

# Internal Iliac Artery Rupture Caused by Endovascular Balloons in a Woman with Placenta Percreta

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## Abstract

**Background:** Prior to Caesarean section (CS) for morbidly adherent placenta (MAP), endovascular balloons are often placed prophylactically to minimize hemorrhage. However, there have been few reports describing complications of this intervention.

**Case:** A 41-year-old woman with a diagnosis of placenta percreta had endovascular balloon catheters placed before CS. Intraoperatively the right internal iliac artery ruptured, requiring vascular repair, multiple transfusions of blood and plasma, and admission to the intensive care unit.

**Conclusion:** Prophylactic placement of endovascular balloons to reduce maternal hemorrhage at CS for MAP may result in complications. Until more evidence becomes available supporting their use, safety guidelines must be instated in centres using them.

## Résumé

**Contexte :** Avant une césarienne pratiquée en raison d'une adhérence pathologique du placenta, on a souvent recours à l'insertion prophylactique de ballons endovasculaires pour réduire au minimum le risque d'hémorragie. Il existe toutefois quelques études de cas décrivant les complications de cette intervention.

**Cas :** Une femme de 41 ans ayant un diagnostic de placenta percreta a subi l'insertion de cathéters à ballonnet endovasculaires avant une césarienne. Durant l'intervention, l'artère iliaque interne droite s'est rompue, nécessitant une réparation vasculaire, de multiples transfusions de sang et de plasma et l'admission au service de soins intensifs.

**Conclusion :** L'insertion prophylactique de ballons endovasculaires pour réduire les hémorragies maternelles durant une césarienne pratiquée en raison d'une adhérence pathologique du placenta peut entraîner des complications. Jusqu'à ce qu'un plus grand volume de données

soit publié à l'appui de cette intervention, des directives de sécurité doivent être mises en place dans les centres qui la pratiquent.

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## INTRODUCTION

Morbidly adherent placenta (MAP) is a disorder of placental implantation that develops when the loss of the decidua basalis allows uncontrolled invasion of the chorionic villi into the myometrium.<sup>1</sup> Based on its depth of invasion, MAP is subdivided into three separate entities: placenta accreta, placenta increta, and placenta percreta. Placenta accreta, the most common but least severe form of MAP, involves superficial placental invasion through the decidua, while placenta percreta, the least common but most severe form of MAP, involves placental invasion through the uterine serosa with possible extension into adjacent organs.<sup>2</sup>

Despite rapidly evolving imaging and surgical technologies and growing surgical expertise, MAP remains an important cause of maternal morbidity and mortality.<sup>1</sup> MAP is associated with life-threatening postpartum hemorrhage, with a 7% risk of maternal mortality.<sup>1</sup> Risk factors associated with MAP include high parity, multifetal gestation, advanced maternal age, assisted reproductive technologies, placenta previa, and, most importantly, a history of Caesarean section or other uterine surgery.<sup>2</sup> As rates of CS have increased, the rate of MAP has also risen.<sup>1</sup> In a 2015 review of birth registries, Mehrabadi et al. noted an incidence of placenta accreta of 14.4 per 10 000 deliveries,<sup>3</sup> increased from approximately four per 10 000 deliveries in 1980.<sup>4</sup>

Although MAP accounts for nearly 30% of peripartum hysterectomies and is associated with a rate ratio of 286 for

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Caesarean hysterectomy,<sup>3</sup> its management remains a major obstetrical challenge with surrounding controversy. A major point of debate is the prophylactic placement of endovascular balloons prior to surgery. The goal of temporarily occluding the internal iliac arteries is to reduce uterine perfusion and decrease the rate of blood flow, thereby reducing blood loss, improving visualization during surgery, allowing for urgent arterial embolization (if required), and possibly preventing hysterectomy.<sup>5</sup> Despite these potential advantages, some have questioned the routine use of endovascular balloons, claiming that the associated risks outweigh their benefits.<sup>6,7</sup>

We describe here the case of a 41-year-old parturient with a suspected placenta percreta who experienced a complication arising from the use of endovascular internal iliac artery occlusive balloons (IIAOBs).

## **THE CASE**

A previously healthy 41-year-old woman, gravida 3, para 2, was referred to our tertiary care obstetrical centre for the management of suspected placenta percreta. She had had two previous uncomplicated CSs for breech presentation at term.

Her pregnancy had been conceived spontaneously. Her ultrasound assessment at 20 weeks' gestation showed an anatomically normal fetus and a complete anterior placenta previa. At 33+2 weeks' gestation, ultrasound again confirmed a complete anterior placenta previa, with features suspicious for invasion of the bladder wall by the placenta. Fetal growth had been appropriate. Consultation and imaging with a tertiary level obstetrical unit suggested placental invasion of the CS scar over a width of 9 cm, with a high likelihood of placenta percreta penetrating through the bladder wall. The patient was given two doses of intramuscular betamethasone (12 mg per dose, 24 hours apart) and met with an interdisciplinary surgical team including consultants from urology, anaesthesia, and gynaecology. She was counselled regarding the severity of this condition and agreed to undergo an elective Caesarean hysterectomy. The patient was admitted for elective surgery at 35+5 weeks' gestation.

In accordance with institutional protocol, prophylactic IIAOBs were placed shortly before surgery. The IIAOBs were placed using previously described radiologic techniques.<sup>8</sup> Once the balloons had been positioned, the vascular sheaths, balloon catheters, and attached 3 mL syringes containing 0.6 mL of normal saline were secured to the patient's thighs with sutures and adhesive bandages. The placement procedure was well tolerated and the

patient was transferred to the operating room for her scheduled Caesarean hysterectomy.

General anaesthesia was induced and the patient was placed in stirrups in the dorso-lithotomy position. A midline skin incision was made and deepened to the abdominal cavity; at this point, it was obvious that the placenta was extending through the bladder wall into the broad ligament, anterior abdominal wall fascia, and pelvic sidewalls. A fundal midline hysterotomy incision was made, and a live male infant weighing 2680 g was delivered with Apgar scores of 9 and 10 at one and five minutes respectively.

Following delivery of the infant, the hysterotomy incision was closed. With very mild manipulation of the uterus, heavy bleeding ensued, so the IIAOBs were inflated bilaterally. The left IIAOB was inflated using the pre-filled syringe. However, the plunger of the 3 mL syringe for the right IIAOB had come out of the barrel, leaving the syringe empty. Another 3 mL syringe was quickly filled with 2 mL of normal saline and attached to the right IIAOB, and the balloon inflated. Hysterectomy was then performed with rapid clamping and suture-ligation of pedicles. After achieving hemostasis, a significant bladder injury was identified, and the urology team performed primary bladder repair with placement of a suprapubic catheter.

Prior to closure of the abdomen, the IIAOBs were deflated after a total inflation time of 90 minutes. Shortly after deflating the IIAOBs, a retroperitoneal hematoma developed and rapidly expanded along the right pelvic side wall. The vascular surgery service was therefore urgently consulted.

During this time, the patient became hemodynamically unstable, with a blood pressure of 60/40 mm Hg, tachycardia of 130 beats/minute, and profound oxygen desaturation (SpO<sub>2</sub> 24%). The hospital's massive transfusion protocol was initiated, and the patient received a total of eight units of packed red blood cells, four units of fresh frozen plasma, and 10 units of platelets.

Exploration by the vascular surgeon identified rupture of the right internal iliac artery caused by the occlusive endovascular balloon. After controlling the bleeding, one litre of fresh blood was evacuated from the retroperitoneal space, the arterial defect was repaired, and the anterior branch of the right internal iliac artery was ligated for hemostatic purposes.

The vascular surgeon then noted that the lower extremities were pale with no Doppler signals in the feet, raising the possibility of ischemia. An angiogram was performed

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