CASE REPORT

Severe endocarditis and open-heart surgery during pregnancy

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SUMMARY

A woman aged 36 years G2P1 presented at our outpatient clinic with symptoms of discomfort, dyspnoea and fever at a gestational age of 17 weeks. She was subsequently diagnosed with severe endocarditis with a large vegetation on the mitral valve. She underwent open chest mitral valve surgery while on cardiopulmonary bypass (CPB) within a few days. Such surgical intervention is not only associated with increased maternal risks, but also with severe fetal morbidity and mortality. In such patients, certain perioperative measures can diminish these risks. In this case, mitral valve plasty was successfully performed and no maternal complications occurred. 22 weeks later, she had an at term vaginal delivery of a healthy son.

BACKGROUND

Heart disease that compromises cardiac function is a serious complication in pregnant women since pregnancy per se already has a significant impact on the cardiovascular system.¹ Nevertheless, when cardiac surgery is required in a pregnant woman, the current maternal risks are similar to that of a non-pregnant woman, with mortality rates ranging from 1.5% to 5%, mostly depending on the indication for surgery.^{2–4} However, cardiopulmonary bypass (CPB) during pregnancy is still associated with very high rates of fetal morbidity (intrauterine growth restriction, low birth weight, congenital malformations) and mortality (fetal death in 14–38%) and therefore remains a serious challenge.^{2–4} These risks can be reduced when factors associated with improved fetal outcome are taken into consideration and acted on.⁴

CASE PRESENTATION

A woman aged 36 years G2P1 was referred to our outpatient clinic because of malaise, dyspnoea and fever since a few days at a gestational age of 17 weeks. Two years earlier, she had an uncomplicated pregnancy and delivery. Her medical history included asymptomatic mitral valve regurgitation and Graves' disease treated with radioactive Iodine therapy. She did not take any medication and is otherwise healthy.

INVESTIGATIONS

On physical examination, she had a temperature of 39.2°C. Heart auscultation revealed a gr II/VI holosystolic heart murmur. Laboratory results showed a haemolytic anaemia (Hb 4.9 mmol/L) and mildly increased inflammatory parameters (leucocytes

$8.6 \times 10^9/L$, CRP 46 mg/L). Subsequently, blood cultures proved positive for *Streptococci sanguis*. Evaluation by the cardiologist, including transoesophageal ultrasound, revealed a severe grade 4 mitral valve regurgitation as well as a large mobile structure of at least 25 mm on the mitral valve highly suspect for a leaflet vegetation. The patient therefore met the following Dukes' criteria:^{5 6} vegetation of the mitral valve, fever, pre-existing heart disease and positive blood cultures. There were no other signs or symptoms of endocarditis (figure 1).

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of pregnant women presenting with malaise and fever is extensive and therefore challenging. In addition to infectious causes, other causes of 'fever of unknown origin' should be considered, including thromboembolic and endocrine disease as well as non-infectious inflammation and neoplasm. Meanwhile, the diagnostic work up is limited because of the pregnancy.

TREATMENT

Treatment with high-dose intravenous penicillin was started. A multidisciplinary meeting proved essential in the decision-making process. Cardiothoracic surgeons, gynaecologists and anaesthesiologists decided that surgery was essential for this young mother because of the continuous high risk of haemodynamic deterioration or a cerebral thromboembolic event caused by this large vegetation (>25 mm) on the mitral valve. The possible serious complications for mother and child caused by surgery were discussed but did not change the decision to operate.

The next day, while on normothermic CPB, a quadrangular resection of the posteromedial commissural region was performed. Several Carpentier 'magic' stitches were used for commissuroplasty and mitral annuloplasty was performed using a 32 mm Carpentier Edwards Physio II annuloplasty ring. The perfusion time was 113 min and aortic cross-clamp time 70 min. Flow could continuously be maintained at 6 L. Diastolic blood pressure was kept above 70 mm Hg and Hb levels above 6 mmol/L throughout the operation. Vasopressive or inotropic medication was not used and acid-base balance was kept intact. Because of the gestational age at the time of surgery, we decided not to monitor the fetus.

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Figure 1 Dukes' criteria for infectious endocarditis. Clinical criteria: two major criteria or one major criterion and three minor criteria or five minor criteria.

Modified Duke Criteria	
<i>Major Criteria</i>	
-	Two separate positive blood cultures with microorganism(s) typical for infective endocarditis
-	Echocardiographic evidence for endocardial involvement
-	New valvular regurgitation
<i>Minor Criteria</i>	
-	Predisposition: predisposing heart condition or intravenous drug use
-	Temperature greater than 38.0
-	Vascular phenomena: major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial hemorrhage, conjunctival hemorrhage, Janeway lesions
-	Immunological phenomena: glomerulonephritis, Osler nodes, Roth spots, rheumatoid factor
-	Microbiological evidence: positive blood culture but not meeting major criterion, or serologic evidence of active infection with organism consistent with infective endocarditis

OUTCOME AND FOLLOW-UP

Trans-abdominal ultrasound of the pregnancy postoperatively showed a normal fetal heart rate and normal movements of the fetus. The postoperative course was uneventful and after 9 days, the patient was able to leave the hospital. Fetotoxic medication was avoided postoperatively and the patient used LMWH's instead of coumarin derivatives for the duration of 3 months. At 39+1 weeks gestation, labour started spontaneously, followed by a normal vaginal delivery. A healthy boy was born, APGAR scores 10/10/10, birth weight 3446 g (p50). No congenital malformations were seen. As of today, mother and son are doing well.

DISCUSSION

Pregnancy has a major influence on the cardiovascular system. Cardiac output increases 30–40% above normal. Uterine blood flow is normally 3% of the cardiac output during the first trimester and increases to 10–15% during the third trimester. There is an intravascular volume expansion of 30–50% and the oxygen consumption increases 25–30% compared with non-pregnant women. Therefore, diseases compromising cardiac function can have great influence on the fetus when these haemodynamic changes cannot be met.^{1–7}

Since pregnancy imposes stress on the cardiovascular system, cardiac surgical intervention in pregnant woman requires significant consideration. Medical therapy remains the treatment of choice to reduce fetomaternal risks. However, when cardiac disease is severe, surgical intervention could be required. Nowadays, maternal complications are not frequent, but the risks for the fetus are high.^{1–3}

Fetal mortality is considered to be the consequence of a fetal and uterine response to CPB. The most serious fetal response to CPB is bradycardia as a direct consequence of hypoperfusion. Hypoperfusion can be the consequence of uterine contractions followed by low perfusion rates as well as decreased uteroplacental function because of maternal hypotension.⁸ These uterine contractions could possibly be elicited by the haemodilution (of the stabilising effect) of progesterone.⁹ Furthermore, a vasoactive response could occur after increased prostaglandin synthesis followed by a deep acidosis and fetal stress response.¹⁰

Fetal outcome can be improved by taking into account factors such as avoidance of hypotension, maintaining acid–base balance, normothermic pulsatile perfusion, high flow rates, minimum CPB and aortic cross-clamp time, valve conservation and avoidance of oral anticoagulants.^{4–11} When surgery is required in the last trimester, delivery might be considered before surgery.

Learning points

- ▶ Pregnancy has a major influence on the cardiovascular system.
- ▶ Endocarditis should be considered as one of many differential diagnoses for pregnant women with fever and general malaise.
- ▶ Endocarditis in pregnant women needs speedily and thorough decision-making to minimise the risk of severe and potentially fatal complications for mother and child.
- ▶ A multidisciplinary approach is essential for an adequate decision-making process.

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