Atypical ventricular tachycardia and syncope with left coronary artery origin from the right coronary sinus

Naomali L Amarasena, Ravi P Pillai, J Colin Forfar

Abstract

An 18 year old man suddenly lost consciousness while jogging. The ambulance crew documented atypical ventricular tachycardia and an episode of ventricular fibrillation. Coronary angiography showed the left main coronary artery arising from the right sinus of Valsalva. Subsequent surgical coronary revascularisation was successful.

(Br Heart J 1993;70:391-392)

Anomalous origin of the left main coronary artery from the right sinus of Valsalva is well recognised to be associated with myocardial ischaemia and sudden death.^{1,2} The mechanism of sudden death is presumed to be arrhythmic and may be associated with exertion but electrocardiographic detail is minimal. We report documented atypical ventricular tachycardia and ventricular fibrillation associated with this anomaly and its management.

Department of Cardiology, John Radcliffe Hospital, Oxford

N L Amarasena
R P Pillai
J C Forfar

Correspondence to:
J C Forfar, Department of Cardiology, John Radcliffe Hospital, Headington, Oxford OX3 9DU.

Case report

An 18 year old man suddenly lost consciousness while jogging. A further episode occurred while in the ambulance. The ambulance crew recorded sinus rhythm with bursts of atypical ventricular tachycardia (fig 1) and an episode of ventricular fibrillation requiring DC shock. On questioning he reported a single syncopal episode also while running, when 14 years of age. There was no family history of sudden death or ischaemic heart disease. Physical examination showed a young man of normal build and cardiovascular examination was unremarkable. The electrocardiogram on arrival in hospital showed sinus rhythm with T wave inversion in leads I, aVL, V2, and V3 with a normal QT interval. The T wave changes partially resolved over 48 hours and cardiac enzymes were normal. Subsequent submaximal symptom limited exercise tests and 24 hour electrocardiographic monitoring were negative during his stay in hospital and again one month later. Intracardiac electrophysiological study when on no treatment showed normal atrioventricular conduction and no evidence of a sustained inducible arrhythmia. Echocardiography and left ventricular angiography were normal. Coronary angiography showed the left main coronary artery arising anomalously from the right coronary sinus and coursing posteriorly between the aorta and pulmonary artery before bifurcation. There was no occlusive disease. A dominant right coronary artery arose normally.

Surgical correction was undertaken after medical treatment with atenolol. At operation the left and right coronary arteries were seen arising from the right coronary sinus with the left coronary artery following an oblique course within the wall of the aorta. The opening of the artery was slit-like (fig 2). The intramural tunnel was deroofed and the internal edge oversewn, thus decreasing the angle of exit of the artery from the aorta. The internal mammary artery was anastomosed to a large diagonal branch of the left anterior descending artery as an added precaution.

The postoperative course was uneventful. Angiography six months later showed satisfactory filling of the left coronary artery from the anomalous left main coronary artery and the diagonal graft. Left ventricular angiography showed good overall ventricular function with mild anterior hypokinesis.

The patient was symptom free and unrestricted on atenolol one year later.

Figure 1 Sequence of electrocardiographic recordings during ambulance collapse (recording speed 25 mm/s). (A) Regular rhythm with broad QRS complexes and ST depression. (B) Salvos of polymorphic ventricular premature beats. (C) Atypical ventricular tachycardia >300-350 beats/min. (D) Sinus tachycardia with narrow complex QRS after defibrillation.

Figure 2 Photograph and diagram of aortic root showing oblique origin of left coronary artery from the right coronary sinus.

Discussion

Anomalous origin of the left main coronary artery from the right sinus of Valsalva was once considered a minor coronary anomaly but is now recognised to be life threatening.¹ Sudden death occurring during or after severe exertion in young people with this anomaly has been described.² Despite the widespread assumption that myocardial ischaemia due to the oblique angle of take off of the left main coronary artery and its intramural course between aorta and pulmonary artery is the mechanism of death, electrocardiographic documentation during syncope has hitherto been lacking.^{1,3} Our patient had two episodes of exertional syncope and during the second episode atypical ventricular tachycardia followed by ventricular fibrillation was documented.

The coronary anatomy in this patient is typical for those with this anomaly in whom sudden death has occurred.^{3,4} There have been no reports of sudden death in patients in whom the anomalous left coronary artery

courses posterior to the aorta or anterior to the pulmonary artery.⁵ It seems plausible that during periods of physical activity, aortic root distension may suddenly obstruct the left main coronary artery because of its oblique angulation and slit-like orifice.

Additional vascularisation in this situation seems appropriate and in this patient a simple deroofing procedure was performed to reduce the risks of flap valve closure of the left main coronary artery.

- 1 Barth CW, Roberts WC. Left main coronary artery originating from the right sinus of Valsalva and coursing between the aorta and pulmonary trunk. *J Am Coll Cardiol* 1986;7:366-73.
- 2 Maron BJ, Roberts WC, McAllister HA. Sudden death in young athletes. *Circulation* 1980;62:218-29.
- 3 Cheitlin MD, De Castro CM, McAllister HM. Sudden death as a complication of anomalous left coronary origin from anterior sinus of Valsalva. *Circulation* 1974;50:780-7.
- 4 Roberts WC. Major anomalies of coronary arterial origin seen in adulthood. *Am Heart J* 1986;111:941-62.
- 5 Chaitman BR, Lesperance J, Saltiel J. Clinical, angiographic and haemodynamic findings in patients with anomalous origin of the coronary arteries. *Circulation* 1975;53:122-31.