

# Successful anesthetic management of parturient with advanced abdominal pregnancy

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Abdominal pregnancy is a rare form of ectopic pregnancy associated with high mortality and morbidity for both the fetus and the mother. It is often observed in developing nations with poor outcomes as most cases result in fetal demise. We present a 48 year old parturient diagnosed with abdominal pregnancy who elected to continue the pregnancy despite the communicated risks. The patient was admitted to the hospital at 24 weeks

of gestational age for antepartum observation with the goal of surgical delivery at 28 weeks of gestation. General anesthesia was provided with multiple large bore intravenous access in anticipation of hemorrhage. The surgeons were able to deliver a viable neonate and the patient did well with moderate blood loss successfully managed with tranexamic acid, crystalloid fluid, and blood products. She was extubated immediately in the operating room and was discharged on postoperative day 4 with no issues.

**Key Words:** Ectopic pregnancy; Abdominal pregnancy; Obstetrics anesthesia

## INTRODUCTION

Abdominal pregnancy is an extremely rare form of ectopic pregnancy where implantation of fertilized ovum occurs directly in the abdominal cavity. The prevalence of ectopic pregnancy is 1-2% with 95% occurring in the fallopian tube [1]. The incidence of ectopic pregnancy occurring in the abdomen is even more uncommon with incidence ranging from 1:1000 to 1:30,000 and mostly seen in developing nations [2]. First documented case of abdominal pregnancy was in 1708 where the diagnosis was made based on excessive hemorrhage during a laparotomy [3]. Similar case reports demonstrated the fatal risks associated with abdominal pregnancy as majority of cases resulted in extraction of the dead fetus with high rate of maternal mortality [4]. The mortality rate associated with abdominal pregnancy is seven times higher than general ectopic pregnancy and 90 times higher than delivery in the third trimester [5]. This presents a major challenge to anesthesia providers caring for these patients as the most common cause of death are hemorrhage and anesthetic complications [1]. However, due to the advancements and improved access to prenatal care, discovery of ectopic pregnancy earlier in the gestational period is more feasible allowing for careful planning and improved outcome. Given the rarity and lack of standard management for this condition, we present our anesthetic management of a patient diagnosed with abdominal pregnancy who underwent successful surgical delivery of a viable neonate.

## CASE REPORT

Our patient is a 48-year-old gravida 4 para 1-0-2-2 African-American female from Ghana with history of sickle cell trait, hypertension, and iron-deficiency anemia who was initially diagnosed with ectopic pregnancy at 5 weeks of gestation. The patient had two prior terminated pregnancies and one cesarean section with twins from in vitro fertilization. She was initially counseled and advised to undergo elective termination given the risks of high morbidity and mortality, but decided to continue with the pregnancy. The MRI showed an extrauterine gestational sac with oligohydramnios containing the fetus in the left hemipelvis that appeared to be attached to the left ovary. Abnormally shaped implanted placenta was located to the left of the gestational sac with heterogeneous necrotic changes. Adjacent bowel loops were displaced, left ureter was compressed resulting in hydronephrosis, and no signs of invasion to other adjacent structures were observed. Follow-up CTA to evaluate placental vasculatures showed primary supply by the left ovarian and left uterine

arteries. The left uterine artery was noted to pass directly beneath the fetal cranium.

The patient was admitted to the obstetrics service at 24 weeks and 0 days of gestation for antepartum observation and to facilitate coordination of care. Trauma surgery, vascular surgery, interventional radiology, urology, and gynecology services were consulted for possible assistance during the operation. Trauma surgery was notified in case of emergency surgical intervention overnight without appropriate services present. Vascular surgery was notified in case of uncontrolled hemorrhage requiring vascular control via aortic cross clamps. Interventional radiology was notified for possible placenta vasculature embolization after the delivery of the fetus. Our anesthetic plan consisted of general anesthesia with rapid sequence endotracheal tube intubation, radial arterial line, single lumen 9-French internal jugular central line, two 8.5-French rapid infusion catheters in bilateral antecubital veins, and multiple typed and crossed blood products in anticipation of hemorrhage. After detailed planning and coordination, surgical delivery was scheduled for 28 weeks and 0 days of gestation in order to maximize fetal benefit while minimizing maternal risk.

In the operating room, our airway management and invasive line placements were successful and unremarkable. Initial baseline hemoglobin was 10.4 with rest of the labs within normal limits for the patient. Once the patient was anesthetized, the urology team first performed cystoscopy with bilateral ureteral stent placement. The obstetrics team then located the fetus in the abdominal cavity behind the uterus with the placenta attached to the interior membrane of the left ovary. The vasculature was then visualized and isolated prior to delivery of the fetus. The viable neonate along with the placenta was delivered approximately an hour and a half after the incision. One gram of tranexamic acid was administered immediately after the delivery due to moderate bleeding. The patient received a total of 3 units of packed red blood cells (pRBC) and 3 units of fresh frozen plasma (FFP) before hemostasis was achieved. Left salpingo-oophorectomy was then performed and the surgery concluded without any further complications. The patient remained hemodynamically stable throughout the case with no vasopressor requirement. Total blood loss was approximately 1,500 ml with post-operative hemoglobin of 11.7. Intraoperative labs including arterial blood gas and lactate remained within normal limits. The patient received total of 2,700 ml of crystalloid fluid and produced 1,010 ml of urine. She was breathing spontaneously off the ventilator by the end of the surgery and was extubated in the operating

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room with excellent tidal volumes and oxygen saturation. Her postoperative pain was well controlled with patient controlled epidural analgesia. She was discharged home on postoperative day 4 with no significant issues while the neonate continued to receive care in the NICU.

## DISCUSSION

Abdominal pregnancy is a rare obstetric emergency with limited literature discussing its surgical and anesthetic managements. This is likely due to improved gestational control leading to early diagnosis and treatment to terminate the ectopic embryo [6]. There are two classified types of abdominal pregnancy. Primary abdominal pregnancy refers to where implantation of fertilized ovum occurs directly in the abdominal cavity as seen in our patient. Secondary abdominal pregnancy, accounting for most cases, occurs following an extrauterine tubal pregnancy that ruptures and gets re-implanted within the abdomen [7]. Although often multifactorial with no clear etiology identified, common risk factors for abdominal pregnancy include previous ectopic pregnancy [8], endometriosis, pelvic inflammatory disease, advanced maternal age, assisted reproductive techniques, tubal occlusions, and multiparity [9,10]. Presenting clinical signs can be vague and include abdominal pain, vaginal bleeding, nausea, vomiting, general malaise, and the ability to easily palpate fetal parts on abdominal examination [11]. It should be noted that patients most commonly complain of persistent abdominal or other gastrointestinal symptoms throughout pregnancy which should alert physicians for possible ectopic pregnancy [1].

Our patient's main risk factors included history of multiparity, in vitro fertilization, and advanced maternal age. The incidence of ectopic pregnancy has been noted to steadily increase with maternal age, with patients over 44 years of age having five times higher risk compared to patients under 22 years of age [12]. It is vital for the diagnosis of abdominal pregnancy to be made early in pregnancy in order to improve outcomes. One report reviewing 163 cases of abdominal pregnancy demonstrated that the diagnosis of this condition is frequently missed, with only about 45% of cases diagnosed during the antenatal period [13]. Fortunately for our patient, the abdominal pregnancy was discovered early during her initial prenatal care allowing us to formulate a plan and coordinate appropriate care for the surgical delivery. Morbidity and mortality are most commonly due to massive hemorrhage from complete or partial placental separation [14]. The placenta can implant at various sites in ectopic pregnancy, including uterine wall, adnexa, bowel, omentum, liver, spleen, and pouch of Douglas [15]. Placental separation is highly unpredictable and can occur at any point during pregnancy causing sudden massive hemorrhage as well as possible exsanguination and death.

For the anesthesiologist, it is critical to establish adequate intravenous access and be prepared to manage hemorrhage in a timely manner. We made the decision to insert multiple large-bore intravenous catheters to ensure rapid infusion if needed, and also coordinated with the blood bank to have a cooler with multiple pRBC and FFP products available in the room before the start of the surgical procedure. Tranexamic acid was administered immediately at the onset of bleeding as it has been demonstrated to reduce mortality from postpartum hemorrhage with minimal adverse effects [16]. Preoperatively, it is vital to identify the arterial blood supply to the placenta as this can predict the severity of bleeding and the difficulty of placenta extraction. Preoperative angiogram is a useful diagnostic tool in abdominal pregnancy as it can help to delineate the exact vascular supply to the placenta. If possible, intraoperative embolization by interventional radiology may be performed on vessels difficult to ligate operatively [17]. In addition, studies have suggested that unless the placenta can be easily tied off or extracted, it may be preferable to leave it in place and allow for natural regression [18]. However, this is not commonly performed as leaving the placenta in situ has been associated with delayed hemorrhage and increased mortality [7]. Postoperative embolization can also be performed in these circumstances and has shown to significantly decrease postoperative hemorrhage. One of our initial plans was to preoperatively place the catheters by the interventional radiology team for possible intraoperative postpartum embolization and leave the placenta in place in case of difficult extraction. However, based on the imaging and the high probability that the vessels

would not interfere with the surgical field, this plan was not pursued and the surgeons were able to deliver the placenta without difficulty.

Overall, our patient had an excellent outcome of her abdominal pregnancy with delivery of a viable neonate at 28 weeks and 0 days of gestational period. Blood loss was effectively managed with an antifibrinolytic agent, intravenous crystalloid fluid, and blood products. Patient's hemodynamics and metabolic state remained stable throughout the operation allowing her to be extubated immediately and discharged on postoperative day 4. Abdominal pregnancy is a rare condition in today's developed world, and it is even more uncommon to report a positive outcome for both the mother and the fetus. We present this case to demonstrate the comprehensive planning, coordination of care, and the anesthetic management involved in ensuring optimal outcome in this patient population.

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