



Evaluation of Cesarean scar pregnancy with Ultrasonography and Magnetic Resonance Imaging

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Abstract: A cesarean scar pregnancy (CSP) implies the implantation of the gestational sac at the previous caesarian scar site in the lower uterine region. Although rare in occurrence, its detection rates have increased due to the increased use of imaging in the first trimester. Diagnosing and intervening as early as possible is of the utmost importance to avoid life-threatening complications like uterine rupture, hemorrhage, bladder invasion, and even maternal death. Through this case report we have highlighted the ultrasonography and Magnetic Resonance Imaging (MRI) features of CSP to enable our readers to understand the imaging features for accurate and prompt diagnosis and also allow them to distinguish potential mimics of this condition such as cervical pregnancy, low placed gestational sac, aborting gestational sac and abnormal placental implantation.

Keywords- cesarean scar pregnancy (CSP), ultrasonography, Magnetic resonance imaging

INTRODUCTION

A cesarean scar pregnancy (CSP) is the rarest type of ectopic pregnancy with a gestational sac implanted within the myometrium at the previous caesarian scar site in the lower uterine region [1]. An increase in the rates of cesarean deliveries, advancement in imaging modalities (Ultrasonography and Magnetic Resonance Imaging), and an increase in the number of early trimester screenings, have led to an increase in the detection of cesarean scar ectopic pregnancies [1]. Diagnosing and intervening as early as possible is of the utmost importance to avoid life-threatening complications like uterine rupture, hemorrhage, bladder invasion, and even maternal death. [2]. Treatment options, whether medical, surgical, or both depend on the clinical scenario of each patient [3]. We present this case report to understand the imaging findings for early diagnosis and intervention and also to provide a differential diagnosis mimicking this life-threatening entity.

CASE REPORT

A 32-year-old female (G2P1) with no prior co-morbidities presented to the emergency department with six weeks of amenorrhea and two days of vaginal bleeding. No other associated complaints were elicited. The history of cesarean delivery 2 years back was revealed by the female. On examination, all vitals were stable. On per vaginum examination, the cervical Os was closed with blood in the vagina. Her urine pregnancy test was positive and serum beta-hCG measured 20,000 mIU/mL. Other laboratory investigations were within normal limits.

Ultrasonography revealed a normal sized uterus in an anteverted position. A well-defined gestational sac (GS) with a fetal pole and yolk sac was seen in the anterior myometrium of the lower uterine region at the expected site of the cesarean scar. An embryo with cardiac activity and crown-rump length (CRL) of 10 mm corresponding to 6 weeks and 1 day was seen. The gestational sac was surrounded by a decidual reaction with gross thinning of the anterior myometrium. Doppler evaluation shows increased vascularity around the sac. The endometrium appeared thickened, measuring 12 mm in thickness. No free fluid was seen in the pelvis. Both the ovaries were normal with no adnexal mass or pathology noted. Blood was seen in the vagina. These sonographic findings with a history of previous Caesarean sections were considered highly suspicious for cesarean scar ectopic pregnancy. Unfortunately, since USG was done in the emergency department, we were not able to obtain the relevant USG images for our patient.

Subsequently, at the request of the obstetrician, an MRI pelvis was performed on a 1.5-T MRI scanner. MRI confirmed scar implantation of the gestational sac and the anterior myometrium between the urinary bladder and gestational sac was completely thinned out. However, no invasion of the bladder wall was noted. The endometrial cavity and cervical canal were empty (Figure 1)

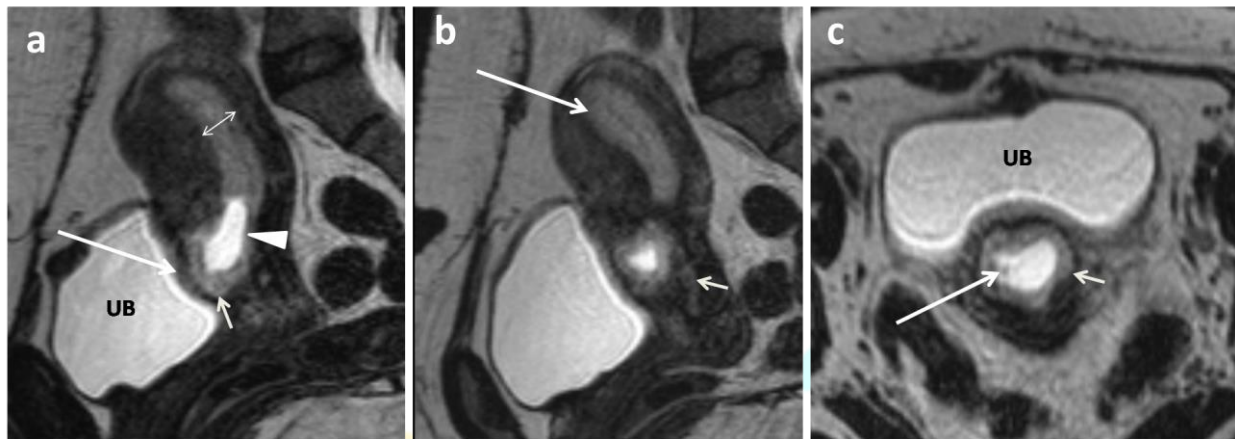


FIGURE 1: MRI of the cesarean scar pregnancy. Fig 1a (T2 weighted sagittal image) shows a normal anteverted uterus with an ovoid shape well defined gestational sac (ARROWHEAD) at the anterior myometrium of the lower uterine region at the expected scar site having similar fluid intensity as the fluid in the urinary bladder (UB). It is seen bulging into the uterine cavity. This gestational sac is surrounded by minimally T2 hyperintense decidual reaction (SHORT ARROW). The anterior myometrium between the gestational sac and urinary bladder appears grossly thinned out (LONG ARROW). Here there was suspicion of bladder wall invasion; however urinary bladder was normal during surgery. The thickened endometrium is marked by a double arrowhead. Fig 1b (T2 weighted sagittal image) shows empty endometrium (LONG ARROW) and an empty cervical canal (SHORT ARROW). Fig 1c (T2 weighted axial image) shows a gestational sac with surrounding decidual reaction (SHORT ARROW) with a tiny T2 hypointense fetal pole seen within the gestational sac (LONG ARROW). UB – urinary bladder.

A combined medical and surgical approach was used for our patient with systemic methotrexate (MTX) followed by laparotomy and excision of the gestational tissue. Intraoperative findings were scar implantation of the pregnancy with a very thin wall of anterior myometrium between the gestational sac and the bladder. No invasion of the bladder was seen. Ultrasonography (USG) performed 1 month later, showed no residual tissue at the scar site, and the patient was asymptomatic with normal beta HCG levels.

DISCUSSION

An increase in the rates of cesarean deliveries, advancement in imaging modalities (USG and MRI), and an increase in the number of early trimester screening, has led to increase detection of cesarean scar ectopic pregnancies [1]. Postulated pathophysiology is poor vascularity of the lower uterine segment causing impaired healing of the cesarean scar, making it vulnerable to trophoblastic implantation [4,5]. Scar implantation has also been reported with other surgeries/procedures like dilatation and curettage (D&C), metroplasty, hysteroscopy, and myomectomy [5].

Trans-abdominal and/or transvaginal ultrasonography is the imaging modality of choice for the primary evaluation of patients with vaginal bleeding. The described sonographic features of CSP include 1. Empty uterus with no gestational sac seen within the endometrium. 2. Empty cervical canal 3. Gestational sac in the anterior myometrium of the lower uterine region at the expected site of cesarean scar 4. The thin myometrial layer between the bladder wall and GS (< 5 mm) and 5. Increased perigestational vascularity [1,2].

In the retrospective study done by Lin et al. [6], they used ultrasound to grade CSP into four grades. Grade I CSP indicated the gestational sac invading less than one-half thickness of the lower anterior myometrium; grade II CSP involved more than one-half thickness of the overlying myometrium. Grade III CSP suggests gestational sac GS bulged beyond the Caesarean scar, and grade IV CSP implies vascular mass at the scar site replacing the gestational sac. They suggested the majority of higher-grade CSPs require hysterotomy or hysterectomy.

Vial et al. [7] proposed two types of CSPs depending on the direction of growth of the GS - 1. Implantation at the prior scar site with inward growth toward the uterine cavity 2. Implantation at the scar defect with growth toward the serosa, urinary bladder, and abdominal cavity. The former may lead to a viable pregnancy with a significant risk of hemorrhage, while the latter type is at greater risk of rupture.

DIFFERENTIAL DIAGNOSIS

CSP has to be differentiated from the low-placed gestational sac, cervical pregnancy, incomplete abortion, and abnormal placental implantation [8,9]. The low-placed gestational sac is seen within the lower endometrium with normal thickness of the adjacent myometrium, whereas CSP is located within the myometrium at the scar site with thinning of the myometrium, and has an empty endometrial canal, making the differentiation obvious. The cervical pregnancy will show a gestational sac ballooning the cervical canal (hourglass appearance of the uterus) with thick surrounding myometrium [9]. Incomplete abortion usually has open internal Os, abnormal shape of the gestational sac, absent cardiac activity, lack of surrounding decidual reaction, and absence of perigestational vascularity [10]. The diagnosis of placenta accreta is difficult in the first trimester. However, in the case of accreta, the gestational sac is predominantly seen within the uterine cavity, adherent to the myometrium. In CSP, the gestational sac is seen within the myometrium at the scar site. Otherwise, the distinction becomes very difficult in the first trimester [1,5,11].

The MRI pelvis, although not always necessary, can be used as an adjunct to sonographic evaluation, in cases where USG findings are equivocal, or when the obstetrician requires additional information in preparation for surgery, particularly to distinguish between CSP and abnormal placental invasion, mainly in the second trimester and to look for invasion of the posterior urinary bladder wall. MRI has excellent soft tissue characterization with 3D imaging allowing multiplanar cross-sectional evaluation of the uterus, gestational sac, scar, urinary bladder, endometrium, and cervix [12]. In our patient, MRI played a role in the diagnosis as well as helped in surgical planning.

TREATMENT

Management of CSP can be either medical or surgical. Termination using medical methods is usually seen as the preferred treatment in the first trimester to preserve fertility and reduce the risk of complications. Such options include systemic or local administration of methotrexate, injecting potassium chloride into the GS, or both. Surgical options include hysteroscopic evacuation, D&C surgical sac aspiration, laparoscopic and transvaginal resection, and open hysterotomy with resection or hysterectomy based on the patient's clinical scenario and degree of implantation into the myometrium. Currently, uterine artery embolization is used to reduce bleeding followed by medical treatment and/or surgery. As such, treatment options differ from patient to patient based on the clinical scenarios [1,3,9,13].

CONCLUSION

Potentially life-threatening cesarean scar pregnancy, although rare in occurrence, is being increasingly detected due to a rise in the number of Caesarean deliveries and more females visiting for first-trimester ultrasonography, particularly in developing countries. Early diagnosis of CSP is crucial to prevent maternal complications, mortality, and an attempt to preserve fertility. The ideal treatment option in the first trimester is the termination of the pregnancy. Through this case report we have highlighted the ultrasonography and MRI features of CSP to enable our readers to understand the imaging features for accurate and prompt diagnosis and also allow them to distinguish potential mimics of this condition, such as cervical pregnancy, low-placed gestational sac, aborting gestational sac and abnormal placental implantation.

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