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INTRAOPERATIVE BLOOD SALVAGE AND AUTOTRANSFUSION IN THE MANAGEMENT OF RUPTURED ECTOPIC PREGNANCY: A REVIEW
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ABSTRACT

Objective: To review the role of intraoperative blood salvage and autologous blood transfusion in the management of ruptured ectopic pregnancy.

Data sources: A complete review of relevant current and old literature using the MEDLINE search strategy.

Study selection: Papers were selected for their relevance to the topic. Preference was for use of blood salvage and autotransfusion in ectopic pregnancy. Other related studies dealing with the use of intraperitoneal blood were also reviewed.

Data extraction and synthesis: Papers were read and analysed. The information on the properties of intraperitoneal blood, the indications, contraindications, complications as well as the techniques for its use were synthesised for the current article.

Conclusion: Based on reviewed information, intraoperative blood salvage and autotransfusion is a simple, effective and safe method of blood replacement. Its use should be of primary consideration in the management of ruptured ectopic pregnancy.

INTRODUCTION

Ruptured ectopic pregnancy is the commonest cause of massive intraperitoneal haemorrhage in the female. It is an important cause of maternal death(1), which is easily prevented if haemorrhage is arrested and lost blood rapidly replaced. In the third world, patients with ruptured ectopic pregnancy often arrive in poor condition(2,3) making urgent blood transfusion necessary. Unfortunately, there may be no blood banks or technicians or enough blood of the right group. Under these circumstances, cell salvage and autotransfusion is life saving.

Autotransfusion was first used by Blundell in 1818(4) and later by Highmore in 1874(5) in the management of post-partum haemorrhage. Theis(6) introduced the term 'autotransfusion' in 1914. Its use in the management of ruptured ectopic pregnancy grew steadily until donor blood became easily available, when it then fell out of favour.

Recently however, there has been a resurgence of interest in autologous blood transfusion and in particular, intraoperative cell salvage(7-9). The reasons are not far fetched. In the UK for instance, the yearly two to three per cent increase in demand for blood is outstripping the increase in donations(7). Allogeneic transfusion exposes patients to the risks of disease transmission such as hepatitis, malaria, syphilis, HIV and the new variant Creutzfeldt-Jakob disease. Furthermore, there are the risks of immunomodulatory side effects, graft versus host disease and post transfusion purpura(3,7,8,10-11). In the serious

hazard of transfusion (SHOT) initiative report(12), the wrong unit of blood was given in over half the cases reported. These untoward effects are minimised with autotransfusion. The safest and most ecologically friendly method of autotransfusion is perioperative cell salvage(9). This procedure should be the cornerstone in the management of the acute ruptured ectopic pregnancy even when banked blood is available.

PROPERTIES OF INTRAPERITONEAL BLOOD AND USE OF ANTICOAGULANT

There have been concerns about the effects of transfused intraperitoneal blood. Serious complications due to extracellular haemoglobin are known to occur when stale and haemolysed blood is autotransfused(13). However, the haemoglobin in intraperitoneal blood in acute ruptured ectopic pregnancy is entirely intracellular. It is therefore capable of normal oxygen transport(14).

Because of the occurrence of rapid clotting which is followed by fibrinolysis(15,16), intraperitoneal blood is deficient in fibrinogen, Factors V, VII and X, and contains an increased level of fibrin split products (FDP). The prothrombin time and partial thromboplastin time is prolonged(15,17,18). This blood is therefore no longer coagulable(15) making the use of anticoagulants during autotransfusion questionable. Although several authors have demonstrated that cell salvage and autotransfusion without anticoagulation is safe(2,10,16), anticoagulants are still utilised. The systemic haematological changes

that accompany the autotransfusion of fresh intraperitoneal blood usually revert to normal by the first or second post operative day(19).

INDICATIONS AND CONTRAINDICATIONS

A review of literature(2,3,11,20,21) indicates that the procedure of cell salvage and autotransfusion is safe only when certain conditions are fulfilled. These can be summarised as follows: (i) there must be significant haemorrhage with hypotension or hypovolaemia; (ii) the history must suggest that the onset of pain -and presumably bleeding - is not over twenty-four hours; (iii) the blood in the peritoneal cavity must be fresh with a normal colour. It is expected to be dark and not bright red as it is deoxygenated; (iv) brown, offensive, infected, soiled or haemolysed blood should not be used; (v) the blood must be used immediately and not stored; (vi) blood from the peritoneal cavity must not be used for another patient; (vii) blood must not be used if there is a foetus, suggesting a ruptured amniotic sac or if there is a heavily inflamed contralateral tube and; (viii) patients with sickle cell disease should not be autotransfused.

TECHNIQUE

A variety of devices have been developed to facilitate the process of cell salvage, and autotransfusion(20). These devices are either complex or expensive and are generally not available in the developing countries where simpler methods have been adopted. These techniques aim at

collecting as much blood as possible with the least amount of contamination. An initial small midline subumbilical incision is favoured(2,11) and the incised peritoneum is tented to avoid spillage(22). Blood is collected either by aspiration(10,11,22) or carefully scooped using a sterile gallipot(2,23) or ladle(24). It is then passed through a six-layered latex gauze filter and collected in an ACD bottle or receiving bowl (anticoagulant is used only if it is available). This is then re-infused immediately into the patient through a filtered blood giving intravenous set. It is prudent to centrifuge 10 mls of the collected blood and transfuse only if the supernatant is clear.

COMPLICATIONS

Literature search (Table 1) on simple cell salvage and autotransfusion revealed one case of 'haemolytic uraemic' syndrome in a patient whose intraperitoneal blood was over 72 hours old(11). Coagulopathy occurred in another patient who received 8500 mls of blood. Two patients whose intravascular volumes had been expanded by resuscitative measures prior to autotransfusion developed pulmonary oedema. All responded to treatment. Jongen(3) reported the only death suspected to be from pulmonary embolism. Selo-Ojeme *et al*(2) compared an autologous with a homologous group and found a similar rate of minor complications. Citrate toxicity can occur with large transfusions where citrate phosphate dextrose is used as an anticoagulant. Fresh frozen plasma should be given when more than 4000 mls of blood is transfused(25).

Table 1

Complications of cell salvage and autotransfusion

Authors	Number of patients	Volume of blood given (mean)	Complications	Anti-coagulant usage	Comments
Stabler <i>et al</i> (28)	13	-	-	-	-
Logan <i>et al</i> (29)	40	-	-	-	-
Pathak <i>et al</i> (11)	530	930	hyperpyrexia-1, 'haemolytic syndrome'-1	ACD	Blood cultures negative
Merrill <i>et al</i> (21)	38	1300	coagulopathy-1 Pul. oedema-2 rash-2	heparin	Donor blood also given. Transfusion device used.
Twycross (22)	over 40	-	none	ACD	-
de Boer (23)	several	-	none	ACD	-
Laskey <i>et al</i> (10)	58	-	minor-2	None	-
Ansaloni <i>et al</i> (24)	18	1014	none	ACD	-
Jongen (3)	48	-	death-1	ACD	Pulmonary embolism
Selo-Ojeme <i>et al</i> (2)	33	1400	fever-3	none	Similar rates with homologous group

CONCLUSION

Although it has no haemostatic benefit, the blood from the peritoneal cavity is useful in volume replacement, augmentation of oxygen carrying capacity and correction of post haemorrhagic anaemia. The practical advantage of intraoperative autotransfusion is the ease and speed with which it can be carried out without the time consuming grouping and cross-matching of blood. The British Medical Journal's conclusion in 1967 is still valid today: 'Naturally, when donor blood is available, autotransfusion is apt to be forgotten, but this method of resuscitation, so simple and at the same time so effective, deserves to be better known and more widely used' (26). Indeed, 'the safest blood a patient can receive is his/her own blood' (27).

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