SPINAL ANAESTHESIA FOR CAESAREAN SECTION

Management of a parturient with severe cardiovascular disease

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SUMMARY

A parturient with severe mitral valve disease and pulmonary oedema was admitted to the labour ward. Fetal distress was also present. An emergency Caesarean section was undertaken under spinal blockade. The reasons for the choice of this technique are discussed.

Clinical reports on the use of extradural anaesthesia in parturients with cardiovascular disease are rare (McMurray and Kenny, 1982). Reports on the use of subarachnoid anaesthesia in such patients are even more unusual (Ostheimer and Alper, 1975), and only discuss its use for vaginal delivery. A case history is presented of a parturient suffering from severe mitral valve disease and pulmonary oedema who was delivered by Caesarean section under subarachnoid anaesthesia.

CASE REPORT

A 38-year-old para 2 + 0 was admitted at term + 2 days gestation. She was anxious, with increasing dyspnoea, severe orthopnoea and slept in a semi-sitting position. On examination, her heart rate was 80 beat min⁻¹, and her arterial pressure 120/70 mm Hg. Clinically, there was evidence of pulmonary oedema and cardiomegaly. Her ECG showed notched P waves. Mitral stenosis was suspected. The cervix was 2 cm long and 3 cm dilated. Fetal heart rate was 160 beat min⁻¹, but showed type II dips. Since labour was not far advanced and the mother's condition was poor, it was decided to deliver the fetus by Caesarean section under extradural anaesthesia. The patient was given oxygen and a slow infusion of Hartman's solution was commenced i.v. Extradural blockade was attempted, but was unsuccessful. By that time the condition of both mother and fetus had deteriorated. Fine crepitations and high-pitched breath sounds were heard throughout both lung fields. Heart rate had increased to 110 beat min⁻¹ and arterial pressure to 140/70 mm Hg. Fetal heart tracing showed type II dips, bradycardia of 60 beat min⁻¹ and loss of baseline variability.

With the patient in the sitting position, a spinal (subarachnoid) block was performed via the L2–3 intervertebral space using a 25-gauge needle. Heavy cinchocaine 1.5 ml was injected via a bacterial filter. Bilateral skin analgesia extending to the T8 dermatome was obtained. The mother's arterial pressure, heart rate and ECG were monitored. She received 100% oxygen by face mask and was placed in a left lateral tilt with her shoulders supported by three pillows. This position was maintained throughout the operation. The rate of the i.v. infusion was adjusted to maintain systolic pressure greater than 100 mm Hg, and phenylephrine 1 mg in 20 ml saline was drawn up to be immediately available. The mother was given diazepam 5 mg and aminophylline 250 mg to allay anxiety and decrease bronchospasm. Maternal heart rate decreased to 90 beat min⁻¹ and arterial pressure remained stable at 110/70 mm Hg. After delivery, 10 units of syntocinon were infused over 3 h.

A live girl, weight 2.2 kg, was delivered but had suffered meconium aspiration. Appropriate resuscitation (endotracheal intubation and suction) was undertaken. Apgar-minus-colour scores were 2 and 8 at 1 and 5 min, respectively. She was transferred to the Special Baby Care Unit. Following operation, the mother's condition improved and she became less dyspnoeic. However, as some evidence of pulmonary oedema remained she was transferred to the intensive care unit. A good diuresis was established (frusemide 20 mg) and postoperative analgesia provided, as required, by papaveretum 5 mg i.v. I.v. fluids were restricted and the patient was prescribed diuretics, antibiotics and chest physiotherapy. Her condition continued to improve and 24 h later the patient was transferred to the post-natal ward. She

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was seen by a cardiologist who confirmed the diagnosis of severe mitral valve stenosis and incompetence and referred her for surgery. Both mother and baby made an uneventful recovery and were discharged home.

**DISCUSSION**

During labour there is a significant strain on the heart, particularly in patients suffering from cardiac disease. Normally, cardiac output, stroke volume and left ventricular work increase. However, pregnant patients with mitral stenosis are likely to have a relatively low cardiac output (Ueland, Novy and Metcalfe, 1973). Tachycardia, and the sudden increases in blood volume which accompany uterine contraction, retraction and placental separation, may precipitate cardiac failure and pulmonary oedema, especially in patients with mitral stenosis.

Elective management of patients with cardiac disease using extradural anaesthesia appears to be the method of choice and has been recommended by several authors (Moir and Willocks, 1968; Ostheimer and Alper, 1975; Crawford, 1978; McMurray and Kenny, 1982). When small incremental doses of bupivacaine are used during extradural blockade, cardiovascular changes in normovolaemic parturients will occur slowly and allow the patient to compensate appropriately. However, when faced with both maternal and fetal distress in an emergency, an attempt to establish extradural anaesthesia would be time-consuming and may prolong the induction-to-delivery interval (Datta and Alper, 1980).

In comparison, surgery was possible within 5 min of the subarachnoid injection. Furthermore, despite the unusual position in which the operation was conducted, intense analgesia and muscle relaxation were obtained and facilitated surgery. These observations are reported to be more common, and are sometimes superior, to those obtained with extradural blockade (Moir, 1976).

In the absence of an experienced anaesthetist, local infiltration anaesthesia for Caesarean section has an invaluable role in the management of parturients with severe cardiac disease (Ranney and Stanage, 1975). However, intra-peritoneal manipulations may provoke pain, hypotension and nausea. This technique, therefore, often requires supplementation with light general anaesthesia and may increase the risk of pulmonary aspiration. Furthermore, time has to be allowed for the analgesia to develop before incising the underlying structures and, since large quantities of local anaesthetic are usually needed, the possibility of a toxic reaction must be considered. Like extradural and local infiltration block, general anaesthesia was considered but rejected, since its disadvantages may outweigh its advantages. The advantages of general anaesthesia are its speed of administration, reliability, the possibility of avoiding hypotension and decreasing pulmonary oedema by increasing intra-alveolar pressure during intermittent positive pressure ventilation (Ostheimer and Alper, 1975; Marx and Hodgkinson, 1980). However, severe cardiovascular disturbance may occur. Myocardial depression and vasodilatation may follow the administration of i.v. induction or inhalation agents (Price et al., 1969; Merin, Kumazawa and Luka, 1976), and hypertension, tachycardia, arrhythmia and increases in pulmonary artery pressure may be associated with endotracheal intubation, extubation and the institution of intermittent positive pressure ventilation (James et al., 1977; Sorensen and Jacobsen, 1977). Inhalation induction in our patient would have been slow and difficult because of the pulmonary oedema and ketamine, which has been suggested as a useful induction agent in such patients (Marx and Hodgkinson, 1980), causes maternal hypertension, tachycardia, uterine hypertonicity and neonatal depression (Moir, 1976).

Principal advantages of spinal anaesthesia for Caesarean section are speed, simplicity, reliability and minimal exposure of the fetus to the effects of the drugs. Its disadvantages include nausea, vomiting, post-lumbar puncture headache and hypotension. The last of these is not entirely predictable, may be too rapid to allow time for physiological adaptation and may adversely affect the utero-placental circulation (Datta and Alper, 1980). However, patients in labour undergoing Caesarean section are less prone to spinal hypotension than those who are not in labour (Clark, Thompson and Thompson, 1976). Furthermore, hypotension may be prevented by prophylactic i.v. infusion, left uterine displacement and vasopressors (Wollman and Marx, 1968; Clark, Thompson and Thompson, 1976; Buley et al., 1977). Expansion of blood volume is potentially dangerous (Wollman and Marx, 1968) and was therefore administered only as required during the block. When combined with left lateral tilt, it appeared to have been effective in preventing hypotension. Furthermore, the use of a heavy spinal solution administered in the sitting position was particularly useful in preventing
the block spreading too high. Rarely, phenylephrine may be needed to treat hypotension following a regional blockade in patients with cardiac disease (Crawford, 1978; Marx and Hodgkinson, 1980). As it interferes with the utero-placental circulation, we were fortunate that its use was not necessary.

Establishing extradural blockade in patients with pulmonary oedema has been followed by clinical improvement in their condition (Moir and Willocks, 1968). Since spinal and extradural anaesthesia produce similar haemodynamic changes, it was considered, and later observed, that spinal anaesthesia in a patient with pulmonary oedema may also be followed by similar improvement. Furthermore, after delivery, there is an increase in cardiac preload caused by increased venous return secondary to uterine retraction. Pulmonary oedema was expected, but not observed, to be exacerbated. Vaso-dilatation and pooling of blood in the legs by elevating the shoulders (physiological venesection) during spinal anaesthesia decreases cardiac pre- and after-load (Moir, 1976; Marx and Hodgkinson, 1980), and may explain these observations. The use of tranquillizers and the administration of oxygen to parturients with cardiac disease to relieve maternal and fetal distress have been advised (Crawford, 1978; Marx and Hodgkinson, 1980) and were used successfully.

In conclusion, while it is accepted that spinal anaesthesia is not normally recommended as a first choice for Caesarean section in patients with mitral valve disease, it is not unreasonable to suggest that it is a useful technique in the armamentarium of anaesthetists when delivery is urgent and the lives of both mother and fetus are at risk. Attention to detail, monitoring and knowledge of the pathophysiology of spinal anaesthesia and mitral valve disease make this technique acceptable.

REFERENCES


SPINALANÄSTHESIE BEI KAISERSCHNITT

Narkoseführung bei einer Patientin mit schwerer kardiovaskulärer Erkrankung

ZUSAMMENFASSUNG


ANESTESIA ESPINAL PARA UNA OPERACION CESAREA

Gestión de una parturiente con enfermedad cardiovascular grave

SUMARIO

Una parturiente fue admitida en el pabellón de partos con enfermedad de la válvula mitral grave y edema pulmonar. Se planteaba también unos problemas fetales. Se emprendió una operación cesárea de emergencia bajo bloqueo espinaual. Se discute de las razones en la selección de esa técnica.