Prenatal Diagnosis of Placenta Accreta by Colour Doppler Ultrasonography: 5-Year Review

Densak Pongrojpaw MD*, Athita Chanthasenanont MD*,
Tongta Nanthakomon MD*, Komsun Suwannarurk MD*

** Maternal Fetal Medicine Unit, Department of Obstetrics and Gynaecology, Faculty of Medicine, Thammasat University, Pathumthani, Thailand*

Objective: *To determine the accuracy of colour Doppler ultrasonography to diagnose placenta accreta.*
Material and Method: *The authors reviewed cases of placenta accreta between January, 2008 and December, 2012. Ultrasonographic images consistent with signs of placenta accreta (numerous vascular lacunae, loss of subplacental sonolucent space, absent lower uterine segment between bladder-placenta, turbulent or complicated blood flow at the uteroplacental interface) were correlated with findings at the time of surgery and pathologic examination.*
Results: *Over 60 months, 12 cases (0.48/1,000 deliveries) with suspected placenta accreta by ultrasonography were studied. The median gestational age at first diagnosis was 24 weeks. All cases had at least one previous cesarean delivery. At surgery, all cases had an adherent placenta requiring hysterectomy (five accreta, three increta, and four percreta). Four cases (33%) had accidental tear of urinary bladder. Nine cases (75%) required blood transfusions.*
Conclusion: *Colour Doppler ultrasonography appears useful in antenatal diagnosis of placenta accreta.*

Keywords: *Placenta accreta, Doppler ultrasonography, Prenatal diagnosis*

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Placenta accreta is a term used to describe the clinical condition when part of placenta, or the entire placenta, invades and is inseparable from the uterine wall. The depth at which chorionic villi and cytotrophoblasts are found determines the exact classification of the variant forms. Placenta accreta, chorionic villi and/or cytotrophoblasts directly attach to the myometrium with little or no intervening decidua. In placenta increta, trophoblasts invade the myometrium; in placenta percreta, villi entend through the entire uterine wall and serosa. The pathogenesis of placenta accreta is clearly demonstrated. The most common theory is that defective decidualization related to previous surgery or to anatomical factors allows the placenta to attach directly to the myometrium[1,2]. The incidence of placenta accreta has increased and seem to parallel the increasing cesarean delivery rate. The incidence during the period of 1982-2002 was 1 in 533 pregnancies. This contrasts sharply with previous reports which range from 1 in 4,207 pregnancies in the 1970s and 1 in 2,510 pregnancies in the 1980s[3-5]. Clinically, placenta accreta becomes problematic during delivery leading to significant maternal hemorrhage, disseminated intravascular coagulopathy, hysterectomy and other surgical complications. The average blood loss at delivery in women with placenta accrete is 3,000-5,000 ml[5]. Placenta previa and previous uterine scar represent the major risk factors of placenta accreta[3-7]. Prenatal diagnosis of placenta accreta by ultrasonography is associated with a reduced risk of maternal complications, as it allows the preoperative treatments of the condition. The ultrasonographic findings suggestive of placenta accreta include (1) irregularly shaped lacunae within the placenta, (2) loss of normal hypoechoic retroplacental zone, (3) interruption of the bladder line and/or focal exophytic masses extending into the bladder space and (4) thining of the myometrium overlying the placenta (5) colour Doppler abnormalities such as abnormal blood vessels at the myometrium-bladder interface, turbulent flow through the lacunae[3,7-14]. The purpose of this study was to assess the accuracy of colour Doppler ultrasonography in the prenatal diagnosis of placenta accreta.

Correspondence to:
Pongrojpaw D, Maternal Fetal Medicine Unit, Department of Obstetrics and Gynaecology, Faculty of Medicine, Thammasat University, Pathumthani 12120, Thailand.
Phone: 0-2926-9343
E-mail: pongrojpaw@gmail.com

Material and Method

This retrospective study was conducted at Maternal Fetal Medicine Unit, Department of

Obstetrics and Gynaecology, Thammasat University Hospital between January 2008 and December 2012. The present study was approved by the Ethics Committee of Faculty of Medicine, Thammasat University. The reports from Doppler ultrasonography, using Voluson E8, GE Healthcare, USA, suspicious for placenta accreta or its variants were reviewed. Sonographic signs suspicious for placenta accreta included include irregularly shaped lacunae within the placenta (Fig. 1), loss of normal hypoechoic retroplacental zone (Fig. 2), interruption of the bladder line and/or focal exophytic masses extending into the bladder space (Fig. 3), thinning of the myometrium overlying the placenta, colour Doppler abnormalities such as abnormal blood vessels at the myometrium-bladder interface (Fig. 4), turbulent flow through the lacunae.

The information of all patients with a suspicious placenta accreta were reviewed for clinical characteristics such as age, gravity, parity, and history of previous uterine surgery. Pregnancy characteristics such as gestational age at diagnosis, and at delivery, blood loss at cesarean section, need for blood transfusions, and requirement for hysterectomy were also evaluated. The 'gold standard' for the diagnosis of placenta accreta was the clinical findings at the time of surgery and the analysis of specimens submitted for pathologic examination.

Results

During sixty months period, there were 24,919 deliveries and twelve cases with suspected placenta accreta by ultrasonography were studied. Of the twelve cases, the mean maternal age was 31.46±6.33 (mean ± SD) years, while the mean gravity was 2.83±1.1 and the mean parity was 1.58±1.0. All patients had at least one

Fig. 1 Ultrasonography showing placental lacunae.

Fig. 2 Loss of hypoechoic retroplacental space.

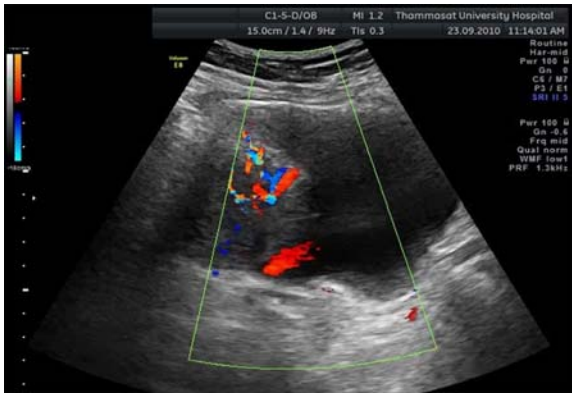

Fig. 3 Colour Doppler flow noting placenta bulging into the bladder.

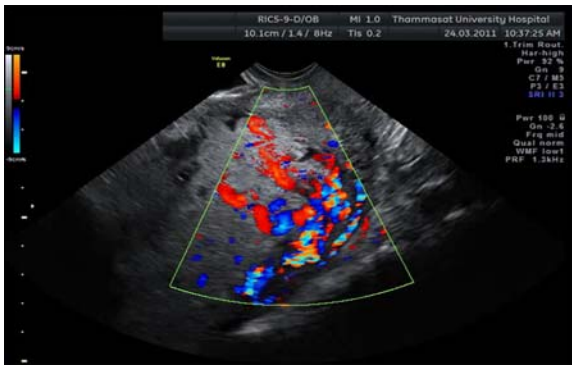

Fig. 4 Trans-vaginal Color Doppler imaging showing abnormal vasculature between placenta and posterior myometrium.

previous cesarean delivery. The median gestational age at first diagnosis was 24 weeks. The mean gestational age at delivery was 36.0±2.1 weeks. At surgery, all cases had the adherent placenta requiring hysterectomy (five accreta, three increta, and four percreta). Classical cesarean section or mid transverse (to avoid placenta) were done, then hysterectomy were performed. Four cases (33%) had accidental rupture of urinary bladder. The mean estimated blood loss was 1,990 ml (range 900-4,000 ml). Nine cases (75%) required blood transfusions.

Discussion

The ability to diagnose placenta accreta using ultrasonography has improved over the last decade. Kerr de Mendonca[13] first reported the finding of intraplacental lacunae within placenta for the diagnosis of adherent placenta in 1988. Fingerg classified these lacunae according to the number, size and shape into four grades[14]. Yang et al[10] used this classification for diagnosing placenta accreta and found that Grade 2+ (four to six irregular lacunaes) had 100% sensitivity, 97.2% specificity, 93.8% positive predictive value and 100% negative predictive value. Comstock et al[8] reported the four criteria for diagnosing placenta accreta during the second and third trimester, consisted of irregularly shaped lacunae within the placenta, loss of normal hypoechoic retroplacental zone, interruption of the bladder line and/or focal exophytic masses extending into the bladder space and thinning of the myometrium overlying the placenta, and found that intraplacental lacunae was the first observed as early as 15 gestational weeks, with 79% sensitivity and 92% positive predictive value. Turbulent flow through the lacunae and the increased vascularity of uterine serosa-bladder interface on colour Doppler ultrasonography were useful for confirming the diagnosis[9]. The meta-analysis of 23 studies of prenatal ultrasonograpic diagnosis of placenta accreta, sensitivity was 90.7%, specificity 96.9%, positive likelihood ratio 11 and negative likelihood ratio 0.16. Among the different ultrasonography findings, abnormal vasculature on colour Doppler ultrasonography had the best predictive accuracy[7].

In the present study, the technique of the cesarean hysterectomy as describe by Catanzarite et al[15] was used. If there are large engorged blood vessels seen within the visceral peritoneum covering the lower uterine segment, extending to the top of urinary bladder, classical or mid transverse uterine incision were performed to avoid injury to the hypervascular region

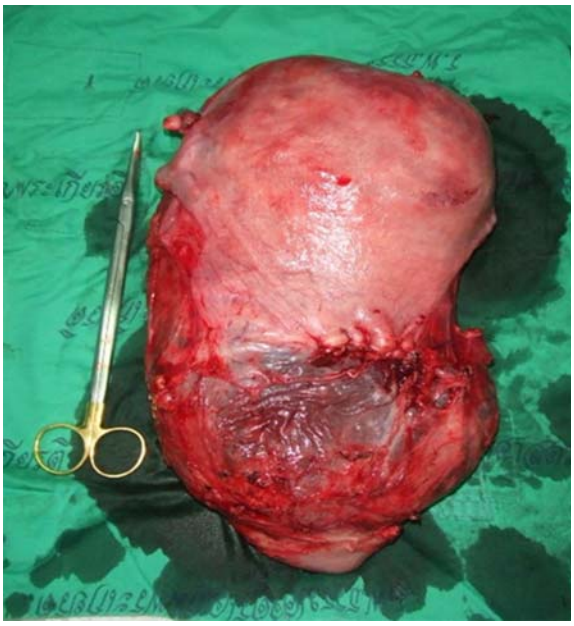

Fig. 5 Specimen of the uterus with placenta insitu showing mid transverse uterine incision and placenta percreta at lower uterine segment.

of the lower uterine segment (Fig. 5). If the abnormal colour Doppler findings and the clinical uterine hypervascularity appearance during surgery are highly suggestive of placenta accreta. After the baby was delivered, the authors strongly suggest immediately hysterectomy without placenta removal to prevent massive hemorrhage. However, bladder injuries were found in four cases of placenta percreta during the dissection of the bladder from lower uterine segment.

In conclusion, the incidence of placenta accreta has increased parallel to the increasing cesarean delivery. The pregnant women at greatest risk of placenta accreta are those who have previous uterine scars and placenta previa either anterior or posterior overlying the scar. If the placenta accreta was suspected from Doppler ultrasonography, the pre-operative counseling should include discussion of the potential need for hysterectomy. The timing of delivery should be individualized, depending on maternal and fetal conditions.

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Potential conflicts of interest

None.

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การตรวจวินิจฉัยภาวะรกเกาะติดแน่นก่อนคลอดด้วยคลื่นเสียงความถี่สูงดอพเลอร์ ศึกษาย้อนหลัง 5 ปี

เด่นศักดิ์ พงศ์โรจน์เผ่า, อธิตา จันทเสนานนท์, ต้องตา นันทโกมล, คมสันติ์ สุวรรณฤกษ์

วัตถุประสงค์: *เพื่อศึกษาความแม่นยำในการใช้การตรวจคลื่นเสียงความถี่สูงดอพเลอร์ในการตรวจวินิจฉัยภาวะรกเกาะติดแน่น*

วัสดุและวิธีการ: *ทำการศึกษาย้อนหลังสตรีตั้งครรภ์ที่ได้รับการวินิจฉัยก่อนคลอดว่ามีภาวะรกเกาะติดแน่นจากการตรวจด้วยคลื่นเสียงความถี่สูง ยืนยันด้วยผลการผ่าตัดคลอดและพยาธิวิทยาตั้งแต่เดือนมกราคม พ.ศ. 2551 ถึง เดือนธันวาคม พ.ศ. 2555*

ผลการศึกษา: *พบว่ามีสตรีตั้งครรภ์ได้รับการวินิจฉัยก่อนคลอดว่ามีภาวะรกเกาะติดแน่นจากการตรวจด้วยคลื่นเสียงความถี่สูงจำนวน 12 ราย (0.48 ต่อ 1,000 การคลอด) อายุครรภ์เมื่อได้รับการวินิจฉัยเฉลี่ย 24 สัปดาห์ สตรีตั้งครรภ์ทุกรายเคยได้รับการผ่าตัดคลอดมาก่อนอย่างน้อย 1 ครั้ง ผลการผ่าตัดสตรีทุกรายพบว่ามีภาวะรกเกาะติดแน่นและต้องได้รับการตัดมดลูกร่วมด้วย พบการบาดเจ็บต่อกระเพาะปัสสาวะ 4 ราย สตรีตั้งครรภ์ 9 ราย (ร้อยละ 75) ได้รับเลือดทดแทน*

สรุป: *การตรวจด้วยคลื่นเสียงความถี่สูงดอพเลอร์มีประสิทธิภาพดีในการวินิจฉัยภาวะรกเกาะติดแน่นก่อนคลอด*
