
Non-invasive imaging of a giant right coronary artery due to a coronary fistula

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Coronary artery fistula is a relatively rare finding in patients undergoing diagnostic cardiac catheterization. Incidence, angiographic characteristics and natural history of coronary fistulas of this type have not been well defined in the literature.

We report a case of a 54-year-old man in whom such abnormalities have been diagnosed with invasive and non-invasive coronary imaging and review the epidemiology, treatment and prognosis of coronary fistulas. *Acta Cardiol* 2006; 61(5): 569-571. doi: 10.2143/AC.61.5.2017774

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Case report

A 54-year-old white man with moderate hypertension treated for 4 years with calcium channel blockers visited our hospital for an examination owing to latero-thoracic rest chest pain. There were no symptoms other than this atypical chest pain. The patient had no previous medical history apart from this straightforward hypertension and had no family history. This was his first cardiological contact. On physical examination, blood pressure was normal at 120/70 mm Hg and heart rate was regular at 70 beats/min. A full physical examination did not reveal any abnormalities. Resting and exercise electrocardiogram were completely normal. Rest echocardiography revealed normal left ventricular function without kinetic abnormality and there was no valvular pathology, but the transthoracic examination suspected a dilatation of the coronary sinus, confirmed soon after by transoesophageal examination.

Therefore, complete cardiac right and left catheterization were undertaken to exclude congenital abnormality.

Coronary angiography revealed a fistula between a normal left circumflex artery and coronary sinus and a giant widely dilated right coronary artery ending in the posterior part of the coronary sinus (figure 1). Left ventriculography was normal and full haemodynamic

evaluation with left and right pressure recording did not reveal any anomaly. Staged oxymetry was performed and made it possible to evaluate a non-significant left/right shunt with QP/QS < 1.3. We also performed a 16-detector slice spiral computed coronary tomography that confirmed these observations with a 3D reconstruction (figures 2, 3). The images were obtained using a Sensation 16 Speed 4D (Siemens Medical Solutions, Forchheim, Germany) with 210 ms gantry rotation time, cardiac gating and 16 detector slices, with contrast-enhanced image (80 ml; 4 ml/s., Optiray 350, Codali-Guerbet, Roissy, France and 50 ml physiologic solution; 3 ml/s.). Axial images were reconstructed at 300 ms RR-interval and 3D reconstruction was obtained using in-space programmed reconstruction (Syngo software, Siemens Medical Solutions, Forchheim, Germany). The patient refused any surgical or percutaneous treatment and was discharged with an ACE inhibitor to reduce the left ventricular postcharge and to treat his hypertension. After 4 years of follow-up the patient is still in good condition.

Definition

Coronary artery fistula is defined as the direct communication of a coronary artery vessel with a cardiac chamber, a great vessel or another vascular structure bypassing the capillary bed. The number, origin and course of the coronary artery, however, remain strictly normal. This abnormality is usually congenital but can also sometimes be secondary to bypass surgery, valvular surgery, endomyocardial biopsy or percutaneous coronary intervention¹.

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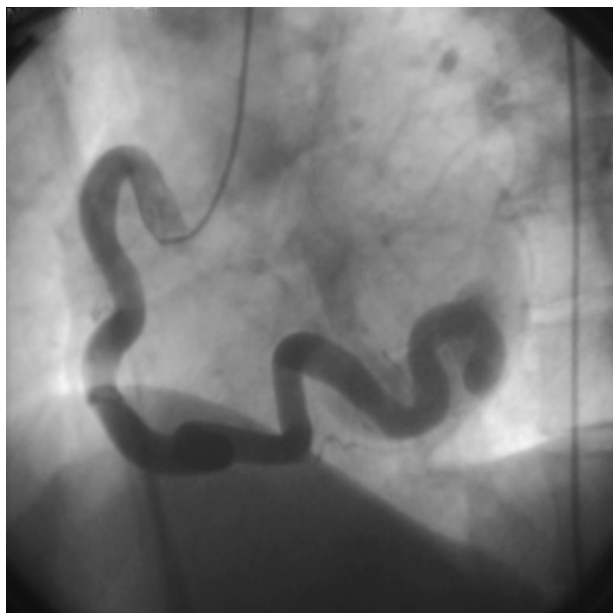


Fig. 1. – Selective angiography of the right coronary artery using 6 French, Judkins Right (4) Catheter, showing a widely dilated right coronary artery ending in the posterior part of the coronary sinus in 45° left anterior oblique view.



Fig. 2. – 16-detector slice spiral computed coronary tomography images with 3D reconstruction showing the course of the right coronary artery and of the fistula draining in the posterior part of the coronary sinus in inferior view.

Incidence

While congenital coronary anomalies occur in 1% or 2% of the population², coronary fistulas account for 0.1 to 0.2% of all patients undergoing coronary angiography³, producing an estimate of 0.002% for the general population⁴. Most of them arise from the right coronary artery and drain into a right chamber: right

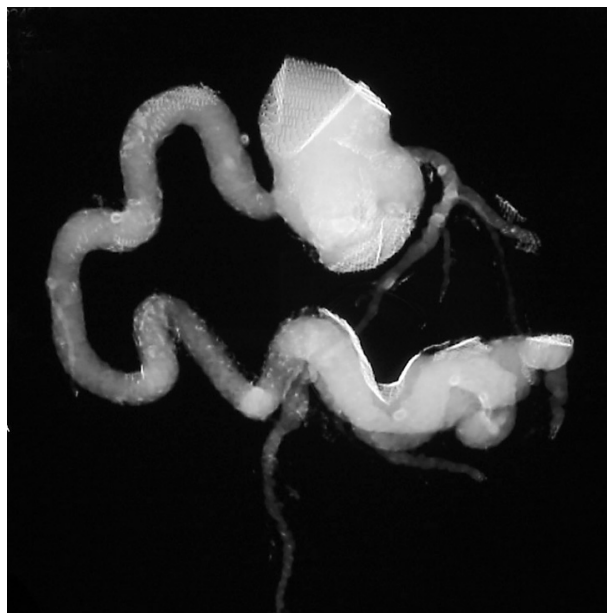


Fig. 3. – 16-detector slice spiral computed coronary tomography with 3D reconstruction images isolating vascular structures in anterior view.

ventricle, right atrium, pulmonary artery and coronary sinus (45%, 25%, 15-20%, 7%, respectively). Left coronary fistulas are less frequent, usually draining in the right ventricle or the right atrium and rarely in the left chamber.

Clinical presentation and complications

The main clinical finding indicating coronary fistula is the auscultation, especially in children, of a continuous murmur similar to “patent ductus arteriosus”, heard at the middle left or right sternal border⁵. The patient can be asymptomatic but when symptoms develop, they usually are angina, palpitations or heart failure, especially if there is substantial communication with a significant shunt creating overload of the left ventricle. In rare cases, rupture and endocarditis have been described^{6, 7}.

Treatment

Surgical or percutaneous closure of coronary artery fistula at the time of diagnosis is recommended by some authors even in asymptomatic patients, since perioperative morbidity and mortality increase with age⁸ and long-term results are good⁹. Nevertheless, other reports suggest a more conservative approach based on prolonged follow-up¹⁰ notably because recurrence after surgery is possible and complete closure can sometimes be difficult because of complex anatomy with multiple entrance sites or arterial inflow

to the fistula located at the posterior part of the heart. Intraoperative guidance by transoesophageal echocardiography or angiography may be recommended in complex situations to ensure complete closure.

In the preoperative evaluation, other non-invasive imaging techniques can be used to improve detailed cardiac anatomy. To the best of our knowledge, this is the first report of a patient in whom 16-slice computed coronary tomography was used as a non-invasive method in the evaluation and diagnosis of a coronary fistula.

These images were obtained with a 16-multislice CT technique but with the already available 64 slices, and soon 128 and 256 slices, diagnostic accuracy will even improve according to the higher spatial resolution of these techniques.

References

1. Vavuranakis M, Bush CA, Boudoulas H. Coronary artery fistulas in adults: incidence, angiographic characteristics, natural history. *Cathet Cardiovasc Diagn* 1995; **35**: 116-20.
2. Engel HJ, Torres C, Page L Jr. Major variation in anatomical origin of the coronary arteries: angiographic observations in 4250 patients without associated congenital heart disease. *Cathet Cardiovasc Diagn* 1975; **1**: 57-69.
3. Gillebert C, Van Hoof R, Van de Werf F, Piessens J, De Geest H. Coronary artery fistulas in an adult population. *Eur Heart J* 1986; **7**: 437-43.
4. Macri R, Capulzini A, Fazzini L, Cornali M, Verunelli F, Reginato E. Congenital coronary artery fistula: report of five patients, diagnostic problems and principles of management. *Thorac Cardiovasc Surg* 1982; **30**: 167-71.
5. Fernandes ED, Kadivar H, Hallman GL, Reul GJ, Ott DA, Cooley DA. Congenital malformations of the coronary arteries: the Texas Heart Institute experience. *Ann Thorac Surg* 1992; **54**: 732-40.
6. Hoffman JIE. Congenital anomalies of the coronary vessels and the aortic root. In: Emmanouilides GC, Riemenschneider TA, Allen DH, Gutgesel HP (eds). *Heart Disease in infants, children and adolescents*. William and Wilkins, Baltimore 1995, p. 769-91.
7. Haberman JH, Howard JL, Johnson ES. Rupture of the coronary sinus with hemopericardium. *Circulation* 1963; **28**: 1143-4.
8. Schumacher G, Roithmaier A, Lorenz HP, Meisner H, Sauer U, Muller KD, Sebening F, Buhlmeyer K. Coronary artery fistula in infancy and childhood: diagnostic and therapeutic aspects. *Thorac Cardiovasc Surg* 1997; **45**: 287-94.
9. Cheung DL, Au WK, Cheung HH, Chiu CS, Lee WT. Coronary artery fistulas: long-term results of surgical correction. *Ann Thorac Surg* 2001; **71**: 190-5.
10. Gowda RM, Vasavada BC, Khan IA. Coronary artery fistulas: clinical and therapeutic considerations. *Int J Cardiol* 2006; **107**: 7-10.