

## **ULTRASOUND DISCRIMINATION BETWEEN PLACENTA ACCRETA SPECTRUM AND URINARY BLADDER VARICES**

### **Abstract**

Distinguishing between urinary bladder varices and retroplacental neovascularization in placenta accreta spectrum in high- risk patients with placental previa is a diagnostic challenge since they have similar appearance on prenatal ultrasound. Placenta accreta spectrum is associated with massive obstetric hemorrhage while the presence urinary bladder varices in pregnancy poses a lower surgical risk. Since the clinical implications and management approach for both conditions are entirely different, false positive diagnosis have iatrogenic consequences. In this article, we share our experiences in differentiating these two phenomena on prenatal ultrasound supported by ultrasound and intraoperative images.

**Keywords:** Ultrasound; urinary bladder varices; placenta accreta; invasive placenta; placenta previa; increta; percreta; uterine scar; prenatal diagnosis; maternal morbidity

## Short opinion

Distinguishing between urinary bladder varices and retroplacental neovascularization in placenta accreta spectrum (PAS) is often a diagnostic conundrum on prenatal imaging since they have similar appearance on prenatal ultrasound [1]. Urinary bladder varices is a common finding in pregnancy and are believed to result from the hyperemic mucosa and venous congestion caused by high levels of progesterone and estrogen and increased pelvic pressure [2,3]. Neovascularization on the uterine serosa surface is known to be associated with PAS which occurs due to the abnormal placentation of the extravillous trophoblast deep within the myometrial tissue [4]. The diagnostic challenge occurs due to the presence of large vascular spaces at the uteroplacental interface in both cases which increases the risk of a false – positive diagnosis for PAS when it coincides with placenta previa in high-risk women. There is currently scarce literature on the topic [1,5] which only describes the diagnostic challenges and offers minimal solutions for differentiating between these two phenomena. The management approach for PAS is geared towards more aggressive approaches such as caesarean hysterectomy and interventional radiology. Anxiety regarding missing PAS increases the risk of overtreatment and potential iatrogenic injury. Therefore, accurate prenatal discrimination between these two conditions is paramount. In this paper, we share our experiences in differentiating bladder varices from PAS-related retroplacental neovascularization.

1. The presence of retroplacental neovascularization is characteristic of PAS which is usually associated with an abnormally thin myometrium; less than 1mm. In contrast, normal myometrial thickness greater than 2mm is observed in normal placental previa (figure 1) except in the presence of a simple uterine scar dehiscence where the myometrium is significantly thinned [6]. Hence, in the presence of large vessels at the uterovesical interface on ultrasound, the myometrial thickness should be considered to differentiate between placenta previa with urinary bladder varicose veins and PAS. Also, to improve diagnostic accuracy particularly in the case of a normal myometrial thickness, the “separation sign” could be demonstrated. This is done by applying pressure using the ultrasound probe to the area of suspected invasion and releasing it rapidly. On rapid release of the probe, the presence of a clear separation between the myometrium and placenta demonstrates the absence of abnormal invasion at the area. The presence of this sign predicts a normal placental separation with a specificity of 100% [7].
2. On ultrasound, retroplacental neovascularization is confined to the uterovesical interface in anterior low lying placenta or previa placenta[8]. However, varices can be seen all around the urinary bladder, well away from the uteroplacental bed (figure 1).
3. In pregnancy, urinary bladder varices form as a result of venous stasis from increased pressure in the pelvis. Hence, these veins demonstrate very low velocity on color Doppler interrogation which is only detectable with a low pulse repetitive frequency (figure 2). However, neovascularization in PAS demonstrates a characteristic high velocity flow which can, in places, be seen to enter the placental lacunae.
4. Urinary bladder varices usually run relatively straight and parallel to the urinary bladder interface while in PAS, the neovasculature on the serosa surface is tortuous and often runs in multiple different directions including craniocaudally. Hence, in the presence of vasculature at the uterovesical interface, on the sagittal plane, the urinary bladder varices consistently appear rounded while neovasculature in PAS cases can appear longitudinal and as bridging vessels. Similarly, on transverse plane, urinary bladder varices consistently appear elongated. Hence, when screening for PAS, a sagittal probe position should be part of the assessment for retroplacental neovascularization.

Regardless of these highly sensitive imaging signs described, we acknowledge that a definitive differentiation between the two conditions is made during surgery. This dissection can be performed before extracting the fetus, through a transverse laparotomy which allows the diagnosis of PAS to be confirmed before performing interventions such as extensive median laparotomy or fundal hysterotomy (figure 3). Evaluation of the lateral (by opening the parametrial space) and anterior walls of the uterus (by the Pelosi maneuver and retro-vesical dissection) are the basis of “intraoperative staging” before incising the uterus or causing bleeding [9] .

## References

- [1] Warshafsky C, Corran B, Willner I, Warren J, Singh SS. Placenta previa and bladder varicosities—a clinical conundrum. *American Journal of Obstetrics & Gynecology* 2022;227:533–4. <https://doi.org/10.1016/j.ajog.2022.05.011>.
- [2] Chaliha C, Stanton S I. Urological problems in pregnancy. *BJU International* 2002;89:469–76. <https://doi.org/10.1046/j.1464-410X.2002.02657.x>.
- [3] Hallamore SL, Grills RJ, Neerhut G, Lawrentschuk N. Submucosal vesical varicosities causing hematuria and retention of urine in pregnancy: cystovarix. *American Journal of Obstetrics & Gynecology* 2007;196:e29–30. <https://doi.org/10.1016/j.ajog.2006.10.864>.
- [4] Jauniaux E, Hussein AM, Einerson BD, Silver RM. Debunking 20th century myths and legends about the diagnosis of placenta accreta spectrum. *Ultrasound in Obstetrics & Gynecology* 2022;59:417–23. <https://doi.org/10.1002/uog.24890>.
- [5] Kennedy A, Mills M, Esplin S. P30.09: Bladder varices: source of confusion for placenta accreta spectrum. *Ultrasound in Obstetrics & Gynecology* 2010;36:285–285. <https://doi.org/10.1002/uog.8718>.
- [6] Adu-Bredu TK, Owusu-Bempah A, Collins S. Accurate prenatal discrimination of placenta accreta spectrum from uterine dehiscence is necessary to ensure optimal management. *BMJ Case Reports CP* 2021;14:e244286. <https://doi.org/10.1136/bcr-2021-244286>.
- [7] Allwood RX, Self A, Collins SL. Separation sign: novel ultrasound sign for ruling out diagnosis of placenta accreta spectrum. *Ultrasound in Obstetrics & Gynecology* 2022;60:390–5. <https://doi.org/10.1002/uog.26021>.
- [8] Adu-Bredu TK, Rijken MJ, Calvache AJN, Stefanovic V, Aryananda RA, Fox KA, et al. A simple guide to ultrasound screening for Placenta Accreta Spectrum for improving detection and optimizing management in resource limited settings. *International Journal of Gynecology & Obstetrics* 2022;n/a. <https://doi.org/10.1002/ijgo.14376>.
- [9] Nieto-Calvache AJ, Palacios-Jaraquemada JM, Aryananda RA, Rodriguez F, Ordoñez CA, Messa Bryon A, et al. How to identify patients who require aortic vascular control in placenta accreta spectrum disorders? *Am J Obstet Gynecol MFM* 2022;4:100498. <https://doi.org/10.1016/j.ajogmf.2021.100498>.

## Figure legends

Figure 1: “A” (upper left image) shows a normal myometrial thickness of 5.9mm overlying an anterior low-lying placenta with massive vasculature at the uterovesical interface suggesting urinary bladder varices. “B” (Upper right image) shows massive vasculature at the uterovesical interface and around the urinary bladder. Note that, the vascularity extends beyond the confines of the uterovesical interface to other areas around the urinary bladder away from the point of placental

attachment (asterisk). Observe the rounded appearance of the bladder varices in this sagittal image of the uterovesical interface. "C" (lower left image) shows a case of placenta accreta spectrum which demonstrates a vanishingly thin myometrium. Note that on this sagittal image, the vasculature at the uterovesical interface appears longitudinal and runs craniocaudally. "D" (lower right image) demonstrates flow pattern on color Doppler.

Figure 2: Shows color and pulse wave Doppler of the vessels stacked side by side. Notice the low pulse repetitive frequency of 3.5cm/s and the low flow velocity approximating 1cm/s.

Figure 3: The diagnosis of urinary bladder varices after intraoperative staging.

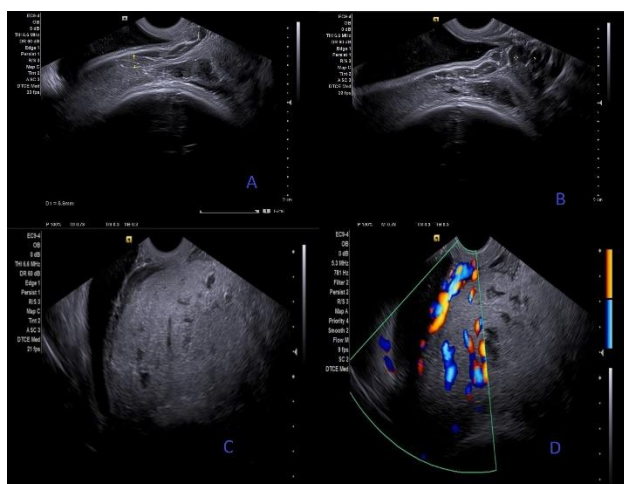


Figure 1

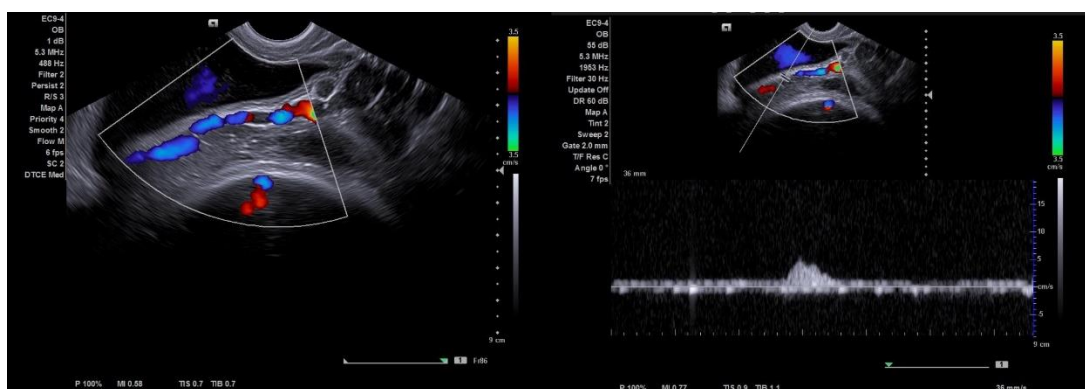


Figure 2



Figure 3