Cardiac Arrest After Rapid Infusion of Triple-strength Plasma

Brit. med. J., 1965, 1, 105

Triple-strength plasma may be given for a variety of reasons. This report describes its administration for suspected fibrinogenopenia following accidental haemorrhage in pregnancy.

CASE REPORT

A 37-year-old woman was admitted to hospital as an emergency after an ante-partum haemorrhage. Her previous pregnancies had terminated in a lower segment caesarean section for mild disproportion and prolonged labour, a forceps delivery for deep transverse arrest, and a 3-month abortion. On admission she complained of suprapubic discomfort and a loss of approximately 120 ml. over the previous hour and a half. She was 27 weeks pregnant, though the fundal height was nearer that of a 34-week pregnancy. The abdomen was tense but not tender, no foetal parts were distinguishable, but the foetal heart was audible and regular. On rectal examination a breech presented in mid-cavity, but the dilatation was uncertain. She was sedated with sodium amytal 200 mg. and papaveretum 20 mg. The subsequent course of events was as follows:

3 a.m.—Admission. B.P. 110/70 mm. Hg. Pulse 104.

6 a.m.—Labour started. Nalorphine 10 mg. given.

6.30 a.m.—Cervix fully dilated. Foetal heart no longer heard.

6.35 a.m.—Fresh stillborn foetus, placenta, 400 ml. of retro-placental clot, and 500 ml. of unclotted blood were expelled.

6.40 a.m.—Syntometrine (ergometrine maleate and oxytocin), 1 ampoule, was followed by ergometrine 1 mg. given in divided doses. Bleeding continued.

7 a.m.—Clotting time, measured by the Lee and White method, found to be 11 minutes. Soft clot which redissolved within 15 minutes. Fibrinogenopenia and fibrinolysis was diagnosed. Serum-fibrinogen level found to be less than 100 mg.

8 a.m.—Epsilon amino-caproic acid was not available, so 5 g. of reconstituted fibrinogen was given followed by a transfusion of whole blood.

8.30 a.m.—Bleeding still continued and the decision was taken to pack the uterus under a general anaesthetic.

8.45 a.m.—Seen by anaesthetist. Total blood-loss estimated at 1.5 l. Extensive bruising of the perineum was present but the patient's general condition was good.

8.55 a.m.—400 ml. of prepared triple-strength plasma was put up following the first bottle of blood. At the same time anaesthesia was induced with thiopentone and gallamine. The patient was intubated and ventilation was maintained with nitrous oxide and oxygen with intermittent positive-pressure ventilation. Pulse and blood-pressure remained within normal limits before, during, and after induction.

9 a.m.—Uterine pack introduced, pulse and blood-pressure still normal.

9.03 a.m.—Triple-strength plasma now finished, having been infused with the help of a Martin's pump. Another bottle of blood was substituted.

9.04 a.m.—Radial pulse found to be absent. No carotid pulses palpable, and the pupils were widely dilated. Cardiac arrest was diagnosed and external massage started. Ventilation was continued with 100% oxygen.

9.15 a.m.—Pupils showing some signs of contracting. Massage stopped and adequate pulses felt.

9.20 a.m.—Oscillograph connected and sinus rhythm noted. Blood-pressure normal. By this time a further 800 ml. of single-strength plasma had been infused, making a total fluid input of two bottles of blood, 800 ml. of plasma, 400 ml. of triple-strength plasma, and the fibrinogen given in 800 ml. of water.

9.25 a.m.—Atropine and neostigmine given, after which spontaneous respiration rapidly returned. The endotracheal tube was removed.

9.35 a.m.—First signs of returning consciousness. No anaesthetic agent given since cardiac arrest (9.04 a.m.).

9.40 a.m.—Patient very restless, making high-pitched whining noises. Cerebral irritation due to cerebral oedema diagnosed.

9.50 a.m.—Chlorpromazine and fan cooling started.

Chlorpromazine was continued intermittently during the day, but by lunch-time the patient was rational and complaining of feeling cold, so the cooling was stopped. By evening she appeared drowsy but otherwise normal. The pack was removed the following morning without an anaesthetic, and apart from considerable bruising over the sternum the patient appeared none the worse and made an uneventful recovery. The serum-fibrinogen level was normal the next day.

COMMENT

Cardiac arrest may be of anoxic, vagal, or biochemical origin.

Anoxia of the cardiac muscle may be due to failure of ventilation or failure of circulation. In this instance controlled ventilation was being employed using 30% oxygen, and thus anoxic anoxia could be excluded. Systemic circulation was intact up to the time of the arrest, but coronary circulatory failure was a possibility. However, the age of the patient together with a subsequently normal E.C.G. made this an unlikely cause.

Vagal arrest was also a possibility, but again seemed unlikely since the arrest took place after the surgical procedure was completed and in the presence of a rapid pulse.

The possibility of this being a biochemical arrest was carefully considered and it was suggested that triple-strength plasma, which contains a large amount of potassium, might be responsible. Accordingly a potassium estimation was made on the residue from the bottle of triple-strength plasma. It contained 30 mEq/l. Since only one bottle was administered the patient received 12 mEq in about seven or eight minutes. Unfortunately the oscillograph was not examined for potassium changes, but two serum estimations were made on the patient. At 10.30 a.m. the serum potassium was 6.5 mEq/l. and at 3.30 p.m. it was 3.5 mEq/l. While by no means proved, it was felt that this patient had probably had a potassium arrest from the rapid infusion of triple-strength plasma. Marshall (1962) describes a case of cardiac arrest occurring after the administration of triple-strength plasma and attributes this to the high potassium content. He also points out that where multiple blood and plasma transfusions have been given the citrate will produce low serum levels of ionized calcium, making the heart even more sensitive to potassium than is normally the case.

It would seem, as Marshall suggests, that wider use of the electrocardiogram during transfusion is indicated. This is particularly the case where old blood, large quantities of blood, or concentrated blood preparations are being used. In addition it is suggested that in these instances routine calcium administration should be practised. This is, of course, commonly done in the case of large transfusions, but is frequently forgotten where triple-strength plasma is being used.

Our thanks are due to Mr. D. R. Kilgour for permission to publish this case and to Dr. P. J. Horsey for his helpful criticism and advice.

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REFERENCE

Marshall, M. (1962). *Anaesthesia*, 17, 145.