Application of 3-D Angiography in the Management of Placenta Percreta Treated with Repeat Uterine Artery Embolization

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Abstract

Background: Rising Caesarean section rates have increased rates of abnormally invasive placentation. In the management of such invasive placentation, hysterectomy may result in greater morbidity than more conservative measures. Non-surgical interventions such as uterine artery embolization (UAE) attempt to decrease placental perfusion and augment placental resorption. Repeat UAE may decrease the risk of unpredictable hemorrhage requiring emergency intervention. Three-dimensional angiography is a novel technology for assessing volume with objective measures of internal flow.

Case: We report a case of placenta previa percreta that was treated conservatively by repeat UAE for persistent densely perfused placenta. Three-dimensional angiography was used to objectively assess placental characterization and vascularization.

Conclusion: Repeat UAE may be beneficial in reducing the risk of delayed hemorrhage in women with placenta previa accreta or percreta managed conservatively. Objective assessment of placental volume and vascularity by 3-D angiography can provide data on patients at risk and allow case selection for repeat UAE.

Résumé

Contexte : La hausse des taux de césarienne a entraîné la hausse des taux de placentation anormalement invasive. Dans le cadre de la prise en charge d'une telle placentation invasive, l'hystérectomie peut donner lieu à une morbidité plus importante que celle qu'occasionnent les mesures plus conservatrices. Les interventions non chirurgicales telles que l'embolisation de l'artère utérine (EAU) tentent de réduire l'irrigation sanguine placentaire et d'accroître la résorption placentaire. La tenue d'une nouvelle EAU pourrait entraîner la baisse du risque d'hémorragie imprévisible nécessitant une intervention d'urgence. L'angiographie tridimensionnelle constitue une technologie novatrice permettant d'évaluer le volume au moyen de mesures objectives de la circulation interne.

Cas : Nous signalons un cas de placenta prævia percreta qui a fait l'objet d'une prise en charge conservatrice au moyen de la tenue d'une nouvelle EAU visant un placenta densément irrigué persistant. L'angiographie tridimensionnelle a été utilisée afin d'évaluer de façon objective la caractérisation et la vascularisation placentaires.

Conclusion : La tenue d'une nouvelle EAU pourrait s'avérer bénéfique pour ce qui est de la réduction du risque d'hémorragie différée chez les femmes qui présentent un placenta prævia accreta ou percreta faisant l'objet d'une prise en charge conservatrice. L'évaluation objective du volume et de la vascularité placentaires par angiographie 3-D peut fournir des données sur les patientes exposées à des risques et permettre la sélection des cas se prêtant bien à la tenue d'une nouvelle EAU.

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INTRODUCTION

The incidence of placenta accreta is estimated at 1 per 1000 deliveries.[1] Owing to the increasing rate of Caesarean section, there has been a 10-fold rise in the incidence of placenta accreta since the 1970s.[1] Placenta accreta is associated with potentially life-threatening hemorrhage and an average blood loss at delivery of 3000 to 5000 mL.[2] This is often the result of attempted manual separation of the placenta from its poorly formed decidual bed, which opens up large calibre vessels and sinuses.[3] Early and accurate antenatal diagnosis is crucial to allow for management, treatment, and reduction of associated morbidity.

Conservative management of abnormally invasive placentation has been described since the middle of the last

century.[4,5] Numerous paradigms of management have been applied, with no best management identified. Interventions are dictated by hemodynamic stability, the desire to retain fertility, and efforts to reduce surgical morbidity.[6]

Since the introduction in 1993 of uterine artery embolization as a primary treatment of placenta accreta,[7] it has been shown to be effective for conservative management with favourable outcomes for future fertility.[8] Secondary treatment has included administration of methotrexate,[9] hypogastric balloon occlusion,[10] uterine evacuation,[11,12] and hysterectomy.[13] There may be opportunity for repeat UAE, with additional use of 3-D angiography to measure placental perfusion.

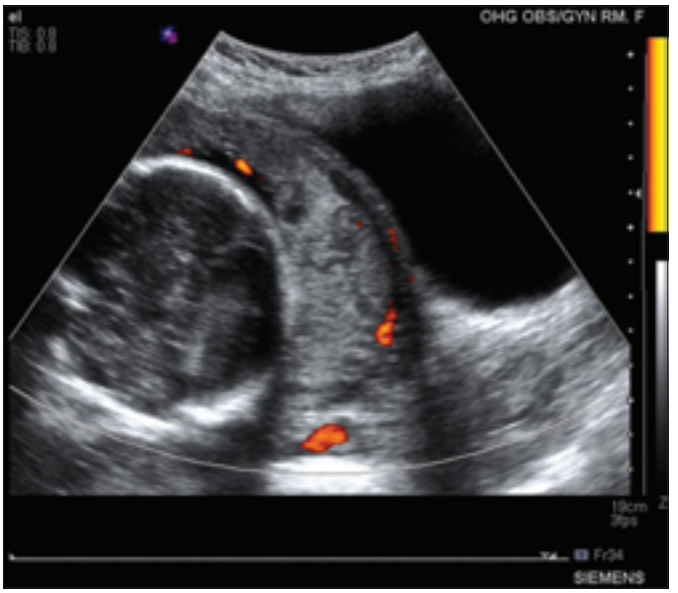
THE CASE

A 37-year-old woman, gravida 7, para 2, abortus 4, was transferred at 26+1 weeks' gestation to The Ottawa General Campus, a tertiary care unit, because of active vaginal bleeding. When the patient arrived, the bleeding had spontaneously settled and her condition was stable. The fetal heart rate was reassuring. The patient had a history of two spontaneous abortions, two therapeutic abortions, a term Caesarean section for failure to progress in labour, and a successful subsequent vaginal delivery seven years later.

Two-dimensional grey-scale and colour imaging at the time of admission revealed a central placenta previa with features of accreta, including loss of the hypolucent retroplacental space along the upper one third of the placenta (Figure 1) and rich vascularity at the bladder-uterine interface on transvaginal scan. An MRI was performed, with findings that concurred with the sonographic findings of central placenta previa in addition to three noted areas of myometrial inhomogeneity. The patient subsequently had serial obstetric sonograms, which continued to show persisting features of placenta accreta. Fetal status remained reassuring, and fetal growth was appropriate.

The patient experienced intermittent episodes of vaginal bleeding. Although she remained hemodynamically stable, she had repeated drops in hemoglobin concentration and required transfusion of a total of 12 units of blood during her hospital stay.

Figure 1. Colour Doppler sonogram at 26+1 weeks' gestation. Note the loss of the hypolucent retroplacental space in the upper third of the placenta under the bladder apex



At 29+5 weeks' gestation, the patient noted a greater amount of bleeding than with prior episodes. Standard resuscitation was carried out and red-cell transfusion began, but the patient developed an allergic reaction. Blood compatibility was retested by the transfusion medicine laboratory and was deemed appropriate. The patient's bleeding settled and tocodynometry remained reassuring. However, because of the recurrent vaginal bleeding and acceptable fetal maturity, the patient was scheduled to have an elective Caesarean section on the following day.

Balloon catheters were placed in the internal iliac arteries prior to the elective classical Caesarean section and tubal ligation. The patient was well-informed of the medical and surgical risks of the planned procedure, including bleeding, the need for further blood transfusions, and possible hysterectomy. Intraoperatively, the placenta was seen to bulge through the lower segment and around the left lateral aspect of the uterus, with possible involvement of the broad ligament. It was also invading the anterior aspect of the lower segment, resulting in difficult identification of the bladder flap. Therefore, a vertical uterine incision was made above this densely vascularized lower segment. The fetus was cephalic and was delivered without difficulty. The female neonate had a birth weight of 1703 g, and Apgar scores were 5, 6, and 5 at one, five, and 10 minutes respectively.

ABBREVIATIONS

FI	flow index
MGI	mean grey index
PI	pulsatility index
RI	resistance index
UAE	uterine artery embolization
VFI	vascularization flow index
VI	vascularization index