



Spontaneous coronary artery dissection: a report of two cases occurring during menstruation

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Since its first description by Pretty in 1931, many reports of spontaneous coronary artery dissection (SCAD) have been published.¹ Despite this, SCAD remains a rarity.^{1,2} The condition carries a high mortality, with the diagnosis of many cases being made post-mortem.¹ Eighty per cent of cases of SCAD occur in women, with a third of these occurring late in pregnancy or in the early puerperal period.² The majority of women who present with SCAD are pre-menopausal with a mean age of 35 to 40 years.²

We report two cases of SCAD that presented at our institution. In both instances no cardiac risk factors were identified and angiography did not demonstrate any evidence of coronary artery disease. An important observation was the menstrual status of both patients. We propose a potential pathogenesis for SCAD in pre-menopausal women.

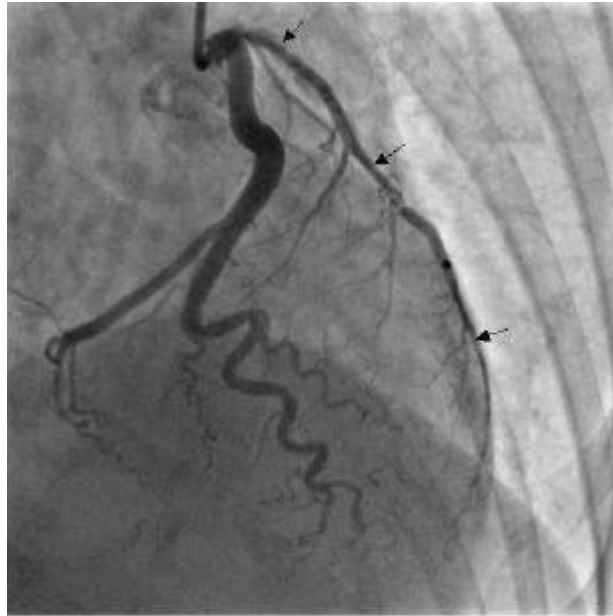
Case reports

Case 1

A 49-year-old female GP was admitted with a one-hour history of central, crushing chest pain. There was no history of cardiovascular disease or identifiable coronary risk factors. The patient was noted to be at the beginning of her menstrual cycle. ECG on admission revealed antero-lateral ischaemic changes and the patient subsequently underwent thrombolysis with streptokinase. Due to the persistence of chest pain and the ECG changes, urgent angiography was performed, which demonstrated dissection of the proximal two thirds of the left anterior descending (LAD) artery (Figure 1). No additional coronary disease was identified. Surgical intervention was felt to be the most appropriate course of action in order to preserve a large first diagonal branch. The patient was haemodynamically stable prior to surgery.

The presence of intra-mural haematoma, compressing the lumen of the LAD, was confirmed at operation. Two saphenous-vein coronary artery bypass grafts (CABG) were performed to the LAD and the first diagonal branch with the aid of standard cardiopulmonary bypass (CPB). Elective intra-aortic balloon pump (IABP) support was used to discontinue CPB. Re-exploration was performed on the first post-operative day for continuing blood loss and a vein side branch was ligated. Echocardiography on the fourth post-operative day demonstrated antero-apical akinesis with normal valvular function consistent with a trans-mural myocardial infarction. Further recovery was uneventful and the patient was well enough to be discharged home on the eighth post-operative day.

Figure 1. Left coronary angiography displaying diffusely narrowed LAD (arrows). Dissection was confirmed by the presence of intra-mural haematoma at the time of operation.

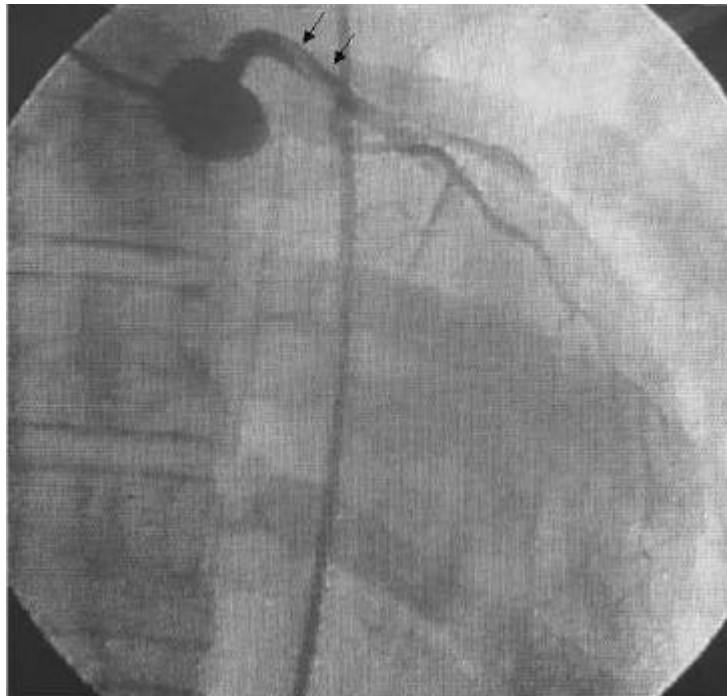


Case 2

A 43-year-old female nurse was referred for urgent CABG. She had experienced increasingly severe central chest pain throughout the previous day. There was no history of coronary artery disease or identifiable coronary risk factors. The patient was at the beginning of her menstrual cycle. ECG on admission demonstrated lateral ischaemic changes in keeping with a diagnosis of acute myocardial infarction. Despite thrombolysis, the patient's condition deteriorated and she became hypotensive and oliguric. Echocardiography showed postero-lateral akinesis. Urgent angiography was performed and revealed a left main stem dissection that was occluded with thrombus (Figure 2).

On arrival at our unit the patient was in established cardiogenic shock despite IABP support. Emergency saphenous vein grafts were performed to the LAD and the obtuse marginal arteries with the aid of CPB. Re-exploration was performed on the day of operation for excessive blood loss. Initially, reasonable pressures were maintained, although overnight, despite maximal inotropic and mechanical support, the patient's pressures began to fall and a low cardiac output state developed resulting in peripheral ischaemia and evolving renal failure. The situation was irretrievable and the patient died on the first post-operative day. No post-mortem examination was performed.

Figure 2. Left coronary angiography with visible dissection flap within the lumen of the left main stem (arrows)



Discussion

In order to arrive at a diagnosis of primary or spontaneous coronary artery dissection, several potential causes must be excluded. These include Marfan's syndrome and other connective tissue disorders, chest trauma, vasculitis and traumatic cardiac catheterisation.^{1,2} The majority of cases of SCAD are found in patients with underlying atherosclerotic coronary artery disease, in post-partum females, or have no obvious cause.²

The two cases reported raise interest in that both women were found to be menstruating at the time of spontaneous dissection. During menstruation the circulating levels of oestrogen and progesterone are known to be at their lowest. This raises the possibility of hormonally mediated changes in the wall of the coronary arteries.^{1,2} A high incidence of SCAD is also reported under the similar hormonal conditions encountered during the post-partum period.² Recent work has focussed on arterial flow patterns at different stages of the menstrual cycle.³ Coronary ischaemia is more likely to present at a time when female circulating sex hormones are low.³ The suppressive effects of female sex hormones, in particular oestrogen, on vascular smooth muscle cell activity are well described.⁴

Histopathological changes identified in the spontaneous dissection of muscular arteries include smooth muscle cell proliferation and vacuolar degeneration, fibrosis, collagen degeneration, elastin fragmentation and peri-vascular inflammatory infiltrate.^{1,2,5} It has been suggested that these changes occur in relation to an increase in vascular smooth muscle cell activity.⁵ SCAD in post-partum and pre-menopausal women occurs at a time when circulating sex hormones have dropped to a low level

after a peak in serum concentration. We suggest that the loss of hormonal vascular smooth muscle cell suppression at the time of menstruation, as encountered in our patients, may lead to an increase in smooth muscle activity with resultant weakness in the coronary media. No cyclical change in the presentation of spontaneous dissection affecting the remainder of the arterial tree has been identified in the literature. This selectivity for the coronary vasculature may relate, in part, to the additional shearing forces placed on the coronary vessels during myocardial contraction.

Primary dissection is thought to occur due to haemorrhage into the outer media of the vessel resulting in compression of the true vessel lumen. This finding may or may not be accompanied by the visualisation of an intimal flap.^{1,2} In cases where this is absent it has been theorised that bleeding from the vasa vasorum may be responsible.^{1,2} An intimal flap was visualised in Case 2 (Figure 2); however, it is more likely that Case 1 (Figure 1) was attributable to bleeding from the vasa vasorum.

SCAD is a rare although life-threatening event. We believe that a direct hormonal link outwith pregnancy could exist in pre-menopausal women for SCAD. We feel that in patients presenting with symptoms of ischaemic heart disease during menstruation the diagnosis of SCAD should be considered and early angiography instituted.

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References:

1. Jorgensen MB, Aharonian V, Mansukhani P, Mahrer PR. Spontaneous coronary dissection: a cluster of cases with this rare finding. *Am Heart J* 1994;127:1382–7.
2. Dhawan R, Singh G, Fesniak H. Spontaneous coronary artery dissection: the clinical spectrum. *Angiology* 2002;53:89–93.
3. Charney P. Coronary artery disease in young women: the menstrual cycle and other risk factors. *Ann Intern Med* 2001;135:1002–4.
4. Okubo T, Urabe M, Tsuchiya H, et al. Effect of oestrogen and progesterone on gene expression of growth regulatory molecules and proto-oncogene in vascular smooth muscle cells. *Endocr J* 2000;47:205–14.
5. Hartman JD, Eftychiadis AS. Medial smooth-muscle cell lesions and dissection of the aorta and muscular arteries. *Arch Pathol Lab Med* 1990;114:50–61.

This article has been corrected as per the Erratum published in N Z Med J. 2004;117(1191). (Specifically, the second author's name was originally spelt incorrectly as Alisghar Berhanwala—as supplied to NZMJ and subsequently published).