

First trimester diagnosis of placenta accreta spectrum resulting in spontaneous uterine rupture: A case report

Subhashini Ladella, Stephanie Ng

ABSTRACT

Introduction: Placenta accreta spectrum (PAS) is a severe form of abnormal placentation associated with significant maternal morbidity and mortality due to life-threatening hemorrhage. First trimester detection of abnormal placental implantation, especially placenta percreta, is a rare phenomenon and can be a diagnostic challenge by prenatal ultrasonography. The incidence of PAS has increased in the past four decades due to higher rates of cesarean deliveries, uterine surgeries, endometrial curettages, and other maternal co-morbidities. We report a case of PAS detected in first trimester and explored the sensitivity of first trimester ultrasound diagnosis of PAS.

Case Report: We describe a case of a 33-year-old woman who presented with first trimester vaginal bleeding and was diagnosed with placenta accreta spectrum by ultrasonography in the first trimester. She was followed closely with serial ultrasound scans and diagnosed with intrauterine fetal demise at 15 weeks gestation. Intraoperative findings confirmed spontaneous uterine rupture with placenta invading into the bladder wall. She underwent a total abdominal hysterectomy and bilateral salpingectomy. The histopathological findings were consistent with placenta percreta.

Conclusion: Review of literature, addressing early diagnosis of abnormal placental implantation and adhesion, confirmed that the sensitivity and specificity of first trimester ultrasound diagnosis of PAS was lower than second trimester diagnosis. Our case report highlights the importance of further development of ultrasound

training, education, and awareness of early detection of PAS to effectively manage and reduce adverse pregnancy outcomes.

Keywords: First trimester diagnosis, Placenta accreta spectrum, Uterine rupture

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INTRODUCTION

The reported incidence of placenta accreta spectrum has increased from approximately 0.8 per 1000 deliveries in the 1980s to 3 per 1000 deliveries in the past decade [1].

Placenta accreta spectrum (PAS) also previously known as morbidly adherent placenta is a clinical condition in which a part of the placenta or the entire placenta invades the uterine wall and is inseparable from it [2]. With PAS, there is an abnormally strong adherence of the placenta to the myometrium due to a partial or complete loss of the decidua basalis and an abnormal development of the Nitabuch layer [3, 4]. Instead of implanting into the decidual cells, the placental villi implant directly into the uterine muscle fibers [3]. This prevents the placenta from separating normally after delivery. There are several classifications of placenta accreta spectrum disorder. In placenta accreta, the chorionic villi attach to the myometrium [4]. Placenta increta is defined by invasion of chorionic villi into the myometrium while placenta

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percreta is described as penetration of chorionic villi through the full thickness of the myometrium, serosa, and may invade nearby organs such as the bladder or rectum [2].

Placenta percreta is the most severe category of PAS and is rarely diagnosed by prenatal ultrasonography in first trimester of pregnancy. All forms of abnormal placentation are serious conditions that can lead to significant maternal morbidity and mortality due to life threatening risk of massive hemorrhage, serious bladder, and intestinal injuries [3]. The average blood loss for a delivery complicated by placenta accreta is 3000–5000 mL with up to 90% of patients requiring a blood transfusion and 40% needing more than 10 units of packed red blood cells (pRBCs) during the delivery [2]. Risk factors include history of cesarean section and an accompanying placenta previa [4]. With the increasing number of cesarean deliveries, the incidence of placenta accreta increased from 1 in 2510 pregnancies in the 1980s to 1 in 533 pregnancies from 1982 to 2002 [2].

Placenta accreta is usually diagnosed by ultrasound. Ultrasound features that express concern for placenta accreta include an irregularly shaped lacuna in the placenta, loss of retroplacental clear space, thinning of myometrium overlying the placenta, placental protrusion into the bladder, turbulent blood flow in the lacunae on Doppler ultrasound, and increased vascularity at the serosa-bladder interface [2]. Magnetic resonance imaging (MRI) can be used as an adjunctive modality when the ultrasound findings are ambiguous.

Diagnosing of placenta accreta spectrum is difficult and rare in the first trimester. Here, we discuss a case in which first trimester ultrasound findings were highly suggestive of PAS that was confirmed to be a placenta percreta intraoperatively and by histopathology.

CASE REPORT

This was a case of a 33-year-old multiparous woman, who was referred to the perinatal high risk clinic from her primary obstetrician for an ultrasound examination due to intermittent episodes of vaginal spotting and spotting in early first trimester. The patient was a gravida 6 term 2 abortus 4 live 2 (G6P2042), with past obstetrical history significant for two previous low transverse cesarean deliveries.

Ultrasonography initially performed at 7 weeks gestation showed viable intrauterine pregnancy with a perigestational subchorionic hemorrhage in the uterine fundal region measuring $3.8 \times 1.1 \times 2.8$ cm and a low implantation site of the gestational sac. The placental implantation was observed as wrapping antero-inferiorly (Figures 1 and 2). The patient was followed closely with serial ultrasound examinations due to ongoing symptoms of intermittent vaginal bleeding. A follow-up ultrasound visit at 9 weeks gestation, once again noted the subchorionic hematoma (SCH) which was slightly larger in size measuring $3.55 \times$

2.79×5.05 cm. In addition, a low implantation site of the gestational sac was again observed (Figure 3). Subsequent visit at 12–13 weeks gestation for first trimester nuchal translucency (NT) screening ultrasound (US) examination confirmed a normal NT measurement and the previously noted SCH that was significantly larger in comparison to the 9 week US findings. The placenta was anterior in the lower uterine segment and diagnosed as a complete previa. The placental attachment to the uterine wall appeared to have increased vascularity with an ill-defined retroplacental space and a hypervascular interface. Multiple dilated lacunar spaces were present in the placental interface with the myometrial wall. Based on these abnormal US findings at 12–13 weeks, placenta accreta spectrum was suspected and diagnosed by first trimester ultrasonography (Figure 4). Patient was extensively counseled regarding the high risk of adverse pregnancy outcomes based on the abnormal ultrasound findings with a high clinical index of suspicion for a placenta accreta spectrum.

Patient presented at 15 weeks gestation with increased vaginal bleeding. Ultrasound examination diagnosed an intrauterine fetal demise by US. The ultrasonographic findings at 15 weeks gestation once again confirmed an anterior complete placenta previa with significant vascularity, multiple lacunae at the placental interface with the inner myometrial wall and bladder wall lining adjacent to the lower anterior uterine muscle layer. Multiple vessels were seen traversing from the placenta to the outer myometrial wall to the bladder wall. The ultrasound findings at 15 weeks gestation once again confirmed the previously suspected placenta accreta at 12–13 weeks gestation with a high index of suspicion of placenta percreta (Figure 5).

The patient was admitted to the hospital for a planned surgical management with a multi-disciplinary team approach that involved the obstetrician, anesthesiologist, gynecologic oncologist, interventional radiologist, and the massive transfusion protocol team. The patient was extensively counseled on the potential risks of significant hemorrhage and consented for hysterotomy with possible hysterectomy due to the high risk of intraoperative bleeding from the suspected percreta. Intraoperative findings confirmed a 15 week sized uterus with rupture of the lower uterine segment with the placenta protruding out of the site of rupture. Large-sized blood clots were seen at the site of uterine rupture with a 14–15 week demised fetus, a complete placenta previa, placenta accreta, suspected percreta as the placenta seemed to extend anteriorly to the bladder.

The patient underwent a total abdominal hysterectomy and bilateral salpingectomy. Estimated blood loss was 4500 mL. The patient received 7 units of packed red blood cell units (pRBCs), 1 unit of platelets, 5 units of fresh frozen plasma, and 600 mL from cell saver. Surgical histopathology showed that the “placental plate appears to extend through the entire thickness of the anterior uterine wall to the outside of the myometrium,” suggesting a placenta percreta presentation. The patient did well during

her postoperative course. She met all of her postoperative milestones and was discharged home in stable condition on postoperative day two.

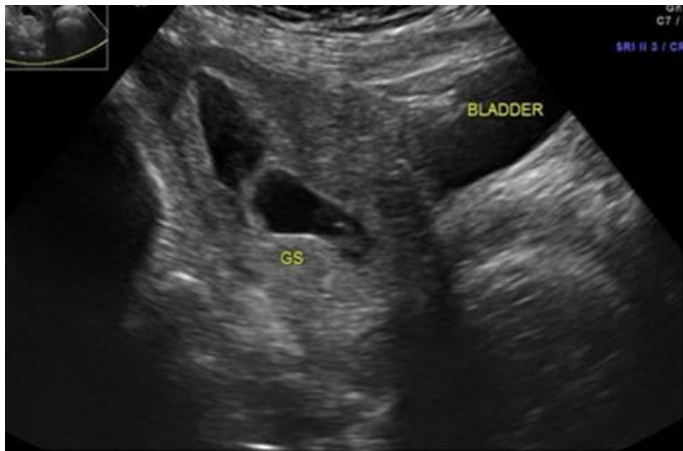


Figure 1: Transvaginal ultrasound at 7 weeks gestation showing low implantation of the gestational sac.

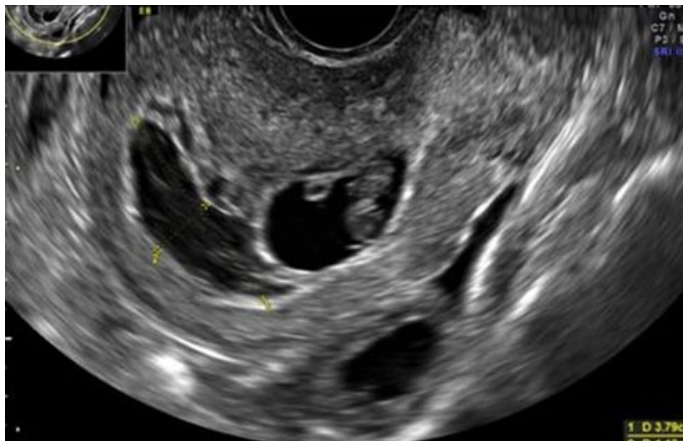


Figure 2: Transvaginal ultrasound at 7 weeks gestation with viable intrauterine pregnancy and subchorionic hematoma in the uterine fundal region.

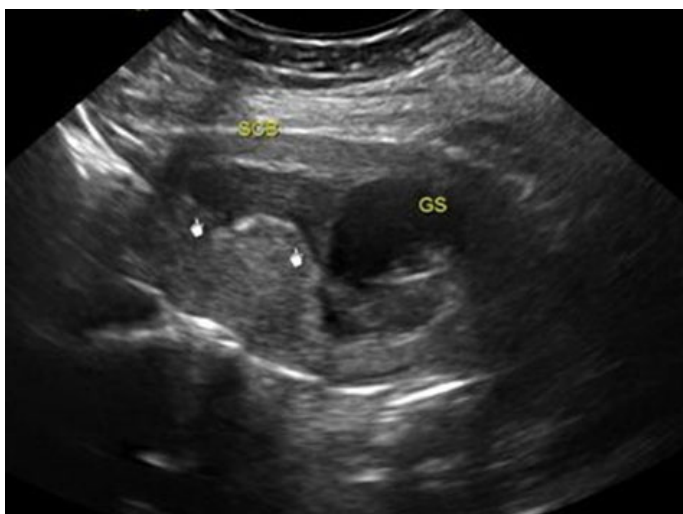


Figure 3: Transabdominal ultrasound at 9 weeks gestation: A low implantation of the gestational sac with subchorionic hematoma superiorly.

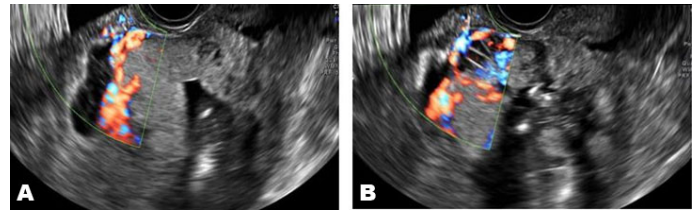


Figure 4: Transvaginal ultrasound at 12–13 weeks gestation: Anterior complete placenta previa dilated lacunae, hypervascularity at placental interface with lower anterior uterine wall.

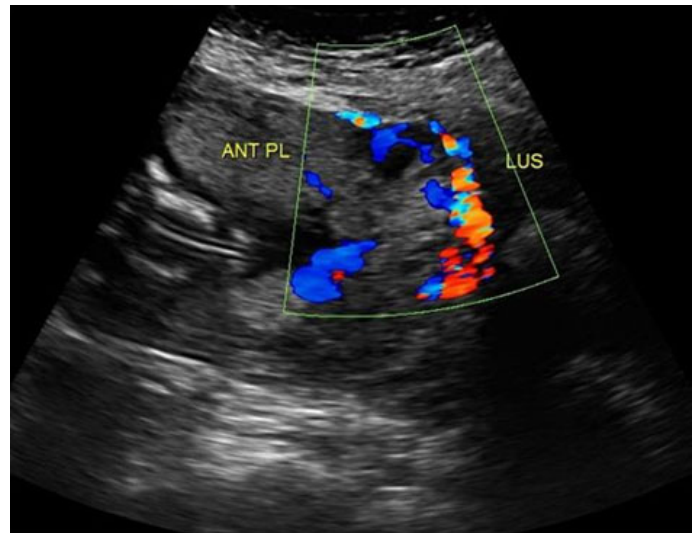


Figure 5: Transabdominal ultrasound examination at 15 weeks gestation: Complete placenta previa with vessels traversing across anterior lower uterine wall with ill-defined bladder lining interface suspicious of placenta percreta.

DISCUSSION

It is very uncommon to see ultrasound findings suggestive of abnormal placentation in the first trimester. In a similar case report by Poland et al., in which, a patient presented with a placenta percreta with occult rupture, the authors acknowledge that the sensitivity and specificity of ultrasound markers for abnormal placentation in the first trimester are low at 41% and 88%, respectively [5]. Ultrasound findings suggestive of abnormal placentation include the absence of a normal and hypodense retroplacental myometrial zone, a decreased or absent surface lining and demarcation between the serosa of the uterus and the bladder, focal exophytic masses, and lacunar flow in the placenta [6, 7]. At times, Doppler ultrasound can demonstrate the myometrium having an abnormal vascularization [6]. Other ultrasound findings include a low-lying or inferiorly displaced gestational sac and dilation of intra-placental vessels going across the lower uterine corpus [8].

In the above case we discussed, our suspicion for an abnormal placentation was raised when an early ultrasound suggested increased vascularity at the interface between the placenta and the uterine wall. Upon review of other

cases of abnormal placental implantation discovered in early pregnancies, there are early pregnancy ultrasound indications of abnormal placentation. In a case by Shaamash et al., PAS was found at 11 weeks. Ultrasound showed a low placental implantation with numerous and irregularly shaped hypoechoic and anechoic spaces that invaded the myometrium [9]. Chen et al. describe a case of PAS at 9 weeks gestation. Transvaginal ultrasound had shown a placenta previa with no clear retroplacental space seen as well as hypervascularity of dilated lacunar spaces which suggested a placenta accrete [7]. In all of these cases, pathology done on the hysterectomy specimen confirmed the diagnosis of placenta accreta spectrum disorder.

A study by Ballas et al. attempted to summarize and identify specific ultrasound markers for placenta accreta in the first trimester by analyzing first trimester ultrasound images in cases of proven placenta accreta. They found that placental irregularities normally found in the second trimester ultrasound such as a placenta previa, anechoic areas, and abnormal myometrial interfaces can be found in a first trimester ultrasound and that all cases were associated with a low implantation of the gestational sac [10].

However, a study by Rahmimi-Sharbat et al. questions the accuracy of first trimester ultrasound findings for placenta accreta. Their study concluded that first trimester ultrasound screening does not have as high sensitivity as ultrasound screenings done in the second and third trimester [3]. Women at high risk for PAS underwent a first trimester vaginal and abdominal Doppler ultrasound that looked for the site of implantation of the gestational sac, the site of implantation of the placenta, the placenta and myometrial interface, and interplacental lakes. Second and third trimester ultrasounds analyzed the placental location, hypoechoic placental areas, irregularities in the interface between the myometrium and placenta, and increased vascularity between the myometrium and the bladder [3]. Studies showed that the first trimester ultrasound's ability to detect PAS had a sensitivity of 41% and specificity of 88% [3, 10]. The second trimester ultrasound had an improved sensitivity of 60% and specificity of 83.5% as did the third trimester ultrasound with a sensitivity of 71.4% and specificity of 88.5% [11].

Therefore, while several case reports suggest first trimester ultrasound findings can detect placenta accreta, they appear to not have the higher sensitivity or specificity of ultrasound diagnosis in the second and third trimesters. Further studies can be done in this area to investigate why the first trimester ultrasound findings are less sensitive and less specific. Although first trimester ultrasound findings may not be as sensitive or specific, it is worthwhile to standardize ultrasonographic evaluation for abnormal placentation or PAS ultrasonographic features in first trimester with close and serial follow-up of any abnormal US findings in second and third trimesters. Early detection of abnormal US features

of placental implantation can lead to adequate patient counseling along with better preparedness for PAS management as this can lead to adverse outcomes with significant maternal morbidity and mortality. In our case as presented here, due to an early diagnosis and serial US surveillance, we were better prepared at the time of diagnosis of fetal demise for the potential for significant maternal hemorrhage and managed the patient with a multidisciplinary team approach. We preemptively had blood readily available with the massive transfusion protocol process ready for the various blood products that were needed intraoperatively. A multidisciplinary team approach and care coordination of the maternal fetal medicine specialist, obstetrician, gynecologic oncologist and anesthesiologist were very helpful in the assistance of a difficult hysterectomy. The patient was counseled, prepared, and well-supported during the whole process from the initial diagnosis until the definitive treatment.

CONCLUSION

Our case report highlights the importance of early recognition and diagnosis of abnormal placentation or placenta accreta spectrum disorder by prenatal ultrasonography in the first and early second trimester. Literature review confirmed that PAS or morbidly adherent placentation in early pregnancy is rarely detected on sonography and can be a diagnostic challenge. The sensitivity and specificity of diagnosis in first trimester is lower when compared to late second and third trimester ultrasonographic detection of PAS disorders. First trimester screening ultrasound protocols are lacking in evaluation, awareness, and diagnosis of PAS for the patients at increased risk of abnormal placental adhesion and invasion. Due to the rise in the incidence of PAS, it warrants further research and training in improving first trimester ultrasound detection rates of abnormal placentation in the high risk patient population. Early detection is essential in the management of PAS disorders by providing patient counseling, equipping the obstetrical team with better preparedness and thereby resulting in a reduction or prevention of significant life-threatening adverse maternal and fetal outcomes.

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Author Contributions

Subhashini Ladella – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that

questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Stephanie Ng – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.

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