# Correspondence

European Journal of Emergency Medicine 2011, 18:241–242

## Prehospital resuscitative hysterotomy

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**Received** 28 October 2010 **Accepted** 24 January 2011

### Summary
We present the case of a prehospital perimortem hysterotomy and caesarean delivery of the foetus at 38 weeks of gestation. Effective, in-hospital standards of advanced life support were provided by a physician–paramedic team in the prehospital arena to achieve resuscitation of the newborn after maternal cardiac arrest. This case serves as a reminder of the unique challenges of maternal resuscitation and that all physicians involved in the provision of prehospital emergency medical care should be aware of, and be prepared to carry out this procedure.

### Background
The Greater Sydney Area Helicopter Emergency Medical Service (GSA-HEMS) of the Ambulance Service of New South Wales provides prehospital medical and trauma management and interhospital critical care transfer to the population of New South Wales, Australia. Medical teams consisting of a critical care doctor and a specialist intensive care paramedic provide services from three bases in Sydney, Orange and Wollongong.

### Case report
A GSA-HEMS medical team attended the home of a 31-year-old female patient with a previously uneventful 38-week gestation, singleton pregnancy who had complained of abdominal pain shortly before developing respiratory distress and subsequent cardiorespiratory arrest.

The first paramedics on scene found the patient collapsed with no discernible cardiac output and occasional agonal respiratory efforts. Initial electrocardiogram monitoring showed the patient to be in sinus rhythm with an electrocardiogram heart rate of 60/min. Pulseless electrical activity was confirmed and basic life support was commenced with manual external chest compressions and synchronized bag–valve–mask ventilation. The gravid uterus was manually displaced laterally during basic life support. The cardiac rhythm became increasingly bradycardic before rapid deterioration to asystole.

The doctor/paramedic medical team arrived on scene approximately 3–4 min after the commencement of basic life support. The patient was moved into an adjacent room to provide 360° access for continued resuscitation. Advanced life support was commenced immediately by the GSA-HEMS paramedic, with rapid orotracheal intubation, intraosseous access, fluid and drug administration as per local advanced life support guidelines. Concurrently, the medical team doctor performed a hysterotomy and caesarean delivery of the foetus through a Pfannenstiel abdominal incision. Incision of the peritoneum was followed by evacuation of a large quantity of fresh blood and haematoma. The remainder of the procedure was unremarkable with access to the uterus through a low transverse hysterotomy. The foetus was delivered approximately 2 min after the commencement of the procedure and 7 min after initial confirmation of maternal cardiac arrest. After umbilical cord clamping, assessment of the newborn showed central cyanosis, absent respiratory effort and a heart rate of 60/min (Apgar score = 1 at 1 min). After drying, stimulation and suctioning of the oropharynx, inflation breaths were provided using a bag–valve–mask device followed by a short period of external chest compressions. The trachea was intubated with a size 3.0 uncuffed oral endotracheal tube, using a size 1 Miller laryngoscope blade. Bilateral air entry and a strong femoral pulse (rate 115/min) were confirmed. Manual ventilation continued in the absence of respiratory effort (Apgar score = 3 at 5 min) and the newborn was transported to a regional trauma centre for continued resuscitation before retrieval by a specialist, tertiary neonatal intensive care team (Neonatal Emergency Transport Service, Sydney).

Maternal resuscitation continued for further 30 min, with the cardiac rhythm remaining in asystole. Maternal life was pronounced extinct at the scene.

The newborn received tertiary level neonatal intensive care treatment but displayed signs and symptoms of severe hypoxic brain injury and life support was withdrawn approximately 24 h after delivery.

Maternal postmortem examination showed a large (approximately 15 cm) ruptured hepatic adenoma suspected to be the source of intraperitoneal haemorrhage resulting in hypovolaemic cardiac arrest.

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## Discussion

Perimortem hysterotomy and caesarean delivery is a well-described [1,2] but infrequently encountered part of the resuscitation of the pregnant female. The intent of the procedure is to optimize maternal cardiopulmonary resuscitation by increasing cardiac output and improving ventilatory mechanics while allowing simultaneous independent resuscitation of the newborn.

Although there are recommendations that the procedure should be carried out using a midline laparotomy and classical longitudinal hysterotomy [3,4] our physician (an anaesthetist) having observed numerous elective caesarean sections, was most familiar with the Pfannenstiel abdominal incision and a lower segment hysterotomy. We believe this decision did not significantly impact the duration of the procedure.

The International Liaison Committee on Resuscitation consensus on science guidelines published in 2005 [5] suggest that the decision to perform a resuscitative hysterotomy should be made within 4 min of cardiac arrest with delivery of the foetus at 5 min if initial resuscitative efforts by skilled rescuers in the hospital setting fail. It is logistically difficult to achieve this target in many centres due to the absence of obstetric surgical availability, hesitancy in committing to this treatment plan and the superimposed issues of subsequent neonatal resuscitation.

For these same logistical and clinical reasons resuscitative hysterotomies are rarely performed in the prehospital setting. A literature search yielded only one other reported prehospital case in recent medical literature [6]. The GSA-HEMS system allows for provision of this procedure and the hospital-standard advanced life support of two patients simultaneously thereafter.

Although the outcomes of this case were poor, we still believe that it highlights the importance of perimortem hysterotomy as a vital step in the management of maternal cardiac arrest both in-hospital and in the prehospital setting. As such, all physicians who find themselves leading in-hospital cardiac arrest situations and those who provide prehospital emergency medical care should make themselves familiar with and be prepared to undertake this procedure.

## Acknowledgements

Funding: none declared.

There is no competing interest to declare.

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