

Asymptomatic iatrogenic right coronary artery dissection with spontaneous resolution

A case report

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Summary

A young woman with angiographically normal coronary arteries had asymptomatic iatrogenic catheter-induced dissection of her right coronary artery which was managed conservatively. Because of continuing chest pain despite therapy, over a year later she again underwent selective coronary arteriography; a Softip cardiovascular catheter (Angiomedics Inc., Minneapolis) was used without complication. This may be the first report of use of this catheter after previous iatrogenic coronary artery dissection caused by a more conventional type. It is also the first time that this catheter was employed in the RSA. The use of a Softip cardiovascular catheter may significantly reduce this complication of a common coronary angiography.

S Afr Med J 1987; 71: 254-256.

Case report

A 36-year-old white woman with no risk factors for atherosclerotic coronary artery disease (CAD), developed classic effort-induced angina pectoris in August 1983. Her general practitioner performed a two-step Master's test, reported as 'very suggestive of ischaemic heart disease (IHD)'. She was given sublingual isosorbide dinitrate (Isordil; Ayerst) as required and referred to the local military hospital for further assessment. The cardiologist there decided to admit her to Tygerberg Hospital for coronary arteriography; apart from a convincing history of effort-related precordial pain in keeping with angina pectoris, clinical examination revealed nothing abnormal.

Routine biochemical, haematological and serological investigations gave results within the normal range, as did a chest radiograph. A resting 12-lead ECG showed a sinus rhythm of 80/min, a PR-interval of 0,14 second, a mean QRS-axis of +45° and no features of IHD.

Cardiac catheterisation

This was carried out with an 8F pigtail (Cordis) catheter. Central aortic and left ventricular (LV) pressures were all normal. LV cine angiography in the right anterior oblique (RAO) projection

demonstrated nothing abnormal. The pigtail catheter, was then exchanged for a right coronary 8F 4 cm Cordis Judkins-type catheter. The first injection of contrast material into the right coronary artery (RCA) in the left anterior oblique (LAO) view revealed an angiographically normal and dominant vessel (Fig. 1a), with no right-to-left collateralisation. The catheter was removed from the RCA ostium and the C-arm cine-angiographic apparatus repositioned for the RAO projection. The same technique was then used to insert the Cordis catheter into the RCA ostium. Immediately after injection of the contrast material an abnormal appearance of the RCA, not accompanied by chest pain or ECG or haemodynamic change, was noted. The catheter was then removed. On replay of the video a dissection of the RCA was quite clear (Fig. 1b). A 12-lead ECG, with the patient still on the catheterisation table, was normal. Some 15 minutes later, selective injections of contrast medium into the left coronary artery (LCA) showed it to be angiographically normal, with no evidence of left-to-right collateral flow. The patient remained entirely asymptomatic, the central aortic pressure was normal, and the ECG monitor showed no arrhythmia or ST-segment change.

In view of the RCA dissection it was decided not to undertake an ergonovine maleate provocation test. The patient was transferred to the Intensive Coronary Care Unit for further management.

Post-catheterisation course

During the first 3 days continuous heparin infusion, to a dose of 30 000 U/24 h, was given with adequate control. Nifedipine (Adalat; Bayer-Miles) 20 mg 3 times daily was also prescribed orally for any underlying coronary vasospasm. ECG tracings and serum cardiac enzymes remained normal. The heparin was gradually discontinued and aspirin 75 mg daily and dipyridamole (Persantin; Boehringer Ingelheim) 100 mg 3 times daily added to the nifedipine. After discharge 1 week after arteriography the patient remained entirely asymptomatic on nifedipine, aspirin and dipyridamole.

Cardiac clinic follow-up course

The patient remained asymptomatic on medication until early in November 1984, approximately 13 months after coronary arteriography, when she again began complaining of classic effort-induced angina. A treadmill exercise test was negative, and an exercise thallium-201 scintiscan failed to show either a constant defect or reversible myocardial ischaemia. In view of her symptoms she was readmitted for cardiac catheterisation.

Repeat cardiac catheterisation

This was performed on 13 December 1984. Because of the previous RCA dissection, the author opted to use 8F 4 cm Softip Judkins-type, catheters (Angiomedics Inc., Minneapolis). This was the first time this catheter was used in the RSA. The LCA was again angiographically normal. The RCA ostium was entered very carefully with repeated small-volume 'guiding' injections of contrast material. Selective angiograms delineated a completely normal vessel (Figs 2a and b); thus, the previous RCA dissection

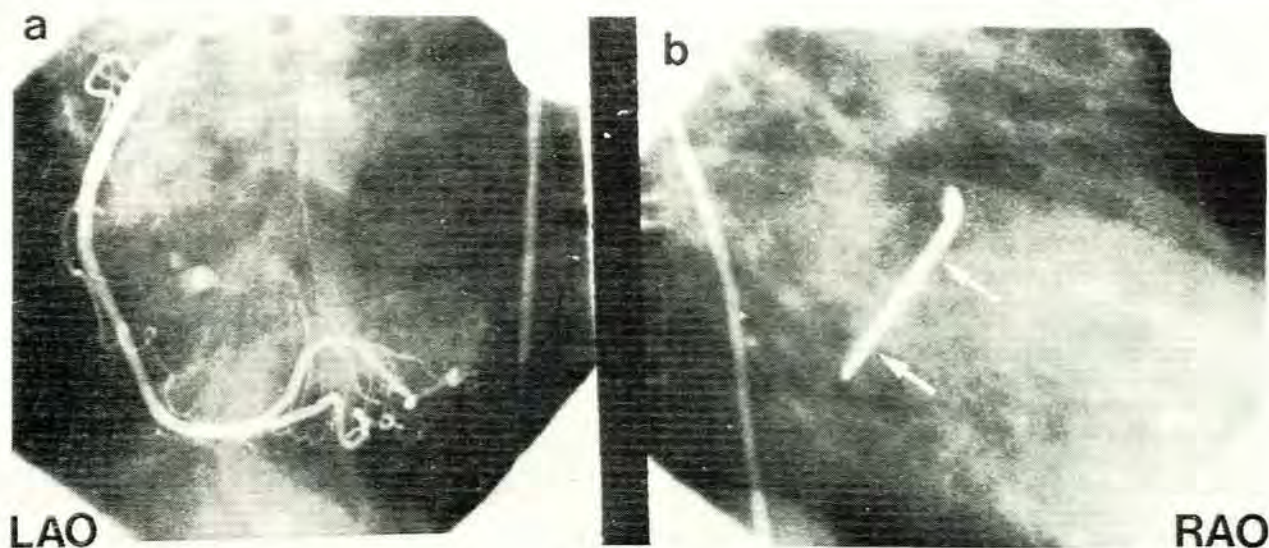


Fig. 1. Right coronary cine angiogram in (a) left anterior oblique (LAO) view where the vessel is normal and dominant; and (b) attempt at contrast injection into the RCA in the RAO projection resulted in a long dissection (arrowed); the true lumen of the RCA cannot be seen.

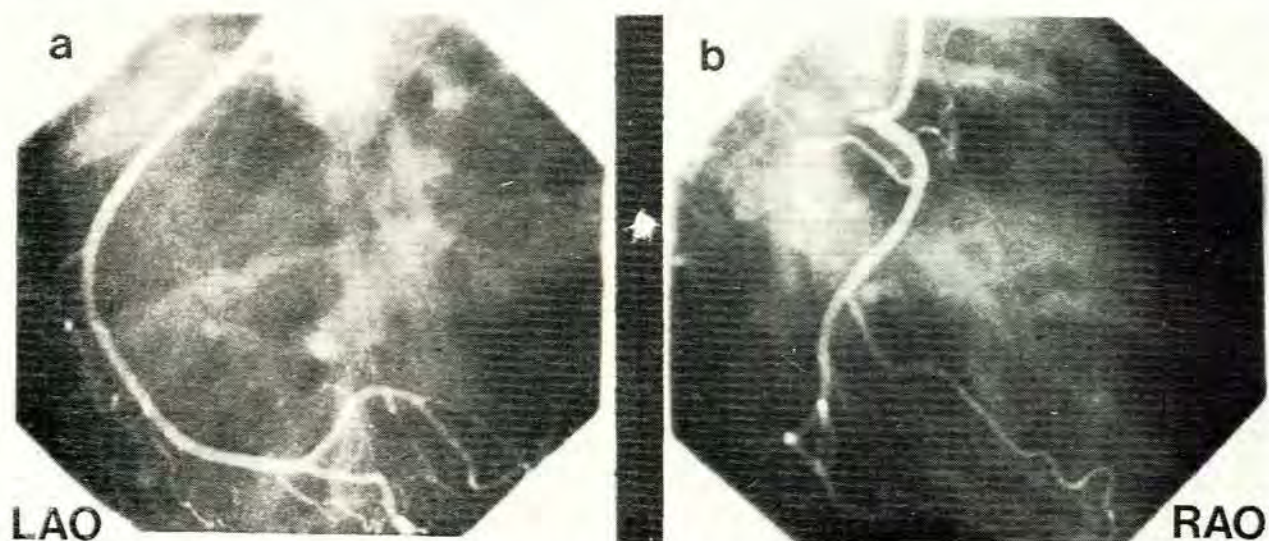


Fig. 2. Right coronary cine angiograms in (a) LAO and (b) RAO views approximately 14 months after the previous iatrogenic dissection. The vessel is now normal and dominant.

could no longer be demonstrated. The patient experienced no chest pain and the ECG remained normal. Ergonovine maleate provocation was not carried out. Nifedipine, dipyridamole and aspirin medication was stopped and the patient was reassured that there was no heart disease present. She has had no further symptoms and resting and exercise ECGs have remained normal. Upper gastro-intestinal tract investigations have also failed to explain her previous chest pain.

Discussion

Atherosclerotic CAD has assumed major importance here but non-invasive investigative methods recently introduced have not entirely replaced the need for selective coronary arteriography. This has been particularly important since the successful introduction of interventional radiology as exemplified by percutaneous transluminal coronary angioplasty (PTCA), and intracoronary thrombolysis in acute myocardial infarction (AMI). The safety standard of coronary arteriography must

therefore be as high as possible. Both operator skill and the design of cardiovascular catheters must be considered in this safety equation, as must the patho-anatomy of the coronary arteries.

This communication highlights the complication of iatrogenic coronary artery dissection. Over the past 15 years about 600 patients annually have undergone diagnostic coronary arteriography at this institution. PTCA has also been performed here over the past few years. Our patient is the first in this institution to have suffered iatrogenic coronary artery dissection. Percutaneous transfemoral catheterisation is carried out in some 98% of our patients and the Sones technique from the brachial artery in the rest. Thus the approximate incidence of this complication has been 1 in 9000 patients (0,01%), a figure that compares favourably with that of less than 1 per 1000 patients investigated.¹ Feit *et al.*² reported an incidence of 1 in 2263 patients studied over a 10-year period, and it is generally believed that this incidence varies between 0,15 and 0,5%.³⁻⁶ In the English-language literature 49 cases of iatrogenic

catheter-induced coronary artery dissection have been documented.^{1-3,7-23}

This complication has been more frequently seen with the RCA (total of 29 cases including the present one) than with the left (21 cases). This peculiarity may well be related to the tendency for a preformed right Judkins-type catheter to 'wedge', as well as the more often experienced vasospasm of this coronary artery. However, Kruyswijk and Müller²³ seem to think otherwise since they state that 'the type catheter used for coronary angiography does not seem to have much influence, since dissection has occurred during the use of both Sones and Judkins-type catheters'. The danger of LCA dissection must also be guarded against since the Judkins-type catheter usually engages quite easily in the absence of much operator control. Coronary atherosclerosis is the most significant disease predisposing to dissection, but it can occur in women with 'angiographically normal' coronary arteries in the presence of medial degeneration.¹

Iatrogenic catheter-induced dissection of the main stem LCA has now been reported in 11 patients,^{1,4,8,11,16,20-24} with death in 5. Two of the remaining 6 suffered an AMI, while 3 of the remaining 4 underwent successful aortocoronary saphenous vein bypass graft surgery. Vacek and McKiernan²¹ documented a unique case given intracoronary streptokinase followed by saphenous bypass grafting with a satisfactory outcome. It is important to be aware of the possibility of late occurrence of left main stem stenosis after asymptomatic iatrogenic dissection, since failure of coronary artery bypass surgery may result in extensive myocardial infarction.²²

A potential breakthrough in catheter design seems to have been achieved by the recent introduction of the Softip catheter. Van Tassel *et al.*²⁵ reported that this catheter reduced the coefficient of resistance by 23% and indentation depth by 56% when compared with other commonly used catheters. In canine studies there was histological evidence of less endothelial damage and intimal proliferation in the aorta and coronary ostia caused by the Softip catheter. They concluded that 'a soft-tipped angiographic catheter is more apt to reduce the frequency and severity of vascular trauma and thereby the chances of catheter-related complications resulting from intimal abrasions, dissection, or atheroma dislodgement'.

This catheter was used for the first time in the RSA in the second coronary arteriographic study of our patient without mishap. To date, the author has employed the Softip cardiovascular catheter in some 300 patients and there have been no complications. This type of catheter may prove to be of great benefit as a guiding catheter during PTCA when coronary artery dissection is more likely because of the coaxial catheter system.

The management of patients with iatrogenic dissection is influenced by several factors. Firstly, it must be appreciated that this complication need not be accompanied, at the time of actual dissection, by any chest pain or other symptom or sign of myocardial ischaemia. This was demonstrated in our case as well as by Feit *et al.*,² Eshaghy *et al.*,¹⁹ Zelinger *et al.*,²² and Kruyswijk and Müller.²³ Nevertheless, delayed features of myocardial ischaemia have been known to occur.^{2,17,22} If there is the possibility of a threatening AMI, particularly if this is likely to be extensive (for example, a left main stem dissection), then emergency coronary artery bypass grafting should be undertaken. If the patient is asymptomatic but has significant obstructive coronary atherosclerosis, surgery can be considered electively but may not be required. Conservative management

should probably include heparinisation during hospitalisation at which time an AMI should be excluded. Whether oral anticoagulation should be prescribed after discharge is controversial. The very limited experience of Vacek and McKiernan²¹ with intracoronary streptokinase followed by successful coronary artery bypass surgery needs further evaluation.

The author wishes sincerely to thank Mrs Inge Blicke, Head of the Photographic Unit, Bureau for Medical and Dental Education at the University of Stellenbosch, for preparing the illustrations. I would also like to express my gratitude to Dr J. P. van der Westhuyzen, formerly Chief Medical Superintendent, Tygerberg Hospital, for permission to publish.

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