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CASE REPORTS

Emergency repair of incidentally diagnosed ascending aortic aneurysm immediately after Caesarean section

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A 36-yr-old pregnant woman with a history of hypertension presented at term for elective Caesarean section because of breech position. At preoperative examination, a diastolic murmur was found and transoesophageal echocardiography (TOE) revealed a large, 8.1-cm diameter ascending aortic aneurysm with severe aortic regurgitation and moderate pericardial effusion. Surgical repair was not considered to be urgently required. The patient was delivered electively by Caesarean section under epidural anaesthesia using invasive arterial pressure monitoring. TOE performed 6 h post-partum showed progressing pericardial effusion, for which emergency replacement of the aortic valve and ascending aorta were indicated. The epidural catheter was removed 4 h before starting the cardiopulmonary bypass procedure. Arterial pressure was controlled by a titrated infusion of esmolol and clonidine. To improve uterine tone, the patient received an i.v. infusion of oxytocin throughout surgery. After implantation of an aortic composite graft and weaning from cardiopulmonary bypass, the patient was transferred to the intensive care unit. Awake and receptive to neurological evaluation, her trachea was extubated 4 h after surgery. Mother and baby made an uneventful recovery.

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Incidentally diagnosed ascending aortic aneurysm and/or dissection in pregnancy is a rare but potentially fatal event. A review of the English literature revealed only three cases of ascending aortic repair immediately after delivery.[1–3] It has been estimated that 50% of all ascending aortic dissections in women less than 40 yr occur during pregnancy, mostly in the last 3 months.[4] As highlighted in recent reports of the Confidential Enquiries on Maternal Deaths, hypertension (18.6%) and cardiovascular disorders are the most frequent causes of indirect death.[4 5] While systemic hypertension is the most common aetiological risk factor for aortic aneurysm, Marfan's syndrome, other congenital cardiovascular abnormalities and pregnancy-induced changes in the vessel wall are also associated with this entity.[6–13] We report a case of an elective Caesarean section for breech position in a primiparous woman with an incidentally found ascending aortic aneurysm.

Case report

A 36-yr-old primiparous woman was admitted at term to the obstetric department for elective Caesarean section because of breech presentation. Fourteen years previously, when the patient had an insurance policy check up, a systolic murmur was found over the apex, and transoesophageal echocardiography (TOE) revealed concentric left ventricular hypertrophy and a mitral valve prolapse without significant mitral regurgitation. Before conception, her medical history over the preceding 4 yr revealed only untreated mild hypertension.

At the preoperative examination, a grade 4/6 diastolic murmur was detected. TOE demonstrated an aneurysm of 8.1 cm in diameter, extending from the sinus portion to the ascending aorta (Fig. 1). Additionally, severe aortic incompetence, left ventricular hypertrophy and pericardial effusion without signs of tamponade were found. Mitral valve anatomy and function were normal. Having studied these findings, the cardiac surgeons considered immediate operative intervention unnecessary. To prevent any possible risk of hypertension during rapid sequence induction of general anaesthesia and tracheal intubation, we decided to perform an elective Caesarean section under lumbar epidural anaesthesia. Epidural block was achieved with 0.5% bupivacaine

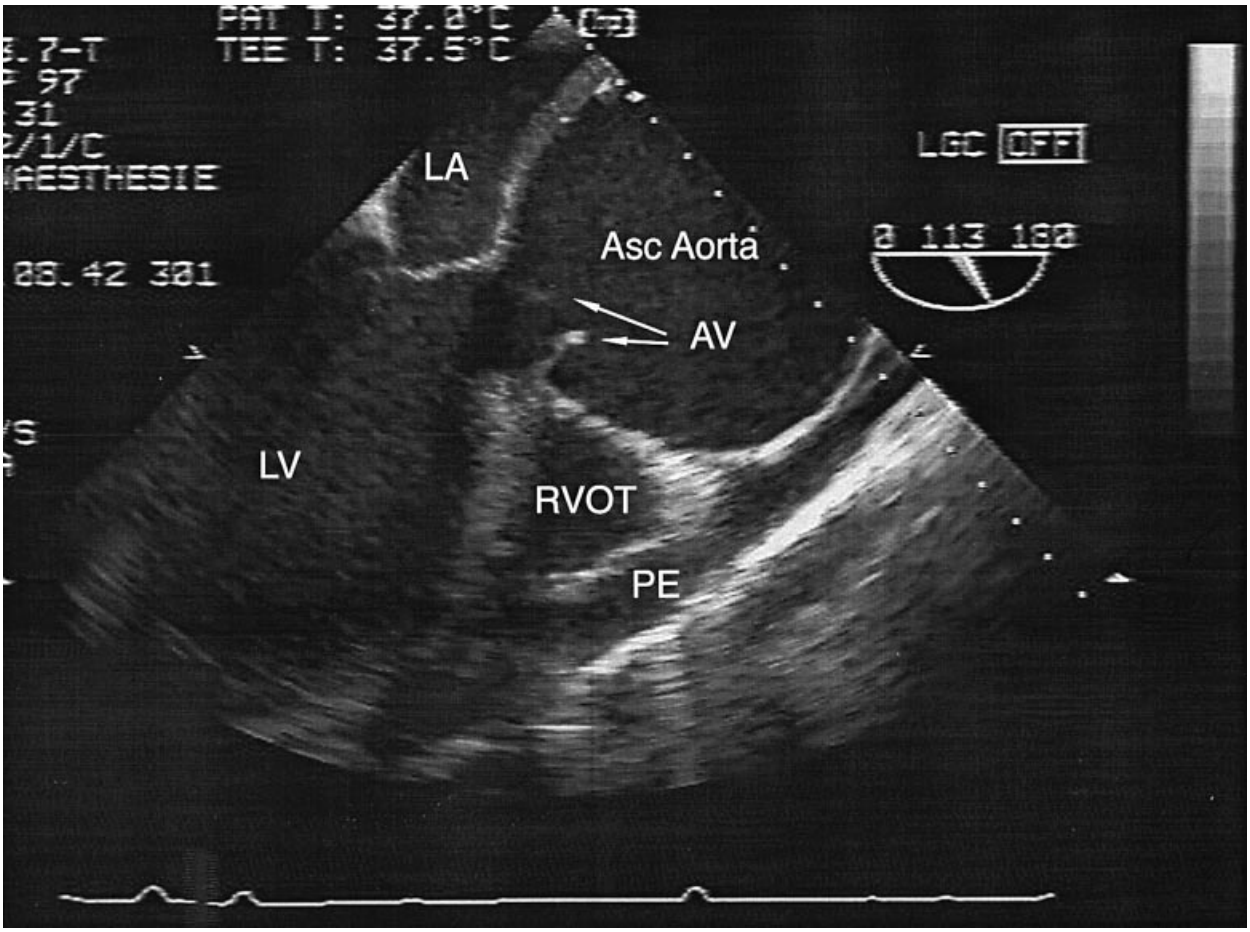

Fig 1 Transoesophageal oblique view of the left ventricular outflow tract. Abbreviations: LA=left atrium; LV=left ventricle; AV=aortic valve; Asc Aorta=ascending aorta; RVOT=right ventricular outflow tract; and PE=pericardial effusion.

50 mg at the L4–5 interspace and the block reached the level of T4. Coronary blood flow and perfusion pressure were managed with volume substitution (hydroxyethylstarch 500 ml) before and after institution of the epidural block. No inotropes were needed to maintain adequate arterial pressure. Uterine contraction after delivery was achieved with oxytocin 10 u. i.v. After an uneventful delivery of a healthy baby (Apgar 8/9/10), the patient was transferred to the intensive care unit (ICU). The epidural catheter was left in place for postoperative analgesia.

TOE, performed 6 h post-partum, showed asymptomatic but increasing pericardial effusion for which emergency replacement of the aortic valve and ascending aorta were now indicated. Anticipating a coagulation disorder after complex cardiac surgery, we removed the epidural catheter 4 h before starting cardiopulmonary bypass (CPB). Further pain relief was achieved with nicomorphin 3 mg i.v. when required. Anaesthesia and perioperative management focused on prevention of hypertension, treatment of any coagulation disorder and ensuring early detection of potentially fatal uterine atony. Rapid recovery of consciousness was required for neurological evaluation, thus permitting early diagnosis and immediate treatment of epidural haemorrhage. Anaesthesia was induced with flunitrazepam 1 mg and fentanyl 300 μg, maintained with fentanyl 25 μg kg^{-1}, 0.4–0.6% isoflurane and a continuous infusion of propofol 400–600 mg h^{-1}. Neuromuscular block was achieved with pancuronium 8 mg. Arterial pressure was controlled with a titrated infusion of esmolol 1.8–2 mg min^{-1}. After induction, an i.v. priming dose of aprotinin 2 000 000 u. was administered followed by continuous infusion of 500 000 u. h^{-1} until the patient arrived in the ICU. Post-partum infusion of oxytocin was continued throughout surgery and an obstetrician regularly controlled intraoperative uterine tone manually.

After implantation of a 27-mm Carbo Medics composite graft under moderate hypothermia (26°C), the patient was weaned successfully from CPB with dopamine 3 μg kg^{-1} min^{-1}. An additional i.v. bolus dose of oxytocin 5 u. was necessary when uterine tone decreased and vaginal bleeding increased 20 min after cessation of CPB. Obstetric examination at the end of surgery showed a well contracted uterus with minimal vaginal bleeding. The postoperative course was uncomplicated. Thirty minutes after admission to the ICU, the patient was awake and receptive to neurological evaluation. Four hours later the trachea was extubated. Postoperative haematological examination showed a maternal haemoglobin concentration of 7 g $litre^{-1}$, platelet count

of 135 000 μl^{-1} and normal prothrombin time. Arterial pressure was controlled initially with esmolol 1–3 mg h^{-1} followed by clonidine 12.5–25 $\mu g\ h^{-1}$ i.v. and oral captopril 12.5 mg, three times a day. Oxytocin infusion was stopped 48 h after delivery. On the third postoperative day the patient was transferred to the ward and her subsequent recovery was uneventful.

It is thought that untreated hypertension and pregnancy-induced changes in the aortic wall were the most likely causes of the aneurysm.

Discussion

Epidural anaesthesia for this elective Caesarean section was preferred to general anaesthesia, so avoiding the risk of hypertension associated with rapid sequence induction of anaesthesia. Although the hypertensive response to tracheal intubation could have been prevented by the use of opioids, we favoured epidural anaesthesia to avoid opioid-induced respiratory depression of the newborn. The need for subsequent cardiac surgery produced two major potential problems: first, the risk of life-threatening uterine haemorrhage during and after CPB as it was carried out only a few hours after delivery; and second, the risk of epidural haemorrhage since CPB was commenced only 10 h after epidural puncture, with the catheter removed 4 h before heparinization. The question arose whether the epidural catheter should be removed before cardiac surgery or left in place until the coagulation profile returned to normal.

According to our current directives for patients at high risk of bleeding during open heart surgery and based on the report of Lamarra, Azzu and Kulatilake[14] of a successful emergency mitral valve replacement 2 h after Caesarean section, aprotinin was used as a loading dose before skin incision, followed by continuous infusion. The obstetricians had prescribed an oxytocin infusion post-partum and this was continued for 48 h after surgery. To our knowledge, prophylaxis and treatment of uterine atony with i.v. oxytocin during CPB has not been reported previously. It proved to be effective in our patient and an additional bolus was not necessary until shortly after extracorporeal circulation, when decreased uterine tone was diagnosed clinically. Regarding the risk of epidural haemorrhage, Wulf[15] described 51 patients in a 10-yr period who presented with spinal haematoma and neurological disorders associated with epidural anaesthesia. In 21 cases, catheter insertion had caused the vascular lesions, 18 patients had received i.v. heparinization and 14 had a pre-existing coagulopathy. In contrast, Matthews and Abrahams[16] reported 40 patients undergoing open heart surgery who received a single dose of intrathecal analgesia with morphine before operation, and none developed a spinal haematoma. The shortest interval between intrathecal puncture and haeparinization was 50 min. In this patient, we removed the epidural catheter 4 h before cardiac surgery.

The uncomplicated postoperative course of this patient, who had incidentally been found to have an aortic aneurysm, has demonstrated that a two-step procedure with epidural anaesthesia for Caesarean section followed by cardiac surgery with CPB can be performed safely. Neurological evaluation is possible immediately after surgery which may allow early detection of an epidural haematoma thus minimizing the risk of neurological sequelae.

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