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**Dr. Pooja Kamat**  
Junior Consultant,  
Department Of Anaesthesia,  
Khan Bahadur Bhabha  
Hospital, Kurla, Mumbai,  
Maharashtra, India

**Dr. Pratima Killekar**  
Senior Consultant,  
Department Of Anaesthesia,  
Khan Bahadur Bhabha  
Hospital, Kurla, Mumbai,  
Maharashtra, India

**Dr. Govinda Innani**  
Speciality Medical Officer,  
Department Of Anaesthesia,  
Khan Bahadur Bhabha  
Hospital, Kurla, Mumbai,  
Maharashtra, India

**Corresponding Author:**  
**Dr. Pooja Kamat**  
Junior Consultant,  
Department Of Anaesthesia,  
Khan Bahadur Bhabha  
Hospital, Kurla, Mumbai,  
Maharashtra, India

## Anaesthetic management of hemorrhagic shock in ruptured ectopic pregnancy for emergency exploratory laparotomy

**Dr. Pooja Kamat, Dr. Pratima Killekar and Dr. Govinda Innani**

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### Abstract

**Background:** Hemorrhagic shock is a form of hypovolemic shock resulting from decreased blood volume (hypovolemia) caused by blood loss which leads to reduced cardiac output and organ perfusion. It is a life-threatening emergency if hemorrhage continues unchecked, death quickly follows. We report perioperative management of a 25 year-old anemic patient who was in hemorrhagic shock with a ruptured ectopic pregnancy for emergency laparotomy it's an anesthesia challenge.

**Keywords:** Hemorrhagic shock, ectopic pregnancy

### Introduction

Ectopic pregnancy is a type of a pregnancy where the placenta is implanted in the peritoneal cavity exclusive of tubal, ovarian or intraligamentary implantation. About 95% of ectopic pregnancies are located in one of the fallopian tubes, while the rare sites of implantation are the cervix, ovary and abdominal cavity <sup>[1]</sup>. Ruptured ectopic pregnancy is a common life threatening emergency and leading cause to mortality in first trimester <sup>[2]</sup>. The sudden rupture of a fallopian tube caused by ectopic pregnancy can lead to haemorrhagic shock and death if not diagnosed and treated in a timely fashion <sup>[3]</sup>.

### Case report

The 25 year old woman (American Society of Anaesthesiologist physical status II), case of gravida 2, para 1, living 1, not registered for antenatal check-up elsewhere, resident of Mumbai presented to the emergency department with history of amenorrhea of 6 weeks with per vaginal bleeding, severe pain in abdomen with bouts of vomiting since 4 to 6 hours. Urine pregnancy test and B-hCG test were positive. USG abdomen revealed normal ovaries with 7mm hyperechoic structure with cardiac flickering noted within right adnexa with moderate free fluid collection seen surrounding to complex lesion suspecting right tubal pregnancy.

A patient was immediately taken up for emergency exploratory laparotomy for suspected ruptured ectopic pregnancy with hemoperitoneum. On preanaesthetic evaluation, patient was drowsy but oriented to time, place, and person. She was 154 inches tall and weighed 40 kg with pulse rate (PR) of 130/min, regular in rhythm, of low volume. Blood pressure (BP) was 70/40 mm hg. Two wide bore 20 G intravenous (I.V) lines secured. Resuscitation started with 500 millilitre (ml) of I.V colloid and I.V ringer lactate (RL). Later BP was 86/66 mm Hg which was recorded from right upper arm in supine position. I.V vasopressor support, Injection (inj.) Noradrenaline (8mg/50cc NS @ 3ml/hr) started. On airway examination she had adequate mouth opening, no loose teeth, caps or crowns and mallampati grading II. Pre-operative investigation revealed haemoglobin (Hb) of 8 g/dL, total blood count 17500 cells/cumm, and platelet count 259000/cumm 1 hour prior to procedure.

We had ordered 2 units of packed cells (PCV) and 2 units fresh frozen plasma (FFP). General anaesthesia was planned for the exploratory laparotomy as the patient was in a state of grade III shock. Informed consent was taken after explaining to the patient's attender (spouse) regarding the risk of bleeding, general anaesthesia related complications, intraoperative cardiac events and post-operative ventilator support. Patient was taken to operation room and standard ASA monitors (Electrocardiogram (ECG), Non-invasive

BP, Spo<sub>2</sub>, ETCO<sub>2</sub>) applied and patients vitals noted heart rate(HR) 130 beats per min, respiratory rate(RR) 16 per min ,BP was 90/60mmHg, Ecg was showing normal sinus tachycardia, Spo<sub>2</sub> showing 98% @room air. The patient was pre-medicated with I.V inj. Pantoprazole 40 mg; inj. Metoclopramide 10mg induced with inj. Glycopyrrolate 0.2 mg and inj Fentanyl 50 microgram. Rapid Sequence intubation was done by using inj. Ketamine 50 mg with inj. Propofol 40 mg and inj Succinylcholine 75 mcg with cuffed endotracheal tube 6.5 F and fixed on mark 19 cm after confirmation of bilateral air entry. Anaesthesia was maintained with Sevoflurane and intermittent boluses of 25mcg Fentanyl. Inj. Atracurium 0.5 mg /kg was used for

neuromuscular blockade. Right internal jugular vein (IJV) taken with all aseptic precaution by using Seldinger's technique. Central venous pressure (CVP) recorded were 2 cm of water. Intraoperative Blood loss were 1500ml (blood clots and blood soaked mops) drained from peritoneal cavity. There was right tubal pregnancy, right salpingectomy was performed. Inj. Tranexamic acid 1000 mg was given to maintain hemodynamic stability; patient was managed with 1litre colloids, 1500 ml RL and vasopressors like inj. Noradrenaline and. Blood transfusion started with 2 units of PCV and 2 units of FFP. Hypothermia was prevented using intravenous fluid warmer.



**Fig 1:** Ruptured right tubal pregnancy



**Fig 2:** Blood clots from ruptured right tubal pregnancy

BP was improved 100/60 mmHg, HR settled up to 90 beats per min. Blood gas analysis revealed pH value of 7.1, partial pressure of carbon dioxide (PCO<sub>2</sub>) was 24 mm hg, bicarbonate (HCO<sub>3</sub>) was 8 mEq/L suggestive of severe metabolic acidosis with respiratory compensation, therefore 100 ml of sodium bicarbonate was infused. Total duration of surgery was 90 minutes which was uneventful. Initially urine output was 30 ml. Urine output was improved to 180ml after giving of inj. Furosemide 10mg. Reversion of neuromuscular blockade was made with 2.5 mg of inj. Neostigmine and 0.5 mg of inj. Glycopyrrolate. Patient was extubated after surgery uneventfully and shifted to intensive care unit (ICU) for further monitoring. In ICU 1 units of PCV and 2 units of FFP were transfused on next day. Vasopressor support was stopped on next day. The patients report were Hb 10.5g/dL, prothrombin time, activated partial thromboplastin clotting time and international normalized ratio were in normal limit and she was shifted toward after 3 days and discharged from hospital after 8

days.

### Discussion

An ectopic pregnancy is a complication of pregnancy in which the embryo implants outside the uterine cavity<sup>[4]</sup>. Furthermore, they are dangerous for the mother, as internal haemorrhage is a life-threatening complication. Although recognition of primary abdominal pregnancy poses a difficult diagnostic challenge, increased detection of ectopic pregnancies is made possible through improved access to ultrasonography and improved sensitivity of urine and serum  $\beta$ -human chorionic gonadotropin tests<sup>[5]</sup>.

Hemorrhagic shock is a severe clinical syndrome, produced by rapid and massive blood loss, which may lead to hemodynamic instability, decreasing in oxygen delivery and tissue perfusion, cellular hypoxia, organ damage, and even death<sup>[6]</sup>.

To help guide volume replacement, haemorrhage can be divided into four classes.

**Table 1:** The ATLS classification of hemorrhagic shock [7, 8].

Class of haemorrhagic shock				
	I	II	III	IV
Blood loss (mL)	Up to 750	750–1500	1500–2000	> 2000
Blood loss (% blood volume)	Up to 15	15–30	30–40	> 40
Pulse rate (per minute)	< 100	100–120	120–140	> 140
Blood pressure	Normal	Normal	Decreased	Decreased
Pulse pressure (mm Hg)	Normal or increased	Decreased	Decreased	Decreased
Respiratory rate (per minute)	14–20	20–30	30–40	> 35
Urine output (mL/hour)	> 30	20–30	5–15	Negligible
Central nervous system/mental status	Slightly anxious	Mildly anxious	Anxious, confused	Confused, lethargic

Hb level of 7–8 g/dL is an appropriate threshold for transfusion in critically ill patients with no risk factors for tissue hypoxia. Maintaining a Hb level of 10 g/dL is a reasonable goal for patients who are actively bleeding [8].

Early recognition and early diagnosis of ectopic pregnancy is important for saving patient's life. In view of the deteriorating condition of patient, decision for emergency exploratory laparotomy was taken. Considering the hemorrhagic shock grade III we decided to operate patient under general anaesthesia and the drugs and techniques used to anaesthetize the patient were optimally safe. Blood loss was measured [9]. Hypovolemia secondary to bleeding from ruptured tubal pregnancy was treated by RL, colloids, vasopressor and blood to preserve perfusion of vital organs [10, 11].

### Conclusion

Hemorrhagic shock can be rapidly fatal. The primary goal is prompt recognition and to stop the source of bleeding. Resuscitation is depending upon severity of hemorrhage. When patient is in hemorrhagic shock, the use of intravenous RL or colloids, blood products and vasoactive agents are lifesaving. In hemodynamically unstable patient, the choice of anaesthesia should be general anaesthesia. Aim is to assess the adequacy of perfusion and oxygenation and the magnitude of ongoing blood losses. Deleterious effects of tissue hypoxemia along with threat of major blood losses in the pre-operative period need to be anticipated and treated adequately.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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