tion of vibrations and some rigidity to support the vertebral column should external cardiac compression be necessary. A soft spring mattress (or springs in the trolley axles) makes efficient closed chest cardiac massage difficult. An air mattress effectively prevents transmission of vibration from the trolley to the patient and damps inertial movement. If cardiac massage is necessary the mattress can be deflated within 10 seconds.

Although a hydraulic loading lift on the tail of the ambulance would allow the trolley to be maintained in a horizontal position, such devices are very expensive to fit, and we thought that tilting patients for the few seconds needed to load or unload the trolley would be unlikely to cause anything more than a transient alteration in cardiovascular function.

Using surplus or renovated items of equipment where possible has minimised the capital cost of the mobile intensive care unit. The ventilator, defibrillator, and monitor were purchased specifically for the mobile intensive care unit, as were some parts of the gas-supply system. Engineers in the Nuffield department of anaesthetics modified the trolley, and the ambulance service undertook the alterations and refurbishing of the ambulance. The trolley and its equipment are maintained by technicians of the Nuffield department of anaesthetics, and the ambulance by ambulance service engineers.

As the mobile intensive care unit is manned by those members of the ambulance, medical, and nursing staff who are on call running costs should be low. A senior member of intensive therapy unit medical staff is readily available at all times, and can usually leave the unit temporarily to undertake a transfer. On rare occasions when this is not possible a senior member of the on-call anesthetic team accompanies the mobile unit. An ambulance crew is required to move the patient whether the mobile intensive care unit is used or not, though the total period of the journey may be longer when it is used. If there is to be a considerable delay before the patient is fit to travel the ambulance crew can resume their normal duties and be called back when required.

We believe that a mobile intensive care unit can make an important contribution towards the safe movement of critically ill patients and that it is a logical extension of a regional intensive care service. With co-operation between clinical, technical, and ambulance staff, such units can be brought into service with low construction and running costs.

References


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**Lesson of the Week**

**Acute congestive cardiac failure in a hypertensive woman receiving salbutamol for premature labour**

M I WHITEHEAD, A M MANDER, K HERTOGS, R M WILLIAMS, K W PETTINGALE

Beta-sympathomimetic agents, such as salbutamol, are widely used to manage premature labour. Pulmonary oedema due to left-sided heart failure has been reported in patients receiving both beta-sympathomimetics and corticosteroids. Cardiac failure developed in a patient of ours when salbutamol was prescribed in combination with an antihypertensive drug.

**Case report**

A 28-year-old previously normotensive West Indian primigravid woman had no clinical evidence of pre-existing cardiac disease. At 27 weeks' gestation her blood pressure rose to 170/100 mm Hg. During the next four weeks diastolic pressure was main-

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Antihypertensive treatment combined with a beta-sympathomimetic drug given to delay premature labour may cause congestive cardiac failure.

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**Table:**

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**References**

chemical abnormalities quickly returned to normal after salbutamol was stopped and 100 mmol of sodium bicarbonate was infused. A 20-g intravenous bolus of mannitol produced a satisfactory diuresis. Labour started again, and a healthy girl weighing 1500 g was born vaginally 10 hours later. At delivery the patient again became tachypnoeic (30 respirations/min) with a tachycardia (110 beats/min), and central venous pressure rose to 24 cm H₂O. Urine output fell in the three hours before delivery to 16 ml/h. Infusing 50 mg intravenous frusemide and 150 mg aminophylline produced a diuresis of 1450 ml in the next three hours. Although the tachypnoea resolved within four hours of delivery, the clinical signs of cardiac failure persisted for 24 hours. The patient required long-term, antihypertensive therapy (labetalol 300 mg and hydralazine 25 mg, both three times a day). ECGs, chest x-ray films, and cardiac ultrasound examination performed three days and six months after delivery were normal.

Discussion

Controlling hypertension during pregnancy with alpha-methyldopa has been associated with a pronounced improvement in fetal survival. Patients who are not pregnant, however, have shown appreciable increases in blood volume after 14 days' treatment. In one patient the increase was 16%, the body weight increasing by 2.7 kg. Two other patients gained more than 2 kg, and one of these developed congestive cardiac failure at seven days. Premature birth increases the incidence of perinatal mortality. If beta-sympathomimetic agents such as salbutamol are given intravenously as soon as premature labour starts, delivery may be delayed, but there may be associated tachycardia and raised plasma insulin, C-peptide, glucose, and lactate concentrations; decreased concentrations of plasma potassium; and ketocidosis. Myocardial ischaemia has been reported after salbutamol treatment and right-sided heart failure has been reported when salbutamol and corticosteroids are combined. Furthermore, we have been notified by the Committee on Safety of Medicines that a pregnant woman developed cardiac failure after treatment with salbutamol and methyldopa. She died of inhalation of stomach contents, and necropsy showed massive myocardial damage.

We suggest that giving salbutamol to our patient at the onset of premature labour induced a metabolic acidosis and hypokalaemia, which together may have depressed myocardial function when the circulating blood volume was high owing to one month's treatment with alpha-methyldopa. Pregnant patients who receive medication that is likely to increase blood volume should be given a beta-sympathomimetic for premature labour under carefully monitored conditions. Careful attention should be paid to plasma potassium concentrations, the metabolic state, urine output, fluid administration, and above all the clinical markers of early congestive cardiac failure.

References


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