
Rare Symptomatic Fistula from Distal LAD Territories Drained into Right Ventricle: A Case Report

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Abstract

Introduction: Coronary-cameral fistulas (CCF) are anomalous connections between one coronary artery, most commonly the right coronary, then the left or circumflex, and a cardiac chamber, most commonly the right ventricle or right atrium. However, iatrogenic CCF or coronary arteriovenous fistula can occur after coronary artery perforation. Indications for closure are significant left to right shunt, congestive heart failure due to ventricular volume overload, myocardial ischemia due to coronary steal phenomenon, prevention of endarteritis or rupture.

Case Summary: A 83-year-old female patient presented with right sided heart failure. Transthoracic echocardiography revealed unusual large fistula at tricuspid annulus, which drained into right ventricle. Cine images confirmed fistula connection to distal LAD coronary territories. Decision to treat it conservatively due to patient's comorbidity, atypical anatomy and failure risk to close it effectively.

Conclusion: Coronary-cameral fistulas in unusual sites can be easily detected and assessed by the transthoracic echocardiography. The decision to treat is a case-by-case based on balancing the symptoms, the risk of the fistula, and the risk of complications. Careful planning of the procedure is mandatory and successful closure can be obtained by transcatheter or surgical approach.

Keywords: Fistula; Transthoracic echocardiography; Heart failure; Fistula closure devices

Introduction

Coronary-cameral fistulas (CCF) are anomalous connections between one coronary artery, most commonly the right coronary, then the left or circumflex, and a cardiac chamber, most commonly the right ventricle or right atrium [1]. However, iatrogenic CCF or coronary arteriovenous fistula can occur after coronary artery perforation [2]. A coronary arteriovenous fistula occurs if the fistula drains into the pulmonary artery. Indications for closure are significant left to right shunt, congestive heart failure due to ventricular volume overload, myocardial ischaemia due to coronary steal phenomenon, prevention of endoarteritis or rupture [3]. Careful planning of the procedure is mandatory to understand the anatomy, proper device selection, prediction of compression of adjacent structure and to decide to select transcatheter or surgical CCF closure. Successful closure can be obtained according to the morphology by transcatheter occluder, coils and plugs or surgically in more than 90% of cases [1].

Case Presentation

An 83-year-old female patient was admitted in the emergency ward due to dyspnea NYHA VI. Transthoracic echocardiography revealed unusual large fistula at tricuspid annulus, which drained into right ventricle with preserved left ventricular function (Figure 1, Supplementary Figure 1 and Video 1) and with preserved ejection fraction, EF ca. 65%.

It leads to severe tricuspid valve insufficiency, moderate pulmonary artery hypertension, hyperdynamic circulation and right sided heart failure (Supplementary Figure 2 and 3).

Cine images confirmed fistula connection to distal LAD coronary territories (Supplementary Figure 4).

Drainage from LAD coronary into right ventricle could cause ischemia due to coronary steal phenomenon.

We treated this symptomatic fistula conservatively with optimal heart insufficiency treatment due to patient's comorbidity, atypical anatomy and failure risk to close it effectively. We hope to raise awareness among cardiologists of the unusual fistula site at tricuspid annulus.

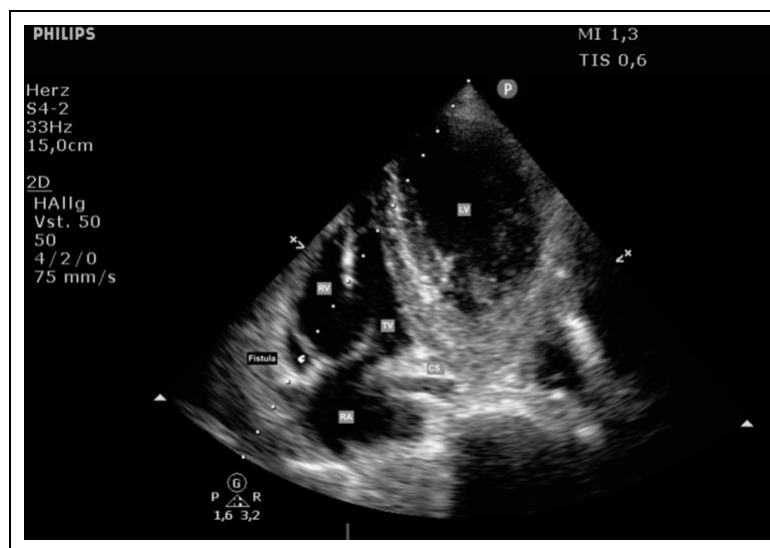
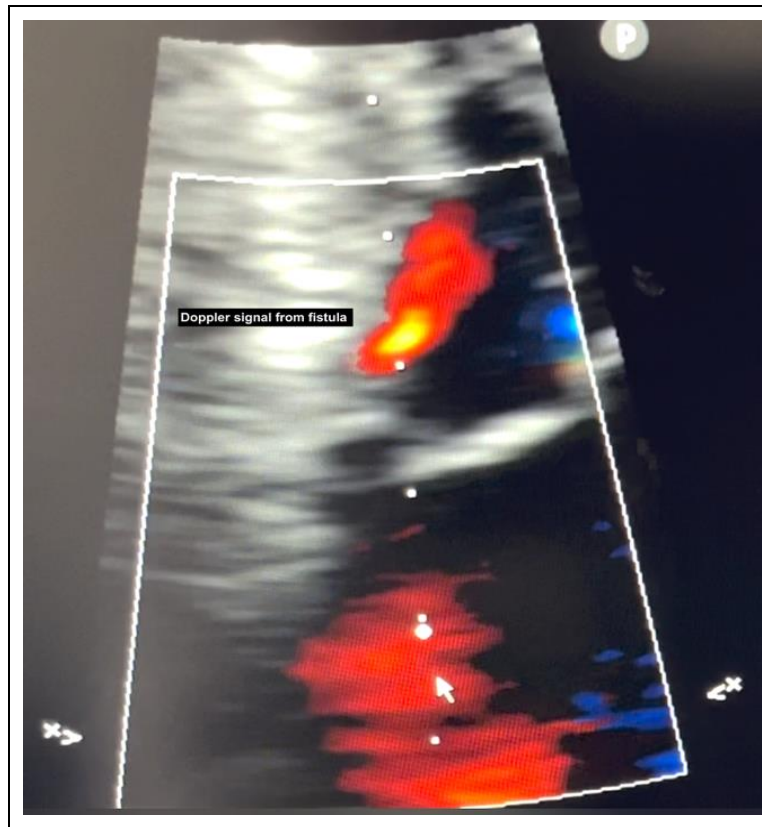


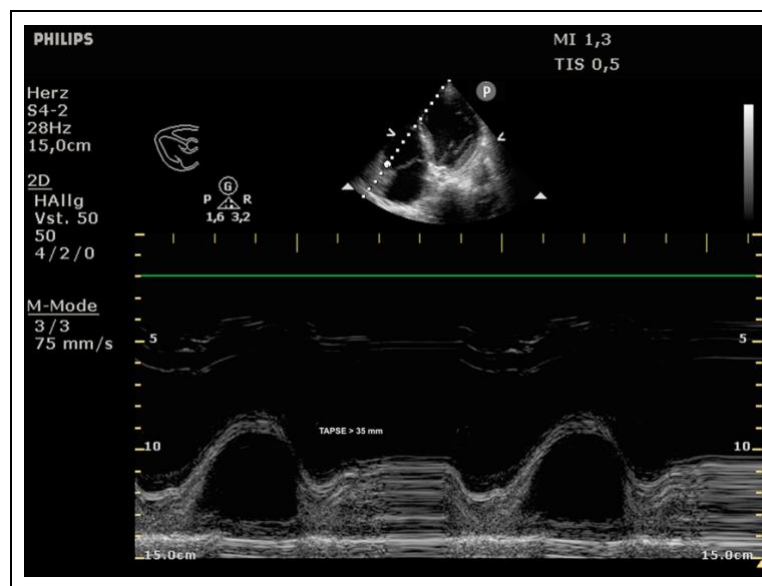
Figure 1: Transthoracic echocardiography in three chamber view revealed unusual large fistula at tricuspid annulus, which drained into right ventricle.

RA: Right atrium; RV: Right ventricle; LV: Left ventricle; TV: Tricuspid valve; CS: Coronary sinus.



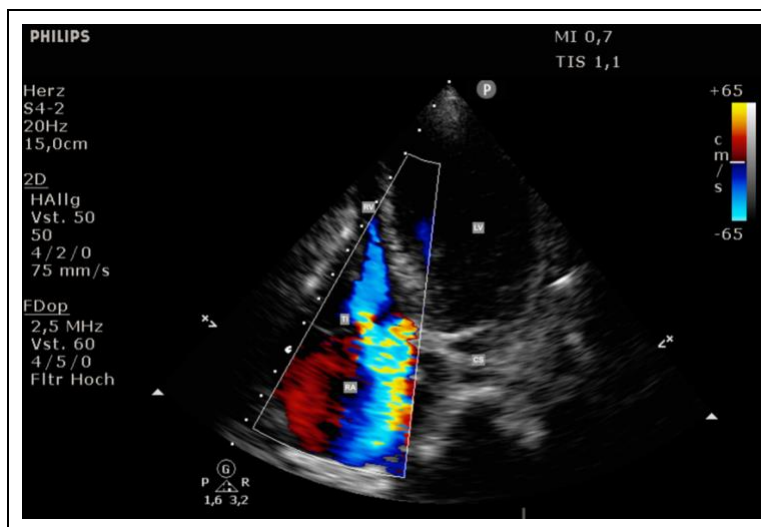
Supplementary Figure 1: Zooming by transthoracic echocardiography in four chamber view revealed color doppler signal at unusual large fistula at tricuspid annulus, which drained into right ventricle.

RA: Right atrium; RV: Right ventricle; LV: Left ventricle; TV: Tricuspid valve; CS: Coronary sinus.

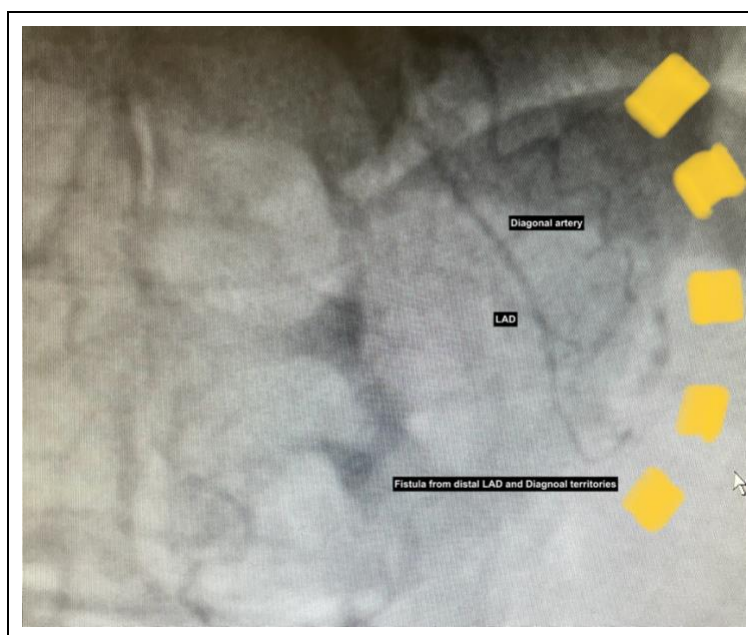


Supplementary Figure 2: Transthoracic echocardiography in three chamber view revealed M-Mode at tricuspid annulus revealed preserved right ventricular function with TAPSE above 35 mm due to hyperdynamic circulation.

TAPSE: Tricuspid annular plane systolic excursion.



Supplementary Figure 3: Transthoracic echocardiography in three chamber view revealed color doppler signal at tricuspid valve to the roof of the right atrium due to severe tricuspid insufficiency and hyperdynamic circulation.



Supplementary Figure 3: Cine images of coronary angiography in right oblique view revealed fistula connection to distal LAD and diagonal coronary territories.

LAD: Left anterior descending

Discussion

This case highlights, that echocardiography can detect the unusual fistula site at tricuspid annulus and allows real-time non-invasive assessments. Mechanisms for clinical manifestation could be left-to-right shunting, myocardial ischemia secondary to coronary steal or side-branch obstruction (acquired), mural thrombosis at sites of coronary ectasia, rupture (aneurysmal wall degeneration), endocarditis, and aortic valve insufficiency (secondary to an aneurysmal proximal coronary artery).

Steal phenomena could be persistent steal caused by the existence of large fistulous tracts, or episodic steal, caused by physiologic factors that increase shunting flow into the fistula such exercise. Of note, stress testing with vasodilators is likely to yield negative results, since they increase flow more to the nutrient branches than to the fistulous tract (which has no significant vasodilatory capacity) [4].

Cardiac CT, aortography and coronary angiography are essential for pre-procedural assessment. It frequently has a tortuous course and can be very dilated or aneurysmatic. Thus, it is important to delineate the anatomy of the fistula, in terms of origin, course, size, site of drainage, and relationships with coronary and adjacent structures. Intravascular ultrasound can be used to evaluate intimal integrity, mural clots, vessel size, and localized aneurysms; and pressure-wire studies can be used to evaluate the pressure loss along fistulous arteries [4].

The decision to treat is a case-by-case based on balancing the symptoms, the risk of the fistula, and the risk of complications [3]. Criteria for intervention should be the pulmonary–systemic flow ratio: if it exceeds 1.5:1, aneurysmal degeneration, and myocardial ischemia caused by steal phenomenon.

Generally, surgical repair is recommended in young symptomatic patients with body weight less than 5 kg or in complex anatomy [1]. Transcatheter closure is judged to be feasible according to pre-procedural assessment. floppy 0.014 inch or superfloppy wires are generally recommended to be able to track tortuous vessels [1].

A test occlusion of the fistula with balloon catheter and simultaneous coronary angiogram is recommended for choosing the proper device size, type and position for deployment to achieve complete occlusion without compromising the adjacent coronary arteries. It is recommended to close the CCF as close to the coronary origin as possible and simultaneously to close the distal end, if possible, to prevent a cul de sac which could promote thrombosis [3].

The most used occluder devices are the following:

Coils (e.g., Gianturco coils and controlled-release coils [both Cook Medical, Bloomington, IN, USA], PFM coils [pfm medical ag, Cologne, Germany]) [5].

A patent ductus arteriosus (PDA) device or a muscular ventricular septal defect (VSD) device or vascular plugs by a manufacturer such as Occlutech (Helsingborg, Sweden) or Abbott Medical (Abbott, MN, USA) [6]. The size of the occluder device should be 20 to 40% larger than the size of the fistulous vessel.

Conclusion

Coronary-cameral fistulas in unusual sites can be easily detected and assessed by the transthoracic echocardiography. The decision to treat is a case-by-case based on balancing the symptoms, the risk of the fistula, and the risk of complications. Careful planning of the procedure is mandatory and successful closure can be obtained by transcatheter or surgical approach.

Note: Videos related to this article can be found online at: <https://www.cardiologycasereportsjournal.org/archive/Rare-Symptomatic-Fistula-from-Distal-LAD-Territories-Drained-into-Right-Ventricle:-A-Case-Report.html>

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