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CASE REPORT

# Closing the gap between decision and delivery—Amniotic fluid embolism with severe cardiopulmonary and haemostatic complications with a good outcome<sup>☆</sup>

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**Summary** Perimortem caesarean section is very rare, mostly resulting in high mortality of mother and/or fetus. We report a case of successful resuscitation of both mother and newborn following maternal cardiac arrest prior to delivery. Postoperative outcome was complicated by severe bleeding and coagulopathy following fibrinolysis and subcapsular hepatic haematoma. We consider a fast reaction time based on a special in-hospital emergency team for immediate caesarean section and an aggressive management of coagulopathy as major factors that led to both patients recovery without neurological sequelae.

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## Introduction

Facilities providing labour and delivery services are confronted with the necessity of also having to guarantee an adequate infrastructure for emergency caesarean delivery in cases of immediate

threat to the life of the woman or fetus. The American College of Obstetricians and Gynaecologists recommends a 30 min maximum interval between decision and delivery for acute obstetric emergencies.<sup>1</sup> Although studies have shown that emergency caesarean delivery is only necessary in 1.4<sup>2</sup>–2.7%<sup>3</sup> of all deliveries a 24h in-house anaesthesia disposition is essential. However, such intervals may be too long in unpredictable and life-threatening sudden obstetrical complications such as cardiac arrests prior to delivery, thus resulting in adverse outcomes for both mother and child. After implementation of a reporting

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system for critical incidents at our institution<sup>4</sup> and evaluation of the anaesthesiology in-hospital processes an optimised interdisciplinary alerting system for emergency caesarean delivery including potential perimortem section was introduced. The goal was to minimise time intervals between emergency diagnosis and reaction.

We report a case of perimortem section following maternal cardiac arrest due to amniotic fluid embolism (AFE) prior to delivery complicated by severe haemorrhage and coagulopathy with successful resuscitation of both mother and child, probably due to rapid management after using an emergency alerting system.

## Case report

A 28-year-old healthy female (gravida 4, para 2) with known gestational diabetes was admitted for scheduled vaginal delivery at 39 weeks and 1 day of pregnancy. Induction of labour was performed by means of intravaginal 1 mg prostaglandin E1. No spontaneous labour activity was noted; therefore, a repeated dose of 1 mg prostaglandin E1 was planned for the next morning. Maternal and fetal monitoring, as well as laboratory variables were within normal range.

Shortly before receiving the second prostaglandin dose the patient suddenly complained of dyspnoea, agitation and clear amniotic fluid discharge occurred. Immediately thereafter, fetal bradycardia ( $60 \text{ min}^{-1}$ ) and uterine hyperactivity accompanied by loss of consciousness were noted by the midwife. At 07:20 the emergency caesarean delivery team was summoned and the patient was immediately transferred to the adjacent operating room (OR).

In case of an emergency caesarean delivery midwives contact the telephone operator via a special number and an emergency caesarean delivery team consisting of a staff anaesthesiologist, anaesthesia nurse, obstetrician and OR nurses are contacted by special pagers and dispatch immediately to the OR without having to return a call. Additionally, the paediatric ICU dispatches a paediatrician and a nurse for care of the newborn. Prior to implementation of this system, midwives contacted and informed each individual separately. During the day time the staff anaesthesiologist on duty in the Department of Obstetrics and Gynaecology was contacted via his/her personal pager. The evaluation of anaesthesiological processes in our department found this to be a time-consuming vulnerable point, especially during shift changeover, with a high probability of malfunction and therefore delay.

On arrival (after 4 min) the staff anaesthesiology and anaesthesia nurse found the patient to be unresponsive (GCS 3) with bilateral mydriasis, cyanosis, prominent jugular veins and no palpable carotid pulse. Chest compressions were started immediately ( $100 \text{ min}^{-1}$ ) and the trachea was intubated and ventilated with 100% oxygen. ECG analysis revealed broad complexes corresponding with cardiac compressions. The patient was placed in a left side wedge/head down tilt position and a total of 3 mg of adrenaline (epinephrine) was given in boluses of 1 mg every 3 min during the course of resuscitation. In addition, fluid replacement and a continuous noradrenaline (norepinephrine) infusion of  $0.2\text{--}0.4 \mu\text{g/kg/min}$  were started.

An embolic incident was suspected to be the cause of the cardiac arrest. It was presumed that sufficient maternal circulation would not be restored within an acceptable time interval, thus the decision was made for immediate emergency caesarean delivery during cardiopulmonary resuscitation. A normal sized female baby was delivered within 2 min (decision to delivery time: 9 min) with a 1 min Apgar score of 0. Cardiopulmonary resuscitation was started immediately and the Apgar score improved to 3 and 6 at 5 and 10 min, respectively. Primary pH (umbilical artery) was 6.74 and BE—18.7. The neonate was intubated and transferred to the neonatal intensive care unit by the paediatrician.

Maternal return of spontaneous circulation (ROSC) was noted 10 min after delivery (palpable pulse of  $140 \text{ min}^{-1}$ , blood pressure 50/30 mmHg), still requiring intermittent chest compressions for a further 10 min. Under continuous noradrenaline and volume resuscitation a sufficient ROSC was achieved at 20 min after the incident (heart rate  $133 \text{ min}^{-1}$ , blood pressure 140/70 mmHg). The patient was now anaesthetised with 15 mg midazolam and 0.5 mg fentanyl, mechanical ventilation was continued with 100% oxygen. An arterial line was placed in the left radial artery for continuous blood pressure monitoring and a central line was inserted via the innominate vein. In all, the patient received 1500 ml of Ringer's solution, 1500 ml of hydroxy ethyl starch 6% 130/0.4 (Voluven<sup>®</sup>, Fresenius Kabi, Bad Homburg, Germany) and 250 ml HyperHAES<sup>®</sup> (Fresenius Kabi).

During closure of the rectus sheath profuse haemorrhage from the abdominal cavity and per vaginam was noted. Due to uterine atony a sulprostone infusion was started at  $200 \mu\text{g/h}$  (sulprostone is a PGE<sub>2</sub> analogue and potent stimulator of uterine smooth muscle contraction) with external manual compression of the uterus which led to return of uterine tone and the patient was trans-

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