An ethical dilemma: severe ischaemic mitral regurgitation and acute coronary syndrome in a 49-year-old pregnant woman

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We report the case of a 49-year-old woman who presented with symptomatic severe mitral regurgitation secondary to previous myocardial infarction. During the work-up for surgery, she was found to be pregnant. This report explores the difficulties and ethical dilemmas encountered dealing with the need for urgent valve surgery and coronary revascularization in association with an unplanned, but wanted pregnancy in an older woman.

Keywords
Ischaemic heart disease • Mitral regurgitation • Pregnancy

Introduction

Cardiovascular disease is the most important cause of maternal mortality in the developed world. Recent advances in the treatment of acute coronary syndromes (ACSs) including acute myocardial infarction have improved outcomes, but the lack of large trials and evidence base in the pregnant population makes treatment of pregnant patients with cardiovascular disease a challenge. In addition, consideration for the well-being of the foetus influences the choice of investigation as well as treatment of these patients.1

A 49-year-old woman with known coronary artery disease presented to her GP with increasing symptoms of breathlessness and reduced exercise tolerance. She had suffered an inferior myocardial infarction at the age of 34 and had been lost to follow-up. She had been investigated with coronary angiography at the time which showed single vessel disease (no revascularization performed), and she had been managed medically on aspirin, an angiotensin-converting enzyme inhibitor, and a beta-blocker. She had since been poorly compliant with medication because she had been feeling well and thought she deserved a ‘drug holiday’.

When seen by a cardiologist, she gave a history of symptoms suggestive of paroxysmal nocturnal dyspnoea and breathlessness NYHA class III. On examination, her venous pressure was not elevated. Her blood pressure was controlled at 130/80 mmHg, and she was in sinus rhythm with a heart rate of 88 bpm. Auscultation revealed a pansystolic murmur radiating to the axilla. Her lungs were clear. A transthoracic echocardiogram showed a dilated left ventricle (LV) (EDD 6.7 cm, ESD 5.6 cm) with moderate systolic impairment (EF 44% using Simpson’s method) and confirmed severe mitral regurgitation (Figure 1). She was booked for coronary angiography prior to proposed mitral valve surgery. On the day of the angiogram, a pregnancy test was unexpectedly found to be positive. She was subsequently referred to the obstetric medical clinic. The patient stated that her pregnancy was unplanned, but wanted. A foetal viability scan showed a gestational age of 9 weeks. She was quoted a risk of 1:3 for all chromosomal abnormalities based on maternal age, and it was explained that maternal risk was also high in view of her comorbidities of severe mitral regurgitation with LV impairment and ischaemic heart disease. She was given time to consider her options, which after discussion in a multidisciplinary team of cardiologists, cardiothoracic surgeons, obstetric physicians, and obstetricians were as follows:

(i) continue the pregnancy, delay cardiac surgery (i.e. mitral valve repair/replacement plus coronary artery bypass grafting on cardiopulmonary bypass) until after delivery:
(ii) continue the pregnancy, perform cardiac surgery in pregnancy;
(iii) terminate the pregnancy (given high maternal and foetal risk) and continue with cardiac treatment.

When seen in clinic the following week, the patient opted for termination of her pregnancy on medical grounds. She also reported new onset cardiac chest pain at rest, but worse on effort (thought to reflect unstable angina, CCS class IV). She was immediately admitted with a diagnosis of an ACS. Coronary angiography was performed the next day as she was considered too high risk for a general anaesthetic and termination of pregnancy without further investigation of her suspected unstable angina. Her angiogram showed critical lesions in both the mid-left anterior descending and the circumflex arteries in the presence of a chronically occluded right coronary artery (Figure 2). After extensive discussion in the multidisciplinary team, the following plan was agreed: proceed to immediate percutaneous intervention, prior to termination of pregnancy, followed by semi-elective cardiac surgery after termination of pregnancy. There was a provisional plan to perform angioplasty without stenting, to avoid the need for prolonged dual antiplatelet therapy and associated risk of bleeding during termination. Bare metal stents were, however, required to both lesions due to suboptimal results from balloon angioplasty alone. This committed the patient to a minimum of 4 weeks dual antiplatelet therapy (aspirin 75 mg daily and clopidogrel 75 mg daily). She made an uneventful recovery and was discharged home 2 days later.

A surgical termination of pregnancy was performed 10 days later on dual antiplatelet therapy at 12 weeks gestation using ultrasound-guided uterine evacuation under GA. Ultrasound was used to aid visualization and ensure complete removal of the products of conception. Haemostasis in this situation is dependent on adequate uterine contraction. This was achieved by ensuring that the uterus was emptied completely and by administration of 10 mg oxytocin im. There was minimal blood loss during the operation. She had no postoperative bleeding and was discharged home.

When reviewed in clinic 4 weeks later with a repeat echocardiogram, she was asymptomatic, but continued to have severe mitral regurgitation with volume loading of the LV. She underwent a successful mitral valve repair with three neo-chords and coronary artery bypass grafting 5 months after the termination of pregnancy. Post-operatively, there was no longer any mitral regurgitation, the LV size returned to within normal limits but a localized inferior akinesia remained.

**Discussion**

Coronary artery disease in pregnancy is rare and, compared with outside pregnancy, is more frequent due to non-atherosclerotic causes such as spontaneous coronary artery dissection or embolism.\(^2\,3\) Since maternal age is currently increasing and rising numbers of pregnant women have risk factors such as diabetes and obesity, the incidence of ischaemic heart disease during pregnancy is increasing. This is already reflected in the latest CEMACH report, which shows that cardiac disease is now the leading cause of maternal mortality in the UK, with ischaemic heart disease contributing 12% of cardiac deaths.\(^4\,5\)

![Figure 1](image1) Apical four chamber view with colour Doppler demonstrating an eccentric, posteriorly directed jet of ischaemic mitral regurgitation.

![Figure 2](image2) Coronary angiography showing tight stenoses of the left circumflex artery (left) and the left anterior descending artery (LAD, right).
As a consequence of small patient numbers and the absence of large trials, treatment must be tailored for each patient, balancing risks and benefits for both mother and foetus. Diagnostic coronary angiography, as with any other use of ionizing radiation, is of particular concern in the first trimester while organogenesis is occurring. However, this should not be withheld when clinically indicated in, for example, ACS. Both percutaneous intervention including the use of dual antiplatelet therapy and coronary artery bypass grafting have been carried out successfully in pregnancy.\(^{6–9}\) The main risk is to the baby, especially if cardiopulmonary bypass is required for cardiac surgery, which carries a foetal mortality rate of up to 20% (increasing to 24% when hypothermia is used), whereas the risks to the mother are now similar to those outside pregnancy.\(^{10–12}\) Advanced gestational age is another factor known to increase foetal morbidity during cardiopulmonary bypass,\(^{13}\) whereas sustained uterine contractions during cardiac surgery and cardiopulmonary bypass are said to be responsible for the majority of foetal deaths.\(^{14}\)

In counselling our patient, we had to weigh the risks of her having cardiac surgery during pregnancy, which may technically have been more difficult because of pregnancy-related changes in haemostasis and collagen tissue and the increased risk of maternal bleeding, against managing her conservatively (i.e. with beta-blockers, nitrates, and diuretics) and delaying surgery until post-delivery, a strategy that would carry the risk of her decompensating during pregnancy and requiring emergency cardiac surgery. This risk was perceived to be high because her mitral regurgitation was ischaemia-driven—otherwise, mitral regurgitation is mostly tolerated well in pregnancy, even if severe.\(^{15}\) In addition, it was felt that pregnancy had precipitated her recent symptomatic deterioration. From the maternal point of view, it is advisable to operate early in pregnancy, to minimize the haemodynamic changes of pregnancy, which occur within the first trimester. From the foetal point of view, however, it would be preferable to wait until viability is reached (after 28 weeks gestation), so that delivery can be carried out prior to cardiac surgery.

Once our patient had decided to proceed with termination of pregnancy, the main issue was regarding the timing of this related to the treatment required for her coronary artery disease. No data exist on the incidence of significant post-operative bleeding following termination of pregnancy (usually ~5%) on dual antiplatelet therapy. It was felt that a 10-day interval was a reasonable balance between waiting 4 weeks and interrupting clopidogrel treatment but necessitating a surgical termination at a more advanced gestation. In this patient, termination was carried out without complications, by careful planning of the operation.

References