disease. Because this patient had non-

significant stenosis at the proximal LAD and proximal RCA, percutaneous coil embolization was chosen instead of surgery to prevent the dangers of surgery.<sup>[1,9]</sup>

## Conclusion

CAFs, or coronary artery abnormalities, are a very uncommon type of heart abnormality. Although standard angiography has been used for coronary artery assessment, cross-sectional imaging is a noninvasive and valuable tool for diagnosing CAFs. CTCA is a noninvasive imaging technique used to define the CAF anatomy better. In addition, optimal CTCA images can be acquired with contrast volumes that are comparable to or lower than those used in conventional coronary angiography.

## Acknowledgement

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