

CASE STUDY

**BLOOD SALVAGE MANAGED A CRITICAL
HEMORRHAGE DURING CESAREAN SECTION WITH
UTERINE RUPTURE ACCOMPANIED WITH
PLACENTA ACCRETA**

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Abstract A 30-year-old woman underwent an emergency cesarean section because of fetal distress involved uterine rupture. As the placenta was firmly adhered to the uterine wall, following safe delivery, it took over one hour and more than 10000 ml blood loss until the placenta was removed. Additional blood was ordered, but there was delay in delivery. Bleeding was extremely beyond our estimation, and hardly controlled despite of transfusing 1400 ml of prepared blood. With stopping operation and continuing hyperoxic ventilation, we decided to start intraoperative blood salvage. Though hemoglobin, platelet, and base excess decreased to 2.7 g/dl, 1000/ μ l, and -11.2, hemodynamics could be maintained with use of a blood salvage system. Salvaged blood was very helpful to manage critical hemodilution until additional blood was reached. Overall estimated blood loss was 20190 ml and massive blood transfusion was needed. The patient emerged from anesthesia with no neurological complication. Rarely but actually cesarean section resulted in life-threatening hemorrhage. Blood salvage systems is safe and useful during cesarean section. Blood salvage should be usually considered one of the suitable choices in cesarean section patients when supply of homologous blood is limited.

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Key words: cesarean section; uterine rupture; obstetrical hemorrhage; intraoperative blood salvage; placenta accrete.

症例研究

**大量出血を呈した子宮破裂合併帝王切開術において
回収式自己血を用いた1例**

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抄録 大量出血を呈した子宮破裂合併帝王切開術で回収式自己血が有用であった1例を報告する。患者は帝王切開既往の30才。妊娠29週で突然の腹痛・血圧低下・胎児仮死を認め緊急帝王切開となった。麻酔はサイオペンタール・サクシンで導入し、胎児娩出後はプロポフォール・フェンタニル・ケタミンで維持した。執刀後子宮破裂と診断され、胎盤娩出後も出血は持続しすぐに輸血血液不足に陥り追加血液を要請した。追加血到着までに10000 ml以上の出血を認め、回収式自己血輸血を施行した。総出血量は20190 gで大量の輸血を必要とした。帝王切開における回収式自己血は羊水塞栓の点から懸念されていたが、安全性や有用性について多数の報告がある。稀ではあるが帝王切開では生命を脅かすような大量出血が見られることがあり、大量輸血を要するが血液が迅速に十分に手に入らないこともある。回収式自己血は帝王切開の際にも血液供給の一手段として積極的に考慮されるべきと思われる。

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キーワード: 帝王切開; 子宮破裂; 産科的出血; 術中回収式自己血; 癒着胎盤.

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Introduction

Maternal mortality in Japan is 9.5/100,000-birth with hemorrhage, being the major cause of death (39%)¹⁾. Spontaneous uterine rupture is one from of life-threatening obstetric hemorrhage with a common cause being separation of a previous cesarean section scar.

As obstetric hemorrhage is often massive with unexpected onset, multiple uterine of homologous blood transfusion are required. However, there is an associated risk of transfusion reactions, infection and erythrocyte alloimmunization²⁾. Thus, the intraoperative blood salvage during cesarean section would be useful for avoiding these adverse transfusion reactions²⁾ although this supposition remains controversial^{3,4)}.

Case Report

A 30-year-old woman presented with lower abdominal pain of sudden onset at 29 weeks gestation. She had one previous cesarean section 3 years ago and underwent Shirodkar's operation during this gravidism. As ultrasonographic examination suggested the presence of placenta accreta, she was planned to hospitalize to examine the status of her uterus and the placenta by the Magnetic Resonance Imaging in the next week. Upon transfer to a perinatal medical center in our hospital, she was restless with hypotension (Blood pressure [BP] 70/50 mmHg) and anemia (hemoglobin [Hb] 6.4 g/dl). Uterine rupture or placental abruption was suspected.

Fetal distress occurred simultaneously. The patient was moved to the operating theater for an emergency cesarean section whilst receiving red blood cell (RBC) transfusion.

On arrival at the theater, her BP was 115/60 mmHg and heart rate (HR) was 110bpm, but Hb

decreased to 3.9 g/dl. Anesthesia was induced with thiopental (150 mg) and succinylcholine (40 mg) without hypotension. Following laparotomy, a large hemoperitoneum and a laceration with a thin and fragile wall area of 10 cm in diameter close to previous cesarean scar on the uterus were found. A male fetus weighting 1534 g was delivered with the Apgar score of 4 and 8 at 1 and 5 min. He was immediately diagnosed as respiratory distress syndrome, and administered pulmonary surfactant by pediatricians.

Anesthesia was maintained with an infusion of ketamine (2 mg/kg/hr) and propofol (0- 4 mg/kg/hr) and bolus administration of fentanyl and vecuronium. Bleeding was ~5000 g within 20 min after commencement of the procedure. Packed red blood cells (RBCs) of 1400 ml were rapidly transfused, and additional RBCs, fresh frozen plasma (FFP) and platelets (PC) were simultaneously ordered. The placenta was adhered to the internal scar and it took over one hour and more than 10000 ml blood loss was counted before the placenta was removed. Arrival of the additional blood was delayed. Bleeding continued extremely beyond our estimation, and hemodynamic control became difficult. Thus, we decided to use an intraoperative blood salvage system (CATS: Fresenius AG, Bed Homburg) to compensate for blood shortage. Simultaneously, we ordered fresh blood (FB) as massive bleeding caused coagulopathy. Despite this mean BP and HR were maintained around at 60mmHg and 120bpm, respectively, with the blood salvage system. Hb, platelet, and base excess decreased to 2.7 g/dl, 1000/l, and -11.2, respectively. Additional blood arrived 3.5 h after the first request. Hemodynamics and bleeding could now be controlled easily. Total blood loss was 20190 g. Total blood transfusion was 19 units of RBCs, 30 units of FFP, 20 units of PC, 10 units of FB, and 1090 ml of salvaged blood. (See Figure)

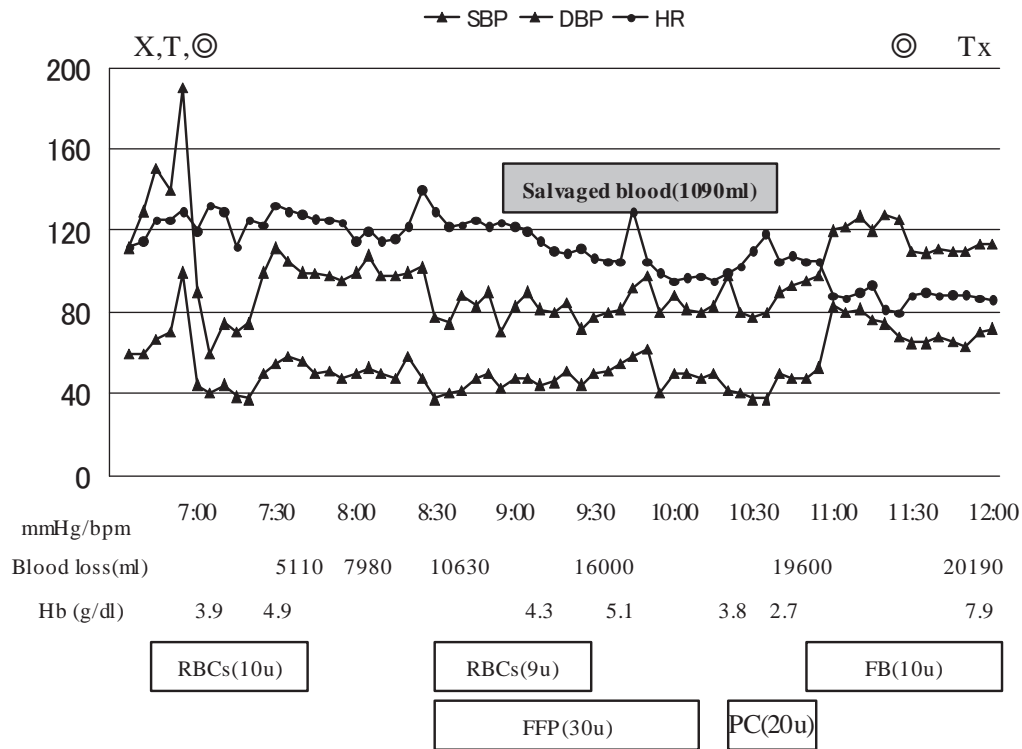


Figure 1: Anesthesia record, X = start and end of anesthesia, T = intubation, Tx= extubation, ◎= start and end of surgery. RBCs = packed red blood cells, FFP = fresh frozen plasma, PC = platelets, FB = fresh blood, u = units.

The operation time was 4 hours and 57 minutes. The patient was emerged smoothly from anesthesia without any neurological complications and was then moved to an intensive care unit. Although the patient was accompanied with postoperative pyrexia, dyspnea and diarrhea that were due to the pleural effusion, as well as atelectasis and colitis, she recovered fully with intensive treatment.

Discussion

It has been reported that blood loss from uterine rupture exceeds 2000 ml in 50% of cases and a majority of women require blood replacement exceeding five units⁵. However, as uterine rupture sometimes occurs with unexpected onset, timely arrival of homologous blood is essential. Delay may lead to maternal death or

life-saving hysterectomy.

In the present case, although packed RBCs of 1400 ml were prepared preoperatively, bleeding was far beyond our estimation. Thus, we had to employ an intra-operative blood salvage system. In 1994, the National Institutes of Health National Heart, Lung and Blood Institute in the United States endorsed the expanded use of intraoperative blood salvage but did not recommend this technique during cesarean section because of both a concern of an amniotic fluid embolism and a lack of data from prospective randomized studies documenting the safety of this technique for cesarean section⁶.

Following this announcement, however, several reports^{2, 7-9} have indicated safety of salvage system for cesarean section. Bernstein and colleagues² reported that blood salvage system

could remove functionally active tissue factors from blood heavily contaminated with amniotic fluid. Waters *et al.*⁷⁾ also reported that leukocyte depletion filtering of cell-salvage blood obtained from cesarean section significantly reduced particulate contaminants to a concentration equivalent to maternal venous blood. Rainaldi and colleagues⁸⁾ found that the salvage significantly increased postoperative Hb of patients received cesarean section.

On the other hand several articles^{10, 11)} suggest that blood salvage systems do not efficiently prevent bacterial contamination. In the present case the patient suffered postoperatively from pyrexia, dyspnea and diarrhea. Although bacterial contamination of the salvaged blood was not completely excluded, it was also considered that systemic inflammatory reactions such as pyrexia, pleural effusion and colitis were caused by surgical stress.

Clark³⁾ has warned of a risk of amniotic fluid embolism as there is a fetal case report where amniotic fluid embolism was implicated following blood salvage. However, in the present case as homologous blood was extremely short, we had no other choice except use of a blood salvage system. We suggest that blood salvage systems should be considered in emergency cesarean section patients when supply of homologous blood is limited.

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