

## Case Report

# A Case of Placenta Previa and Accreta with Previous Cesarean Sections Treated In the Hybrid Operating Room: A Case Report and Clinical Management Using the Hybrid Operating Room

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**Abstract**

A 36-year-old woman with placenta previa and three previous Cesarean sections underwent Cesarean section at 34 weeks of gestation in a hybrid operating room. Which of Cesarean hysterectomy or conservative treatments those were combined with uterine artery embolization would be done did not need to be decided at the beginning; rather, it could be determined after evaluation by laparotomy. In this case, a high risk for hysterectomy was determined based on enlarged vessels presence between the bladder and uterus, we chose the conservative treatments. The uterine fundus was incised transversely, and a male neonate weighing 2429 g was delivered. The placenta was not separated, and uterine artery embolization was performed at the same room without a moving of the woman. We could directly observe that bleeding in the uterine cavity had ceased completely, and the uterine wall was sutured. At 1.5 months postoperatively, the vessels between the bladder and uterus were noted to have decreased in size, and secondary hysterectomy was performed uneventfully.

Few reports have described the use of the hybrid operating room for obstetric cases. The management of a patient with placenta previa and previous Cesarean sections is introduced here.

**INTRODUCTION**

The occurrence of adherent placenta combined with placenta previa was once a rare condition; however, its prevalence has been increasing with the growing number of Cesarean deliveries. This condition has emerged as a major cause of maternal morbidity and mortality. The traditional management of adherent placenta consists of Cesarean hysterectomy; however, other conservative treatments have been developed recently [1-3]. However, the optimal management of this condition remains unclear [4,5].

A hybrid operating room combines a full operating room and advanced imaging modalities with interventional capabilities. The most feared complication in adherent placenta is massive bleeding. Not only surgical procedures but interventional radiology are important treatments for controlling massive bleeding in

adherent placenta [6,7]. Bouvier et al. [7] reported uterine artery embolization immediately after Cesarean section was a feasible therapeutic option. In the hybrid operating room, both surgical procedures and interventional radiology are available; therefore, the management of patients with adherent placenta in such a facility appears highly promising. The utilization of the hybrid operating room is gaining popularity for cardiovascular and neurovascular procedures. However, few reports have described the use of the hybrid operating room in the field of obstetrics. Clark et al. [8] reported Cesarean delivery in the hybrid operating room; however, detailed procedures were described from a viewpoint of anesthesiology rather than obstetrics, since it was reported by a department of anesthesiology. Thus far, no reports have discussed the obstetrical management of placenta previa in the hybrid operating room.

In our institution, we had formulated a clinical management protocol for patients with placenta previa and previous Cesarean section using the hybrid operating room. Here, we describe such a case and introduce our management protocol.

### CASE PRESENTATION

A 36-year-old woman, gravida 3, para 3, underwent a medical examination at our hospital for pregnancy. Her obstetric history was significant, with three previous Cesarean sections. Transvaginal ultrasonography revealed placenta previa at 21 weeks of gestation. Magnetic resonance imaging performed at 28 weeks of gestation also diagnosed placenta previa (Figure 1). Cystoscopy found no placental invasion in the mucosa of

the bladder. However, transvaginal ultrasonography revealed enlarged vessels with a diameter of approximately 10mm, at the border between the uterus and bladder (Figure 2).

We had planned a clinical management protocol (Figure 3) for patients with placenta previa and previous Cesarean section involving the use of a hybrid operating room. There was enough time for planning and coordinating, and doctors from the departments of obstetrics, radiology, anesthesiology, neonatology, and urology along with nursing staff anticipated and discussed the treatment of the patient according to the management protocol.

Cesarean section was decided to be performed at 34 weeks

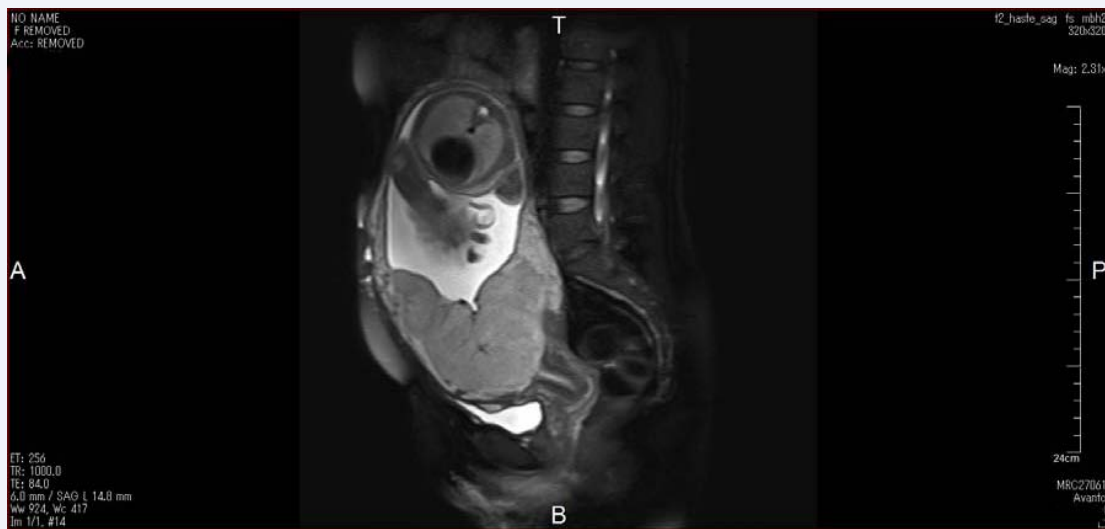


Figure 1 Magnetic resonance imaging demonstrates placenta previa.

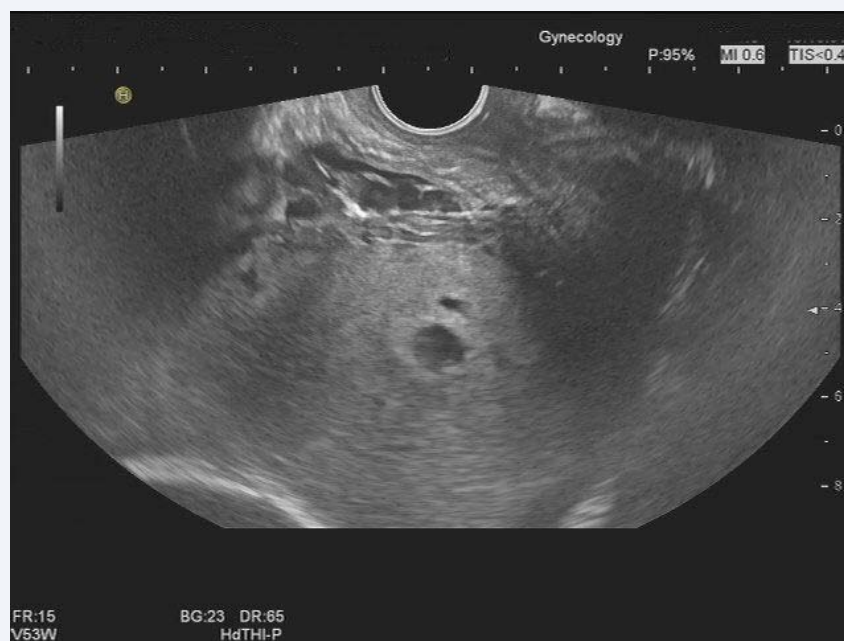
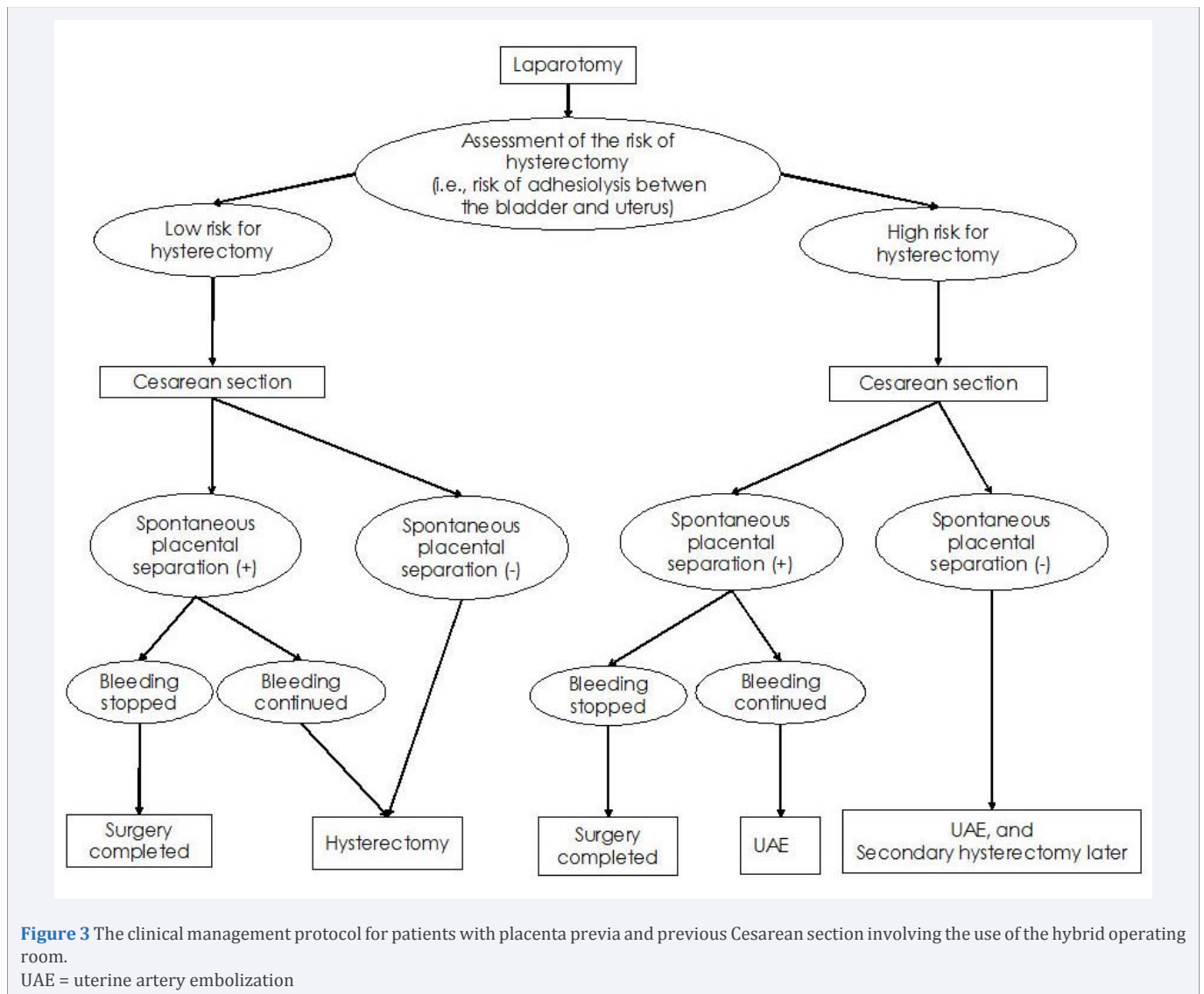


Figure 2 Transvaginal ultrasonography reveals enlarged vessels with a diameter of approximately 10mm, at the border between the uterus and bladder.



and 3 days of gestation because it might be difficult to use the hybrid operating room and to convey the required stuff in case of emergent situations such as continuous bleeding. Both Cesarean hysterectomy and conservative treatments combined with uterine artery embolization were available in the hybrid operating room, and which of the two would be done did not need to be decided at the beginning; rather, it could be determined after evaluation by laparotomy. First, abdomen was incised and the uterus was positioned outside of the abdomen. The vessels between the bladder and uterus were noted to be highly enlarged, and we determined that Cesarean hysterectomy would be risky; therefore, the conservative treatments were chosen in this case.

The uterine fundus was incised transversely to avoid the placenta, and a male neonate weighing 2429 g with an Apgar score of 3 (1 min) and 4 (5 min) was delivered. The low Apgar score was partly due to sleeping state caused by general anesthesia. The umbilical artery blood pH was 7.299.

The bleeding from the incised uterine wall was stopped by using forceps. No oxytocic drugs were used, because we thought that would induce separation of the placenta, and it might disturb

angiography and embolism. The placenta was not separated 15 min after the delivery, and we assessed that the placenta would not be separated from the uterus.

After the bilateral uterine cornu were ligated not only to decrease the blood flow into the uterus but to prevent embolization into the ovaries, bilateral transcatheter uterine artery embolization was performed using gelatin sponge particles without a moving of the woman. The vessels between the bladder and uterus remained enlarged even after embolization. We speculated that these vessels were not supplied by the uterine artery but by another artery or other arteries. Intraoperative ultrasonographic color flow mapping demonstrated that the arterial blood flow within the placenta markedly decreased; however, venous flow persisted. We could see directly that the bleeding in the uterine cavity had completely ceased, because uterine wall remained open. Uterine artery embolization during open surgery, which was available in the hybrid operating room, made all these observations possible.

After that, the uterine wall was closed and the first surgery was completed. The time of surgery was 2 h and 32 min, and

the total volume of bleeding and amniotic fluid was 1,614 mL. Postoperatively, the mother and baby recovered uneventfully.

The patient did not insist on preserving the uterus. Secondary hysterectomy was initially planned for the week following the Cesarean section at first; however, transvaginal ultrasonography revealed that diameter of the vessels between the bladder and uterus remained unchanged at around 10mm; therefore, the surgery was postponed. At 1.5 months after the Cesarean section, the size of the vessels had decreased to 3mm in diameter, and hysterectomy was subsequently performed. The serum human chorionic gonadotropin level immediately after the Cesarean section was 11,000 mIU/mL; this had decreased to 54 mIU/mL just before the secondary hysterectomy.

The hysterectomy was performed uneventfully, although the vessels between the bladder and uterus were a slightly enlarged. The time of surgery was 2 h and 28 min, and total volume of bleeding was 913 g. The histological examination confirmed placental accreta.

## DISCUSSION

Conventional management for adherent placenta consists of Cesarean hysterectomy and other conservative treatments such as uterine artery embolization. Bouvier et al. [7] reported planned Cesarean section in the interventional radiology cath lab, and concluded uterine artery embolization immediately after the surgery was a feasible therapeutic option. However, we thought that an interventional cath lab has not enough function for the management of adherent placenta especially when massive bleeding would occur.

Figure 3 shows our clinical management protocol for planned Cesarean delivery. After laparotomy, the risk of hysterectomy is carefully assessed depending on whether the bladder can be safely separated from the uterus. When separation of the bladder is estimated to be a low-risk procedure, the protocol on the left in Figure 3 is followed. Cesarean hysterectomy is performed when the placenta is not separated from the uterus or bleeding continues, unless the patient has strongly insisted on preserving fertility. Uterine artery embolization can be additionally performed to decrease bleeding during hysterectomy.

However, when separation of the bladder is estimated to be a high-risk procedure, the protocol on the right in Figure 3 is followed, and Cesarean hysterectomy is not performed. After the baby is born, uterine artery embolization is performed if the placenta is not separated from the uterus or bleeding continues. In principle, secondary hysterectomy is planned unless the patient strongly insists on preserving fertility, because the persisting placenta can sometimes cause severe maternal morbidities [1]. Secondary hysterectomy is planned after the vessels at the border between the bladder and uterus have decreased in size. The case reported here was treated according to this protocol.

If a patient strongly hopes to preserve fertility, conservation of the uterus can be selected as long as bleeding is controlled.

Instead of Cesarean hysterectomy or secondary hysterectomy, an expectant management is done until spontaneous regression of the placenta, or the placenta is removed from the uterus after blood flow within the placenta disappeared.

In this case, there were several advantages for using the hybrid operating room. Which of Cesarean hysterectomy or conservative treatments should be done could be determined after evaluation by laparotomy, and the difficulties of transporting the unstable patient from the operating room to a radiology suite could be avoided. Furthermore, we could directly observe that the bleeding completely ceased by uterine artery embolization, and could complete the surgery.

We believe that the use of a hybrid operating room for complex obstetric cases offer other advantages. In cases of Cesarean hysterectomy, uterine artery embolization can be combined to decrease bleeding during hysterectomy. In cases of massive bleeding, both surgical procedures and interventional radiology modalities are easily available under intensive care of an operating room.

In this case, the patient was treated successfully. Although this is a single case report, it indicated several obvious advantages of using a hybrid operating room, with no disadvantages for maternal safety. In conclusion, the treatment of patients with placenta previa and previous Cesarean section using a hybrid operating room is a very promising alternative to conventional management procedures.

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