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Case(s) Report

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Perioperative management of placenta accreta spectrum after early pregnancy loss

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Abstract

Objective: We explore the continuum between the two diagnoses of c-section scar pregnancy (CSP) and early placenta accreta spectrum (PAS), the role of pelvic magnetic resonance imaging (MRI) as a diagnostic aide, interventions to reduce morbidity and mortality, and surgical considerations of a robotic-assisted total laparoscopic hysterectomy for definitive management of an early pregnancy loss impacted by CSP/PAS.

Case(s): A thirty-six-year-old pregnant female with seven prior cesarean sections presents with life-threatening vaginal bleeding after an early pregnancy loss at home. In the hospital, pelvic ultrasound demonstrates a retained placenta, and MRI further reveals findings concerning for a new diagnosis of CSP and early PAS. After medical stabilization and multidiscipliary treating planning, she underwent uterine artery embolization followed by robotic-assisted total laparoscopic hysterectomy. She was discharged on postoperative day one and recovered well. Final pathology confirmed placental invasion through the endo-myometrium with uterine serosa only overlying the attached placenta consistent with a diagnosis of an abnormal placentation disorder.

Conclusion: Here we describe a severe presentation of early PAS after an early pregnancy loss and the role of MRI and multidisciplinary collaboration in successful management. Discussion between minimally invasive gynecology, maternal-fetal medicine, and radiology specialists is critical in management of a c-section scar pregnancy and placenta accreta spectrum disorder. MRI has an emerging and important independent role in visualizing critical anatomy and surgical planning.

Keywords: C-section scar pregnancy, placenta accreta spectrum

Introduction

C-section scar pregnancy (CSP) is a pregnancy that implants either on or into a scar defect at the site of a prior c-section or uterine surgery and occurs in approximately 1 in 2000 pregnancies.[1] This rate has been increasing with rising numbers of c-sections and myomectomies being performed as well as improved diagnostic capabilities.[1] CSP can lead to life-threatening maternal and fetal outcomes from uterine rupture and peripartum hemorrhage.

There is likely an intimate relationship between CSP and Placenta Accreta Spectrum (PAS) in which CSP is a diagnosis of first and second trimesters and PAS manifests later in pregnancy.[2,3] Diagnosis is challenging, typically made by transvaginal ultrasound in early pregnancy, and confirmed with histopathology at the time of surgery. Notably, CSP and PAS have proven to be indistinguishable on pathology with common findings of myometrial invasion by placental villi and very little intervening decidua.[3] Suggestive ultrasound findings of CSP and early PAS include a gestational sac or placenta in the low anterior aspect of the uterus at less than seven weeks gestational age, less than 3 mm intervening myometrium, placental lacunae, increased vascularity, and a disrupted bladder interface.[4] Magnetic Resonance Imaging (MRI) can also be used as an adjunct to ultrasound, but its independent diagnostic value is

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uncertain and a research area of interest as stated by the Society for Maternal-Fetal Medicine (SMFM).[5]

All patients with a likely diagnosis CSP/PAS should be transferred to a tertiary care hospital. Several treatment options have been proposed including intra-gestational and systemic methotrexate, suction dilation and curettage (D&C), transcervical foley balloon placement, operative resection (hysteroscopic, laparoscopic, or open), gravid or cesarean hysterectomy, uterine artery embolization, and expectant management (in a few select cases). Treatment is determined by a combination of factors including type, extent, and location of the pathology, gestational age, desire for future fertility, and resource availability of the care center.[1] Although several surgical and medical interventions have been described, standardized treatment guidelines are lacking,[5] and many gynecologic surgeons are being consulted to assist in obstetric cases, particularly in the previable setting or after fetal demise.

This raises opportunities for multidisciplinary care among Maternal-Fetal Medicine (MFM), Minimally Invasive Gynecologic Surgeon (MIGS), and Radiology specialists. After conducting a literature review,[6-15] our case report is one of few to illustrate radiographic images of a severe first-trimester case of placenta accreta spectrum after early pregnancy loss. We also share our hospital's protocol for using MRI, which does not have a well-defined role in the diagnosis of CSP/PAS to date, and critical perioperative decisions that resulted in a good patient outcome.

Case(s)

The patient is a thirty-six-year-old gravida 9 para 8 with seven prior cesarean sections (all via Pfannenstiel incisions) who was transferred from an outside hospital for management of suspected CSP/PAS after a 13-week delivery of a demised fetus at home with placenta remaining in-situ. On outside presentation, she was hemodynamically stable but acutely anemic with a hemoglobin of 4.0 g/dL after experiencing profuse vaginal bleeding at home. She required transfusion of four units of packed red blood cells. There was no evidence of coagulopathy or trauma.

After stabilization and transport to our hospital, she continued to have normal vitals with resolving vaginal bleeding and a hemoglobin of 10.5 g/dL. Pelvic ultrasound and magnetic resonance imaging (MRI) demonstrated a 5 x 5 cm enhancing placental mass extending through the myometrium in the lower uterine segment at the level of the cesarean scar (Figures 1 and 2). There was no overt extension into the bladder (Figure 3). Review of her single previous obstetric ultrasound suggested possible early placental previa without invasion, which in the setting of seven prior cesarean sections predicts a 67% risk of PAS in pregnancy.[16] Though she was counseled by her outside provider that she was at very high risk of developing PAS, she strongly desired to pursue pregnancy. She had no history of PAS in previous pregnancies.

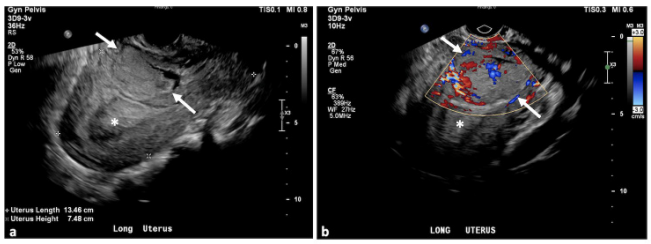

Fig. 1. Sagittal grayscale (a) transvaginal ultrasound images of the uterus demonstrate a homogeneously isoechoic mass (arrows) in the anterior aspect of the lower uterine segment, centered in the myometrium and abutting the endometrium (asterisk). Marked internal vascularity is present in the lesion and surrounding myometrium on color Doppler (b) images.

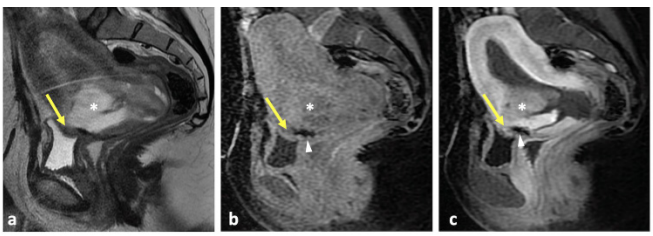

Fig. 2. Sagittal T2-weighted (a), T1 pre-contrast (b) and T1 post-contrast (c) images of the pelvis demonstrate a bulging T2 hyperintense mass (asterisk) centered in the anterior aspect of the lower uterine segment with thinning of the overlying myometrium. The mass enhances on post-contrast images and extends toward the outer myometrium. Contour deformity of the lower uterine segment abuts the posterior bladder dome (arrows) without signal abnormality in the bladder wall. Susceptibility artifact adjacent to the mass represents postsurgical changes from prior cesarean section (arrowhead).

Maternal-fetal medicine (MFM) and minimally invasive gynecologic surgery (MIGS) teams were promptly involved in the patient's counseling. Definitive management with a hysterectomy was recommended due to imaging findings of placental invasion into the c-section scar defect. Fertility-sparing treatment options were discussed as well, but given their significant risk profile of ongoing bleeding, the patient opted for hysterectomy. She was a good candidate for a minimally invasive approach. She had no complicating medical history, and her body mass index was 30 kg/m2. Uterus was palpated approximately 12-weeks in size, mobile, and narrow at the base. Her surgical consent process emphasized higher risks of hemorrhage, exploratory laparotomy, and damage to surrounding structures.

Fig. 3. Coronal T2-weighted image of the pelvis demonstrating soft tissue mass (asterisk) along the anteroinferior aspect of the lower uterine segment (U). Preservation of the perivesicular fat plane (arrowheads) with normal subjacent bladder detrusor signal suggests absence of urinary bladder invasion.

Uterine artery embolization (UAE) with gel foam was performed the day prior to surgery with the goal of reducing intraoperative blood loss (Figure 4). Urologic and gynecologic oncology teams were on-call in the event of operative need. We completed cystoscopy at the start of the case, which revealed a normal bladder survey and bilateral ureteral jets without evidence of placental invasion. A uterine manipulator was not placed to avoid iatrogenic placental bleeding or disruption of the thin interface between the bladder and serosa. She proceeded to have an uncomplicated robotic-assisted total laparoscopic hysterectomy and opportunistic bilateral salpingectomy. Extensive dissection was necessary to create a bladder flap, and bilateral uterine arteries were transected at their origin following a complete retroperitoneal dissection (Figure 5). Gross inspection of the uterus demonstrated placental invasion into the myometrium with intact serosa (Figure 6). Estimated blood loss was 50 cc. The patient was discharged on postoperative day one and recovered well. Final pathology confirmed placental invasion through the endo-myometrium with uterine serosa overlying attached placenta consistent with a diagnosis of PAS.

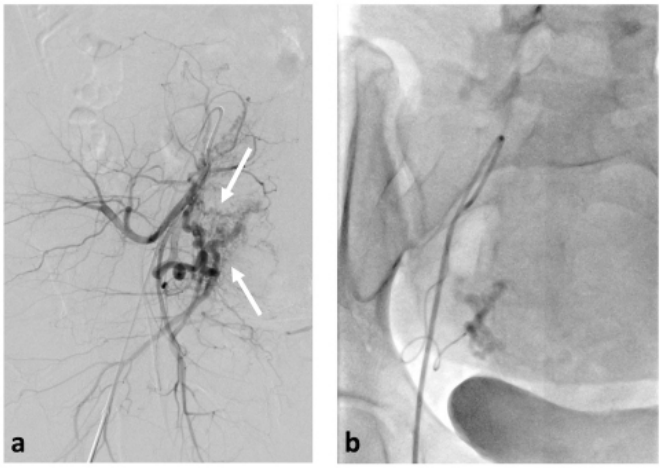

Fig. 4. Pre- and post-embolization images of the right uterine artery. Initial diagnostic angiography sequence (a) demonstrates increased vascularity (arrows) in the right hemipelvis in the region of the right uterine body and adnexa. Similar findings were seen on the contralateral side. Following gelfoam embolization (b), there is marked reduction in the opacification of these vessels.

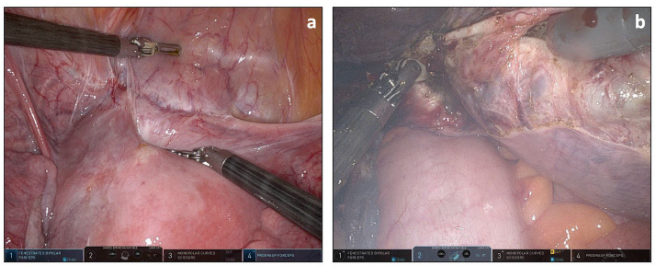

Fig. 5. Intraoperative view of uterus highlighting dense bladder adhesions and increased lower uterine segment vascularity (a) view of lateral lower uterine segment with significantly increased vascularity (b).

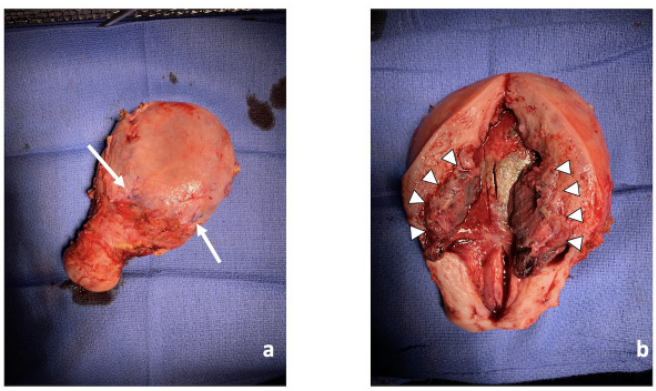

Fig. 6. Gross pathology specimen of uterus and cervix with increased lower uterine segment vascularity (arrows, a) and bivalved uterus with placenta in-situ with evidence of myometrial invasion (arrows, b).

Discussion

For hemodynamically stable patients with CSP/PAS in the first trimester, optimal management is unknown, and medical or surgical management can be considered. It is also difficult to extrapolate data from either conservative management of CSP and PAS in this clinical scenario with imaging findings of placental invasion so early in pregnancy. What is certain, though, is that associated morbidity and mortality increases with later gestational ages. In our case, we did not have to address possible termination, but we engaged in discussions of future fertility as she was initially uncertain.

We felt that fertility-sparing operative approaches, such as suction D&C or operative resection, posed significant risk of life-threatening hemorrhage given clear extension of the placenta through the myometrium and inability to completely resect the disease without removing a significant portion of the uterine wall. The lower uterine segment was so thin and scarred, offering little integrity for re-approximation of myometrium if a resection was performed. Additionally, conservative treatments where the placenta remains in-situ have been associated with enhanced vascularity of the myometrium, often requiring additional treatment with a hysterectomy, blood transfusion, and/or embolization.[17] Exclusive uterine artery gel foam embolization posed a possible conservative approach to curb bleeding and support future fertility. However, persistent risks include hemorrhage, infection, need for surgical intervention, and risk of recurrent CSP/PAS (up to 10-25%).[18] Furthermore, these patients require close postprocedural surveillance with serial hormone levels, imaging, and follow-up appointments.

Our patient lived three hours away and had significant childcare responsibilities, making frequent follow-up difficult. Lack of alternate childcare arrangements also created a barrier to care as our patient did not receive an interval ultrasound in the first trimester after her initial viability scan, and she did not call for emergency medical personnel until her bleeding symptoms were severe. In this case, the patient was appropriately counseled by MFM and MIGS providers regarding the increased risks of CSP/PAS, and she elected for definitive hysterectomy with preoperative uterine artery embolization.

We benefited from MRI to clarify the patient's diagnosis and aid in surgical planning. MRI is a useful independent study in the characterization of PAS and CSP, owing to its ability to provide high resolution and large field of view images of the abdomen and pelvis with exquisite tissue delineation. The advantages of MRI over ultrasound allowed us to visualize the degree of placental invasion that was not clear on transvaginal ultrasound, specifically at the bladder interface. Features of PAS on MRI include myometrial thinning with associated placental bulge, placental heterogeneity and bands, and in cases of placenta percreta, extension of placental tissue to or beyond the level of the uterine serosa; these features have been shown in multiple studies to correlate with findings of PAS at pathology.[2,3] Vascular recruitment and/or invasion, particularly when there is parametrial and thus uterine artery involvement, can also be identified on MRI, which may prompt further evaluation with preoperative angiography.

At our institution, our placental protocol includes multiplanar (axial, coronal, and sagittal) T2-weighted images of the abdomen and pelvis utilizing single shot fast spin-echo and fast imaging with steady state free precession sequences. T1-weighted images may be added to the protocol if there is suspicion for placental abruption or retroplacental hematoma. Intravenous gadolinium-based MRI contrast is not routinely administered to pregnant patients due to its ability to cross the maternal-fetal blood barrier, but may be used selectively if thought to significantly improve diagnostic ability and therefore maternal or fetal outcomes.[19]

In this case, we utilized pre- and post-contrast T1-weighted images with gadolinium to better characterize the extent of retained products, placental invasion, and any associated aberrant vasculature. Careful MRI review between surgery and radiology teams in a multidisciplinary conference informed our surgical preparation. We had lower suspicion for placental involvement of critical structures, but urologic and gynecologic oncology teams were readily available on the day of surgery. We ultimately did not require assistance of other specialists.

In our group, we perform postoperative cystoscopy after robotic hysterectomies for benign indications. We performed cystoscopy also at the start of the case to gain expedient information as to whether we should call our urology colleagues who were on stand-by for possible bladder resection. Given we were anticipating extensive adhesive disease and intraoperative blood loss based on her clinical history and presentation, we felt that preoperative UAE offered a controlled low-risk intervention to reduce future blood loss. Another intentional decision was to defer a uterine manipulator so as not to disrupt vasculature. During the surgery, blood loss was minimal and mainly resulted from dissection of the vesicouterine space.

Lack of a uterine manipulator made creation of bladder flap, ligation of uterine arteries, and colpotomy steps of a hysterectomy more challenging. Robotic ergonomics were particularly beneficial as compared to straight instruments in standard laparoscopy for dissection of the bladder flap. Furthermore, we employed a lateral to medial approach to address the dense adhesions and mobilize the bladder off the lower uterine segment. We began our dissection in the avascular paravesical space to identify our ureter and uterine artery bilaterally. We re-ligated and transected the uterine artery at its origin from the internal ilac artery. We then developed this untouched surgical plan anteriorly to create the bladder flap. This avoided dissection into dense adhesive disease and minimized bleeding and injury to the bladder and ureters. To help delineate the cervicovaginal junction for colpotomy, we placed a sponge on a stick in the vagina and dedicated one robotic arm to retract the uterus cephalad.

We believe that a minimally invasive surgery offered the best outcome for our patient. She had minimal postoperative pain, a short hospital recovery, and overall lower risks of infection, bleeding, hernia as compared to an open approach and other conservative strategies. Importantly, this served as definitive treatment, and she did not require extensive surveillance or treatment apart from a routine postoperative check.

Here we describe a severe presentation of early PAS after an early pregnancy loss and the role of MRI and multidisciplinary collaboration in successful management. While other similar case reports propose that MRI may be used if ultrasound is inconclusive, we found that MRI alone was sufficient and advantageous for both diagnosis and surgical planning. MRI allowed us to better evaluate myometrial depth of invasion, bladder or serosal involvement, and findings of PAS. Importantly, few case reports provide input from experts spanning MFM, MIGS, and radiology fields, which was a strength in our study.

Conclusion

We report a case of CSP/PAS after an early pregnancy loss complicated by life-threating anemia that was treated with medical stabilization, prophylactic uterine artery embolization, and definitive robotic hysterectomy. A multidisciplinary approach between MFM, MIGS, diagnostic and interventional radiology, and other surgical specialists should be utilized in such cases with thoughtful consideration of clinical stability, radiologic characterization, gestational age, and fertility goals. MRI has an emerging and important role in visualizing critical anatomy and considering the surgical approach. Obstetricians may find themselves consulting their gynecologic colleagues more as these cases are increasing due to rising numbers of c-sections and other uterine surgeries being performed and increasing awareness through diagnostic studies.

Conflicts of Interest: No conflicts declared.

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