Catching an ectopic caesarean scar pregnancy – Radiological perspective

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SUMMARY

Caesarean scar implantation is one of the rarest form of ectopic pregnancies and most unwanted complication of caesarean scar. However, with the increasing numbers of caesarean section performed, caesarean scar pregnancy (CSP) may be on the rise. The diagnosis is often difficult, but establishing an accurate diagnosis of CSP in the early first trimester is utmost important to prevent its detrimental consequences of uterine rupture and fatal haemorrhage. Hence, we present a case to highlight the role of imaging in diagnosing and managing this condition to prevent its associated high morbidity and mortality.

INTRODUCTION

Caesarean scar pregnancy (CSP) is a rare complication of a pregnancy after caesarean delivery, in which the gestational sac is implanted in the hysterotomy scar.[1] It is reported in only 0.15% of pregnant women with history of caesarean delivery.[1] However, its frequency is increasing as more caesarean sections are performed. Due to early myometrial invasion in first trimester, this condition carries a high risk of life-threatening uterine rupture and fertility-compromising surgical intervention such as hysterectomy. Early diagnosis is critical to prevent these complications and it can be achieved with ultrasound (USG) and magnetic resonance imaging (MRI), although a study had showed 13.6% of misdiagnosis in 751 cases of CSP identified.[2] Moreover, up to 40% of patients may be asymptomatic, hence a high index of suspicion from clinical and confirmation on imaging investigations is required. Given the potential serious complications and diagnostic challenges of a CSP, we describe the salient features on imaging in a case of CSP and its management.

CASE REPORT

A 30 year-old woman, gravida 3, para 2 at six weeks and four days gestation, presented with persistent vaginal spotting for one month duration. The symptoms had worsened one day prior to admission with intermittent abdominal pain. She had no constitutional symptoms, history of fibroids or endometriosis. She had a past surgical history of two previous caesarean sections for fetal distress. On examination, her vital signs were stable. No abdominal tenderness.

Cervical os appeared closed with minimal blood clots in the vagina but no active bleed or products of conception. Transabdominal USG (TAS) revealed a viable embryo with crown-rump length of 8.5mm, corresponding to 6 weeks and 6 days fetus. It appeared to be outside the endometrial cavity but at the lower part of the myometrium anteriorly, which was just above the bladder (Figure 1). Transvaginal USG (TVS) showed an empty endometrial cavity with a viable embryo possibly implanted within the anterior myometrium at the lower part of the uterus. Both scans showed increased peritrophoblastic flow around the gestational sac at the anterior lower uterine segment myometrial area on Doppler study. These USG findings combined with the history of two previous caesarean delivery, had strongly raised the suspicion of a CSP with possible bladder and isthmic-cervical involvement. Further evaluation with MRI confirmed a gestational sac implanted in the anterior myometrium of the lower uterine segment, at the previous caesarean scar site (Figure 2a-d). There is mass effect with irregular myometrial thinning anterior to the gestational sac, ranging from 2.0 to 5.0mm in thickness. The serosa lining of the lower uterine segment is intact. However, there is no fat plane between the uterus and adjacent bladder dome. The endometrial cavity and endocervical canal are empty.

Termination of pregnancy was then performed with transvaginal methotrexate injection into gestational sac under ultrasound guidance. She was also covered with prophylactic antibiotics IV ceftriaxone 1g b.d. and IV metronidazole 500mg t.d.s. for four days and subsequently IV amoxicillin-clavulanate 1.2g t.d.s. and dequalinium chloride pessary 1 o.d. for another six days. Her serial titres of serum beta-human chorionic gonadotropin (beta-HCG) were going down-trend from 84743.2mIU/mL on day 1 to 31181.6mIU/mL on day 7 of procedure and subsequently fell to undetectable. Follow up USG showed involuted gestational sac.

DISCUSSION

CSP, a previously rare entity, currently has increasing occurrence with the rise in caesarean deliveries. Though its pathophysiology is unclear, it has been postulated that anterior lower uterine segment has poor vascularity that impairs post-caesarean healing in some women and is vulnerable to the formation of small dehiscent tracts and defects in which a trophoblast can implant.[3]

Clinical presentation of CSP often includes vaginal bleeding, abdominal pain or may have no symptoms. CSP was

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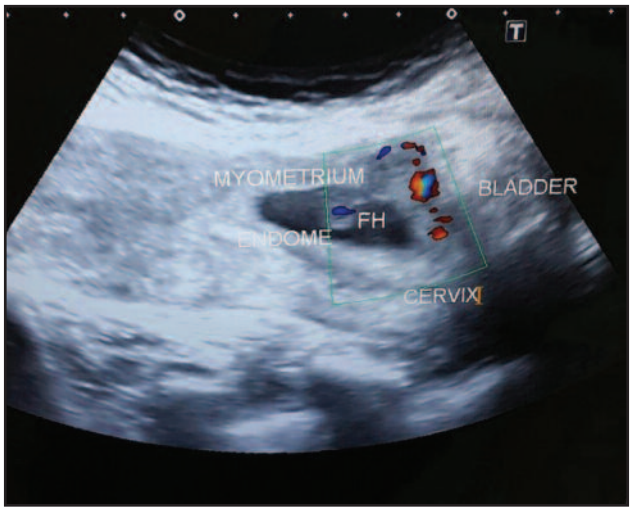

Fig. 1: Sagittal image of transabdominal ultrasound showed a single gestational sac with fetal cardiac Doppler signal and surrounding increased peritrophoblastic flow, implanted within the anterior myometrium of the lower uterine segment.

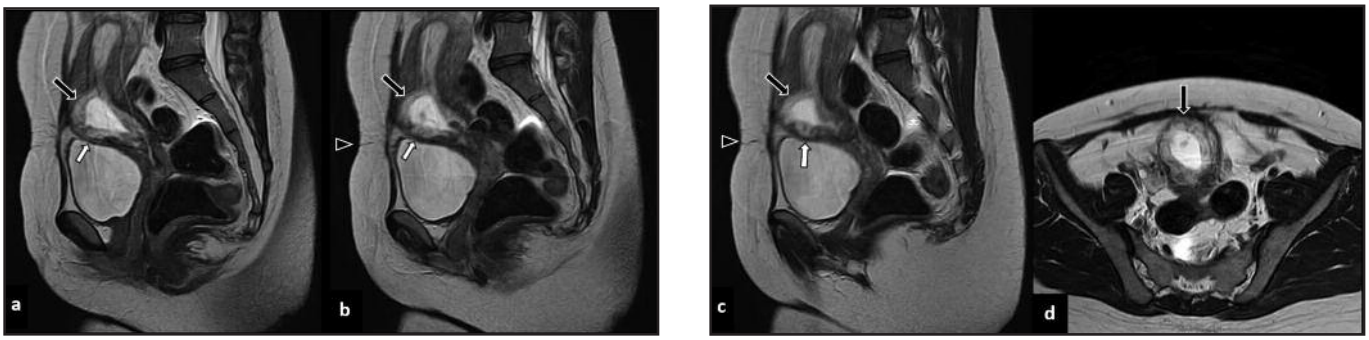

Fig. 2a-d: Sagittal (a-c) and Axial (d) T2-weighted MR images showed gestational sac (black arrow, a-d) within anterior lower uterine segment, with adjacent myometrial thinning (white arrow, a-c). The pregnancy is centered at the level of previous caesarean section scar (arrowhead, b,c).

suspected in our patient due to the previous history of two caesarean sections, one of which was complicated by extended tear. The resulting larger scar surface area may increase the risk of scar implantation. In our patient, apart from CSP, other differential diagnoses to consider include cervical pregnancy, early placenta accreta and incomplete miscarriage.

TAS, which is readily accessible in most primary clinical setting, is the first line investigation, followed by TVS. While TVS has a higher sensitivity, TAS gives a more panoramic field of view hence demonstrating the nature of the pathology clearer. Maymon et al.[4] recommend a combined approach of both TAS and TVS to reduce the risk of a false diagnosis. Patient preparation for TAS includes a full bladder to allow better window for visualization of the pelvic organs to assess the uterus, location and size of gestational sac, fetal pole, myometrial thickness and its relation to the urinary bladder wall. TVS is then performed for detailed information on the relationship of the gestational sac with the caesarean scar and endometrial cavity. The following USG features with the presence of a positive pregnancy test are diagnostic of a CSP.[3,5]

1. Uterine cavity and endocervical canal are empty.
2. Gestational sac or placenta is embedded in the caesarean / hysterotomy scar at anterior part of lower uterine segment.
3. Myometrium layer between the bladder wall and gestational sac is thin (<5mm) or absent.
4. Presence of embryonic/ fetal pole and/or yolk sac with or without heart activity.
5. Increased peritrophoblastic flow or vascularity at the area of caesarean / hysterotomy scar.

Presence of adnexal mass or free fluid in the pouch of Douglas should raise the suspicion of ruptured CSP.

How can CSP be differentiated from the other differential list? In cervical pregnancy, ultrasound will show a thick myometrium intervening between the maternal bladder and the gestational sac, together with the ballooned cervical canal, giving rise to an 'hourglass' appearance. In incomplete miscarriage, the internal os is usually opened and there is no trophoblastic flow; whereas in CSP, the internal os is always closed. Early placenta accreta on the other hand shares similar diagnosis and management with CSP. It may

also be possible as an extension of CSP later during the pregnancy.

In this case, MRI is needed to confirm the diagnosis, especially in inconclusive or equivocal cases before intervention or therapy. It is a better modality as it depicts excellent soft tissue resolution. Images from T1- and T2-weighted MRI sequences in axial, sagittal and coronal planes of the pelvis are used to confirm the presence of gestational sac in the lower uterine segment scar. Other diagnostic features include empty uterine and cervical cavities with myometrial thinning adjacent to the gestational sac. MRI is better in assesing any adjacent organs involvement such as myometrial invasion and bladder involvement, in which disrupted bladder wall integrity would be present in the later. If surgery is needed, MRI provides better pelvic anatomy evaluation and improve intraoperative orientation. Limitations of MRI is the longer acquisition time which requires patient to be clinically stable.

All the USG diagnostic features were present in our patient's sonography examination. However, the USG images revealed close proximity of the gestational sac to the urinary bladder. Her CSP diagnosis was further confirmed with MRI, which provides better visualization of the gestational sac location within the anterior myometrium of the lower uterine segment caesarean scar and demonstrates marked myometrial thinning of 2.0 to 5.0mm thickness at this region. There is no fat plane between the uterus and bladder wall but no direct bladder invasion demonstrated in our patient. This additional information from MRI is essential for the decision to proceed with conservative medical management safely in an attempt to preserve future fertility and may also help with surgical planning if necessary.

CSP can be managed conservatively by medical treatments or surgically but there is no standardized approach for its treatment. Early termination by conservative methods in the first trimester is preferred to lower risk of complications and preserve fertility. Medical treatment options include systemic or local administration of methotrexate (MTX), local injection of embryocides like potassium chloride, hyperosmolar glucose or crystalline trichosanthin into the gestational sac, or a combination of both.[3] Surgical options include combined medical treatment with surgical sac aspiration, dilatation and curettage (D&C), laparoscopic or hysteroscopic removal, open hysterotomy or hysterectomy. Another minimally invasive option is combined medical treatment with uterine artery embolization.

Treatment of CSP carried a significant complication rate of 44.1%, with systemic MTX, D&C, and uterine artery embolization having the highest number of complications while local intragestational injection of MTX or potassium chloride and hysteroscopy had the lowest complication rate.[2] Complications include heavy bleeding or the need for a secondary treatment.

Our patient was treated with transvaginal USG-guided intragestational sac MTX injection in view of her desire for future fertility, early stage of gestation and had no heavy bleeding clinically. This treatment carried a low complication rate in previous literature[2] and can be performed in an outpatient office setting without anaesthesia, in contrast to most surgical treatments. Close follow up on the resolution of the CSP following treatment is warranted. It may take up to weeks or months with the finding of non-detectable serum beta-HCG as evidence that no trophoblast is viable. Besides serial serum beta-HCG level, other parameters that can be used to monitor viability of the pregnency include gestational sac volume and the degree of vascularization. It should be noted that an interesting observation of an initial increase of serum beta-HCG, sac volume and its vascularity before their slow resolution was reported by others.[1] However, it was not observed in our patient. Resolution of CSP was achieved by 13 weeks with no resulting complications.

CONCLUSION

CSP is challenging from diagnostic and therapeutic point of view. Due to its increasing frequency, high index of clinical suspicion is needed in high risk group of patients with history of previous caesarean section. These patients need prompt and accurate diagnosis instituted so that early intervention, regardless of which treatment option selected, can be performed to minimize complications, maternal morbidity and mortality. USG is the imaging modality of choice for diagnosis; with MRI as an adjunct to USG in giving more precise information on the relationship of a CSP to adjacent structures with the advantage of high soft tissue resolution, thereby aiding in decisions on management. Treatment must be tailored to each individual case with careful consideration on patient's clinical presentation, desire for future fertility, gestational age and clinician's experience. Early diagnosis and minimally invasive image-guided intervention improve outcomes, have less complication rate and preserve future fertility.

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