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Original Article

The application of uterine wall local resection and reconstruction to preserve the uterus for the management of morbidly adherent placenta: Case series

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ABSTRACT

Objective: We aimed to evaluate our experience with the application of uterine wall local resection and reconstruction to preserve the uterus in patients with morbidly adherent placenta.
Materials and methods: In a retrospective study, data from patients with morbidly adherent placenta who delivered by cesarean section between January 1, 2013 and May 31, 2016 were analyzed. Prophylactic abdominal aorta balloon occlusion and tourniquet were used to prevent massive hemorrhage in all 62 cases, followed by uterine wall local resection and reconstruction to preserve the uterus. The quantity of estimated blood loss (EBL), operation time, and complications were analyzed.
Results: The placenta penetrated to the myometrium in 10 cases, involved the posterior bladder wall in 46 cases, and penetrated the posterior bladder wall in six cases. For all cases, the mean EBL in the surgery was 1377.3 ± 605.2 mL, the mean EBL in the initial postoperative 24 h was 140.6 ± 66.3 mL, the mean operation time was 72.3 ± 24.5 min, and the mean postoperative hospital stay was 5.8 ± 1.6 days. The six cases of placenta penetrating the bladder underwent bladder repair. Sixty-one cases had preserved uterus, and only one case had a hysterectomy due to amniotic fluid embolism (AFE).
Conclusion: Combined with prophylactic abdominal aorta balloon occlusion and tourniquet, uterine wall local resection and reconstruction is highly effective to reduce the intraoperative blood loss and hysterectomy in morbidly adherent placenta.

Introduction

Morbidly adherent placenta (MAP) is a rare, life-threatening obstetrical complication associated with severe peripartum hemorrhage, massive transfusion, peripartum hysterectomy, coagulopathy and disseminated intravascular coagulation, multi-organ failure, and death [1,2]. Effective methods to control intraoperative bleeding are important for these patients. Recently, more reports about using interventional radiology to control obstetric hemorrhage have emerged. Our previous study [3] found that prophylactic abdominal aorta balloon occlusion (PABO) could reduce intraoperative blood loss and hysterectomy in patients with MAP undergoing cesarean section. However, the application of uterine wall local resection and reconstruction to preserve the uterus, combined with prophylactic abdominal aorta balloon occlusion and tourniquet, has not been reported in MAP cases. In this case series, we present our experiences with these hysterectomy prevention procedures in the management of 62 women with MAP undergoing cesarean section. The efficacy, risks, benefits, and feasibility of this technique are discussed.

Materials and methods

Patients

A retrospective study was carried out at the First Affiliated Hospital of Zhengzhou University, a tertiary medical center. All 62 cases of women with MAP who received PABO, followed by binding the lower uterine segment with a tourniquet, uterine wall local

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resection, and reconstruction during elective cesarean section, between January 1, 2013 and May 31, 2016 were reviewed.

The inclusion criteria of the study were as follows: (1) Diagnosis of MAP was based on history of previous uterine surgery, pelvic Doppler ultrasound (see Fig. 1) and magnetic resonance imaging (MRI) (see Fig. 2) (detailed signs are shown in Table 1). Details of Patient characteristics are shown in Table 2. (2) Absence of preoperative massive hemorrhage. (3) Desire to preserve uterus. (4) Cases without severe complications, such as organ failure, elevated liver enzymes, and low platelet count (HELLP syndrome).

In fact, the combination of PABO and tourniquet have a very high rate of efficacy, and the blood supply is obstructed substantially. Based on that, the operator can finish the uterine preservation surgery calmly and unhurriedly. According to our records, hysterectomy has been required in only a very few situations [e.g., amniotic fluid (AFE) embolism, patient required].

Preoperative preparation for cesarean section

Written informed consent was obtained from all patients after communicating with patients and their families to keep them informed about the related risks. We confirmed the placental location, implantation depth, and invasion to adjacent organs by ultrasound and MRI examination before surgery. Preoperative discussion and risk assessment in a meeting with a multidisciplinary team were recommended. We treated anemia preoperatively by a transfusion of red blood cells, keeping hemoglobin to a minimum of 90 g/L. Cross-matched blood and blood products were prepared and kept available if necessary. The balloon occlusion of the abdominal aorta was performed in all patients by an interventional radiologist under local anesthesia before cesarean section. This procedure has been described in detail previously [3].

Cesarean section

The in-charge anesthesiologist administered general anesthesia. After laparotomy, the surgeon selected a segment above the upper border of the placenta based on ultrasound scan and direct visualization interoperation, and made a transverse “higher” uterine incision trying to not cut through the placenta, avoiding a midline uterine incision as much as possible (Fig. 3B). After exposing and rupturing the amniotic membrane rapidly, the surgeon and assistant pressed at the uterine margin to arrest bleeding while absorbing amniotic fluid (Fig. 3C). After blunt extension of the uterine incision, delivery of the fetus, and umbilical cord clamping, the pre-positioned occlusion balloon in the aortic balloon was inflated with 0.9% saline 15 mL to reduce blood flow. Next, the lower uterine segment around the circumference was bound with the tourniquet to obstruct the blood supply (Fig. 3D). Successful occlusion was assumed if a lower extremity pulse oximeter ceased to read. The interventional radiologist adjusted the balloon inflating according to the bleeding. The balloon was slowly deflated at 5–10 min after first occlusion if no obvious bleeding was found. However, the balloon was re-inflated and further hemostasis methods were attempted if bleeding continued. These procedures would be repeated until satisfactory hemostasis was achieved.

Local resection and reconstruction of uterine wall

After fetal delivery, two corners of the uterine incision, and the superior and inferior lips, were clamped immediately by four Mayo clamps. Blunt dissection downward to the bladder-uterus peritoneal reflection (Fig. 3E and F) was performed, to the partial anterior wall of the uterine myometrium where the placenta was deeply adherent (a myometrium defect, with only the serous layer of the uterus) was resected, together with the placenta (Fig. 3G). In cases of posterior wall bladder invasion, we will separate the bladder gently, and then the partial anterior wall of the uterus free from the bladder will be resected, together with the adherent placenta. In the case of a centrally located placenta (covering the uterine cervix), we do the same procedure, and proper hemostasis methods are used in the cervix area. We will ask the urologist to help if its invasion comes as far as the bladder mucosae layer. It is important to ensure that sufficient myometrium above the peritoneal reflection is available for an optimum closure (Fig. 3H). Then, as much remaining placenta as possible is removed piecemeal from the edge of the uterine incision. Clamps and multiple hemostatic sutures are applied rapidly, while a small amount of saline is gradually released within the balloon until no active bleeding remains. We remove the tourniquet and the remaining placenta in the cervical canals areas and apply multiple hemostatic sutures in those areas. Then, we suture the superior and inferior lips of the uterine incision to reconstruct a residual uterus (Fig. 3I). Finally, an anti-adhesive absorbable membrane is applied over the reconstruction.

All patients received double lower limb intermittent pneumatic compression, lower limb massage, and application of low-molecular-weight heparin for arterial thrombosis prevention. Patients were given an antibiotic for infection prevention.

Estimation of blood loss

In this study, the measurement of the estimated blood loss (EBL) in cesarean section surgery consisted of three parts: (1) the amount of blood drawn into the storage jar during surgery; (2) the weight of

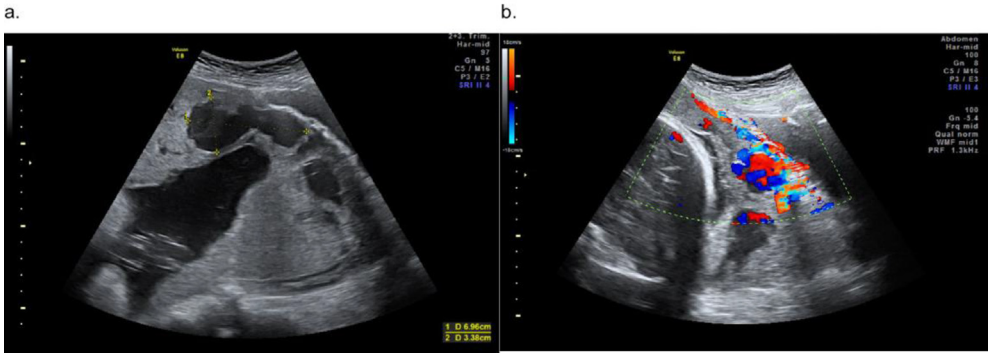

Fig. 1. The characteristic ultrasound images in morbidly adherent placenta. (A) The placenta adhering to the anterior and posterior uterine walls in ultrasound with color Doppler. (B) Hypervascularization surrounding the uterine anterior wall and placenta in color Doppler. In these situations, we perform further MRI scans to evaluate the area and depth of MAP.