Placenta Accreta Spectrum: Ultrasound Fundamentals of Screening

Karin A. Fox, M.D., M.Ed., FACOG, FAIUM

Hennie Lombaard MBChB Mmed (OetG) FCOG(SA) PG Dip HSE

Baylor College of Medicine

HARRIS HEALTH SYSTEM

Texas Children's Hospital®
Pavilion for Women

Disclosures Dr Fox

Commercial Interest	Relationship(s)
Eunice Kennedy Shriver NICHD	Co-PI 1R01HD094347-05 Molecular and Vascular MRI of Placenta Accreta
SMFM/ Banner Health Critical Care OB Course	Lecturer
Symposia Medicus	Lecturer
International Society for the Placenta Accreta Spectrum (IS-PAS)	Education & Outreach Board Member
Pan-American Society for the Placenta Accreta Spectrum (PAS^2)	Treasurer, Webmaster

Disclosures: Dr Lombaard

- None

Objectives

1. Discuss the limitations and benefits of use of ultrasound to screen for placenta accreta spectrum

2. Identify 2 major and 2 minor clinical risk factors for placenta accreta spectrum

3. Utilize checklists to improve identification and reporting of placenta accreta spectrum

4. Employ at least 1 optimization technique when scanning your next patient

Who makes up the team?

Center of excellence for placenta accreta

Robert M. Silver, MD; Karin A. Fox, MD; John R. Barton, MD; Alfred Z. Abuhamad, MD; Hyagriv Simhan, MD; C. Kevin Huls, MD; Michael A. Belfort, MD; Jason D. Wright, MD

TABLE 1

Suggested criteria for accreta center of excellence

1. Multidisciplinary team
   a. Experienced maternal-fetal medicine physician or obstetrician
   b. Imaging experts (ultrasound)
   c. Pelvic surgeon (ie, gynecologic oncology or urogynecology)
   d. Anesthesiologist (ie, obstetric or cardiac anesthesia)
   e. Urologist
   f. Trauma or general surgeon
   g. Interventional radiologist
   h. Neonatologist
2. Intensive care unit and facilities
   a. Interventional radiology
   b. Surgical or medical intensive care unit
      i. 24-h availability of intensive care specialists
   c. Neonatal intensive care unit
      i. Gestational age appropriate for neonate
3. Blood services
   a. Massive transfusion capabilities
   b. Cell saver and perfusionists
   c. Experience and access to alternative blood products
   d. Guidance of transfusion medicine specialists or blood bank pathologists

Silver. Placenta accreta: center of excellence. Am J Obstet Gynecol 2014.

"None of us, including me, ever do great things. But we can all do small things, with great love, and together we can do something wonderful."

- Mother Theresa

Who makes up the team?

Evidence-based guidelines for the management of abnormally invasive placenta: recommendations from the International Society for Abnormally Invasive Placenta

Sally L. Collins, MD, PhD[a,b,*], Bahrin Alemdar, MD[c], Heleen J. van Beekhuizen, MD[d], Charline Bertholdt, MD[e], Thorsten Braun, MD[f], Pavel Calda, MD[g], Pierre Delorme, MD[h], Johannes J. Duvekot, MD[i], Lene Gronbeck, MD[j], Gilles Kayem, MD[k], Jens Langhoff-Roos, MD[j], Louis Marcellin, MD[l], Pasquale Martinelli, MD[m], Olivier Morel, MD[e], Mina Mhallem, MD[n], Maddalena Morlando, MD[m,o], Lone N. Noergaard, MD[j], Andreas Nonnenmacher, MD[f], Petra Pateisky, MD[p], Philippe Petit, MD[q], Marcus J. Rijken, MD[r], Mariola Ropacka-Lesiak, MD[s], Dietmar Schlembach, MD[t], Loïc Sentilhes, MD[u], Vedran Stefanovic, MD[v], Gita Strindfors, MD[c], Boris Tutschek, MD[w,x], Siri Vangen, MD[y], Alexander Weichert, MD[f], Katharina Weizsäcker, MD[f], Frederic Chantraine, MD[q] on behalf of the International Society for Abnormally Invasive Placenta (IS-AIP)

1. A center that can provide a multidisciplinary team (MDT) with significant experience in managing abnormally invasive placenta (AIP) and that can provide antenatal diagnosis and preoperative planning. This team should be available 24 hours a day, 7 days a week, to ensure that expertise is available for emergency situations.

2. There should be, *on site*, rapid access to the following in case of emergency:
   - Colorectal surgeon
   - Vascular surgeon
   - Hematologist

3. Adult intensive care facilities available on site
4. Gestational age–appropriate neonatal intensive care facilities
5. Massive transfusion facilities
6. Intraoperative blood salvage (cell salvage) services available

- Imaging expert
(fetal medicine specialist and/or radiologist)

- Experienced obstetrician
(often maternal-fetal medicine specialist)

- Anesthesiologist with expertise in complex obstetric cases

- Surgeon experienced with complex pelvic surgery (often a gynecological oncologist)

- Urologist (with experience of open urological surgery especially ureteric re-implantation)

- Neonatologist

- Interventional radiologist

MATERNAL LEVEL OF CARE III/IV

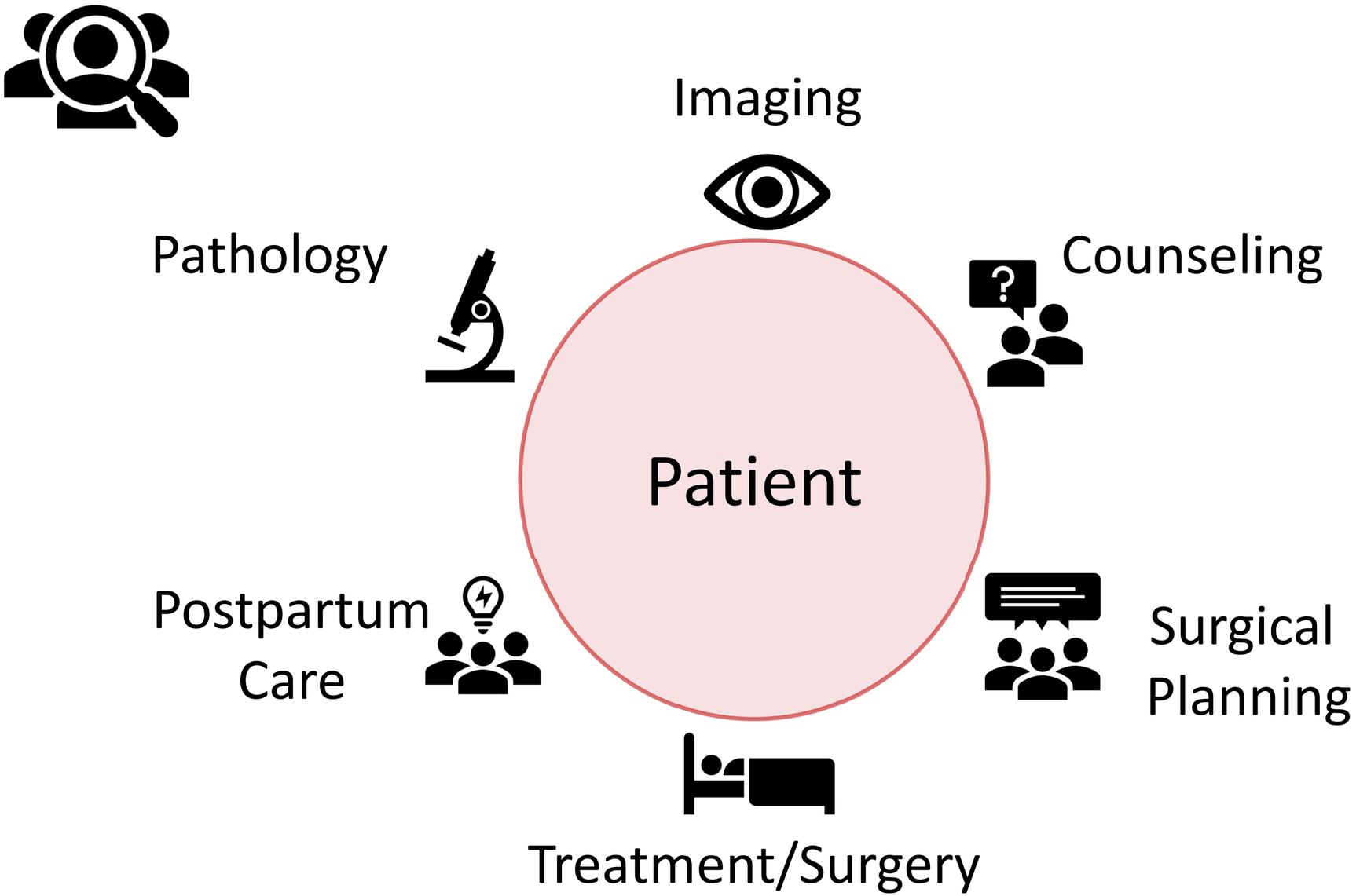
- Clinical Expertise with Multidisciplinary Approach
  - Antenatal imaging
  - Peripartum Management
  - Support Services
  - 24/7 Availability
- Clinical and Education and Outreach
- Quality Assessment/Performance Improvement (QAPI)
- Participation in National & International Research
- Transparency in Outcomes/Trends

PROPOSED CRITERIA FOR PAS CENTERS

“Teamwork makes the dream work, but a vision becomes a nightmare when the leader has a big dream and a bad team.”

- John C. Maxwell

Communication, Communication, Communication



EARLY DETECTION – CLINICAL HISTORY

“The eyes see only what the mind is prepared to comprehend.”

- Henri Bergson

Risk Factors for PAS

Frequency of placenta accreta according to number of cesarean deliveries and presence or absence of placenta previa

Cesarean delivery	Placenta previa(%)	No placenta previa (%)
First (primary)	3.3	0.03
Second	11	0.2
Third	40	0.1
Fourth	61	0.8
Fifth	67	0.8
≥Sixth	67	4.7

Publications Committee, Society for Maternal-Fetal Medicine, Belfort MA. Placenta accreta. Am J Obstet Gynecol. 2010 Nov;203(5):430-9.

Who gets it?

- Placenta previa
- Cesarean Delivery
- In Vitro Fertilization-
(4- to 13-Fold increase)

- Radiation therapy
  Endometrial ablation
  Asherman's
  Prior uterine resection
(septum revision, myomectomy)

- Smoking

- Advanced Maternal Age

- ↓ 4% in 2016[1](31.9%)
- ↑ Tripled since 1996[2]

- (↑) Reduction in overall hyst rates

- ↓ 12% of adults in 2020 (20.9% in 2005)[3]

- ↑ Median age 1st birth: 30[4]

REFERENCES

1. Martin JA, Hamilton BE, Osterman MJK, Driscoll AK, Drake P. Births: Final data for 2016. National Vital Statistics Reports; vol 67 no1. Hyattsville, MD: National Center for Health Statistics, 2018.

2. Sunderam S, Kissin DM, Crawford SB, et al. Assisted Reproductive Technology Surveillance — United States, 2015. MMWR Surveill Summ 2018;67(No. SS-3):1–28. DOI: http://dx.doi.org/10.15585/mmwr.ss6703a1

3. https://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/index.htm

4. https://www.census.gov/library/stories/2022/04/fertility-rates-declined-for-younger-women-increased-for-older-women.html?utm_campaign=20220406msacos1ccstors&utm_medium=email&utm_source=govdelivery

Screening

Baylor College of Medicine – Texas Children's Hospital
MFM Sonographer Checklist for Suspected Morbidly Adherent Placenta

Remember: encourage partially filled maternal bladders for abdominal/vaginal scans
use high frequency linear abdominal and/or vaginal probes when appropriate
add endovaginal scan to evaluate bladder/lower uterus at initial evaluation
optimized color Doppler ultrasound settings should be applied
3D ultrasound with either power Doppler or HD flow can be helpful

A. History	**Yes**	**No**
Advanced Maternal Age	☐	☐
Previous Cesarean Section (s) and Number _____	☐	☐
Previous Uterine Surgery	☐	☐
Congenital Uterine Anomaly	☐	☐
Assisted Reproductive Technologies	☐	☐
Prior Pregnancy with Suspected Accreta	☐	☐
B. 1st TM Ultrasound Findings (< 13 weeks)		
Low Implanted Gestational Sac	☐	☐
Anechoic Placental Areas	☐	☐
Irregular Placental-Myometrial Interface	☐	☐
Placental Edge Over the Cervical Os	☐	☐
C. 2nd and 3rd TM Ultrasound Findings (> 13 weeks)		
Placenta Previa	☐	☐
Irregular Vascular Spaces with Turbulence (most important)	☐	☐
Loss of Normal Retroplacental Echolucency (Clear Space)	☐	☐
Thinning/Disruption: Uterine Serosa-Bladder Interface	☐	☐
Focal Exophytic Masses	☐	☐

Document Prior MRI Findings (Scan Date and Results) *revised 12-12-2014*

SUSPECTED ABNORMALLY INVASIVE PLACENTA (AIP)
Ultrasound report
Demographics and Risk Factors

Date: _ _/_ _/ _ _ _ _ Gestational age: _ _ weeks _ days
Parity ☐ Mode of conception: Spontaneous ☐ IVF ☐
Number of previous CS ☐ Number of classical CS ☐
Number of previous surgical evacuations (including TOP) ☐
Was Cesarean scar pregnancy suspected/diagnosed in first trimester? Yes ☐ No ☐ Not known ☐
Previous uterine surgery (e.g. myomectomy, endometrial ablation) Yes ☐ No ☐ Not known ☐
History of AIP Yes ☐ No ☐ Not known ☐
Placenta previa on ultrasound Yes ☐ No ☐ Not known ☐
If yes: Anterior placenta previa < 2 cm from internal os ☐ Covering internal os ☐
Posterior placenta previa < 2 cm from internal os ☐ Covering internal os ☐

Ultrasound Signs

Cervical length (without funnel or placental tissue)			mm
Grayscale ultrasound parameters and definition	**Yes**	**No**	**Unsure**
Loss of 'clear zone' *- Loss, or irregularity, of hypoechoic plane in myometrium underneath placental bed ('clear zone')*			
Myometrial thinning *- Thinning of myometrium overlying placenta to <1mm or undetectable*			
Abnormal placental lacunae *- Presence of numerous lacunae including some that are large and irregular, often containing turbulent flow visible on grayscale imaging*			
Bladder wall interruption *- Loss or interruption of bright bladder wall (hyperechoic band or 'line' between uterine serosa and bladder lumen)*			
Placental bulge *- Deviation of uterine serosa away from expected plane, caused by abnormal bulge of placental tissue into neighboring organ, typically bladder; uterine serosa appears intact but outline shape is distorted*			
Focal exophytic mass *- Placental tissue seen breaking through uterine serosa and extending beyond it; most often seen inside filled urinary bladder*			
Color Doppler ultrasound parameters and definition	**Yes**	**No**	**Unsure**
Uterovesical hypervascularity *- Striking amount of color Doppler signal seen between myometrium and posterior wall of bladder; this sign probably indicates numerous, closely packed, tortuous vessels in that region (demonstrating multidirectional flow and aliasing artifact)*			
Subplacental hypervascularity *- Striking amount of color Doppler signal seen in placental bed; this sign probably indicates numerous, closely packed, tortuous vessels in that region (demonstrating multidirectional flow and aliasing artifact)*			
Bridging vessels *- Vessels appearing to extend from placenta, across myometrium and beyond serosa into bladder or other organs; often running perpendicular to myometrium*			
Placental lacunae feeder vessels *- Vessels with high-velocity blood flow leading from myometrium into placental lacunae, causing turbulence upon entry*			
Parametrial involvement	**Yes**	**No**	**Unsure**
- Suspicion of invasion into parametrium			

Clinical Significance of Ultrasound Findings

Probability of clinically significant AIP High ☐ Intermediate ☐ Low ☐
Extent of AIP Focal ☐ Diffuse ☐

Alfirevic Z, et al; Ad-hoc International AIP Expert Group. Pro forma for ultrasound reporting in suspected abnormally invasive placenta (AIP): an international consensus. Ultrasound ObstetGynecol. 2016 Mar;47(3):276-8

SUSPECTED ABNORMALLY INVASIVE PLACENTA (AIP)

Ultrasound report

Demographics and Risk Factors

Date: _ _/_ _/ _ _ _ _ Gestational age: _ _ weeks _ days

Parity ☐ Mode of conception: Spontaneous ☐ IVF ☐

Number of previous CS ☐ Number of classical CS ☐

Number of previous surgical evacuations (including TOP) ☐

Was Cesarean scar pregnancy suspected/diagnosed in first trimester?	Yes ☐	No ☐	Not known ☐
Previous uterine surgery (e.g. myomectomy, endometrial ablation)	Yes ☐	No ☐	Not known ☐
History of AIP	Yes ☐	No ☐	Not known ☐
Placenta previa on ultrasound	Yes ☐	No ☐	Not known ☐

If yes: Anterior placenta previa < 2 cm from internal os ☐ Covering internal os ☐

Posterior placenta previa < 2 cm from internal os ☐ Covering internal os ☐

Ultrasound Signs

Cervical length (without funnel or placental tissue)			mm
Grayscale ultrasound parameters and definition	**Yes**	**No**	**Unsure**
Loss of 'clear zone' *- Loss, or irregularity, of hypoechoic plane in myometrium underneath placental bed ('clear zone')*			
Myometrial thinning *- Thinning of myometrium overlying placenta to <1mm or undetectable*			
Abnormal placental lacunae *- Presence of numerous lacunae including some that are large and irregular, often containing turbulent flow visible on grayscale imaging*			
Bladder wall interruption *- Loss or interruption of bright bladder wall (hyperechoic band or 'line' between uterine serosa and bladder lumen)*			
Placental bulge *- Deviation of uterine serosa away from expected plane, caused by abnormal bulge of placental tissue into neighboring organ, typically bladder; uterine serosa appears intact but outline shape is distorted*			
Focal exophytic mass *- Placental tissue seen breaking through uterine serosa and extending beyond it; most often seen inside filled urinary bladder*			
Color Doppler ultrasound parameters and definition	**Yes**	**No**	**Unsure**
Uterovesical hypervascularity *- Striking amount of color Doppler signal seen between myometrium and posterior wall of b adder; this sign probab y indicates numerous, c ose y packed, tortuous vesse s in that region (aemonstrating multiairectional flow and aliasing artifact)*			
Subplacental hypervascularity *- Striking amount of color Dopp er signal seen in p acental bed; this sign probab y indicates numerous, closely packed, tortuous vessels in that region (demonstrating multidirectional flow and a iasing artifact)*			
Bridging vessels *- Vessels appearing to extend from placenta, across myometrium and beyond serosa into bladder or other organs; often running perpendicular to myometrium*			
Placental lacunae feeder vessels *- Vessels with high-velocity blood flow leading from myometrium into placental lacunae, causing turbulence upon entry*			
Parametrial involvement	**Yes**	**No**	**Unsure**
- Suspicion of invasion into parametrium			

Clinical Significance of Ultrasound Findings

Probability of clinically significant AIP	High	☐	Intermediate	☐	Low ☐
Extent of AIP	Focal	☐	Diffuse	☐	

**Each box represented ONE risk factor. Treat patients with 2 or more medium risk factors as high risk. **

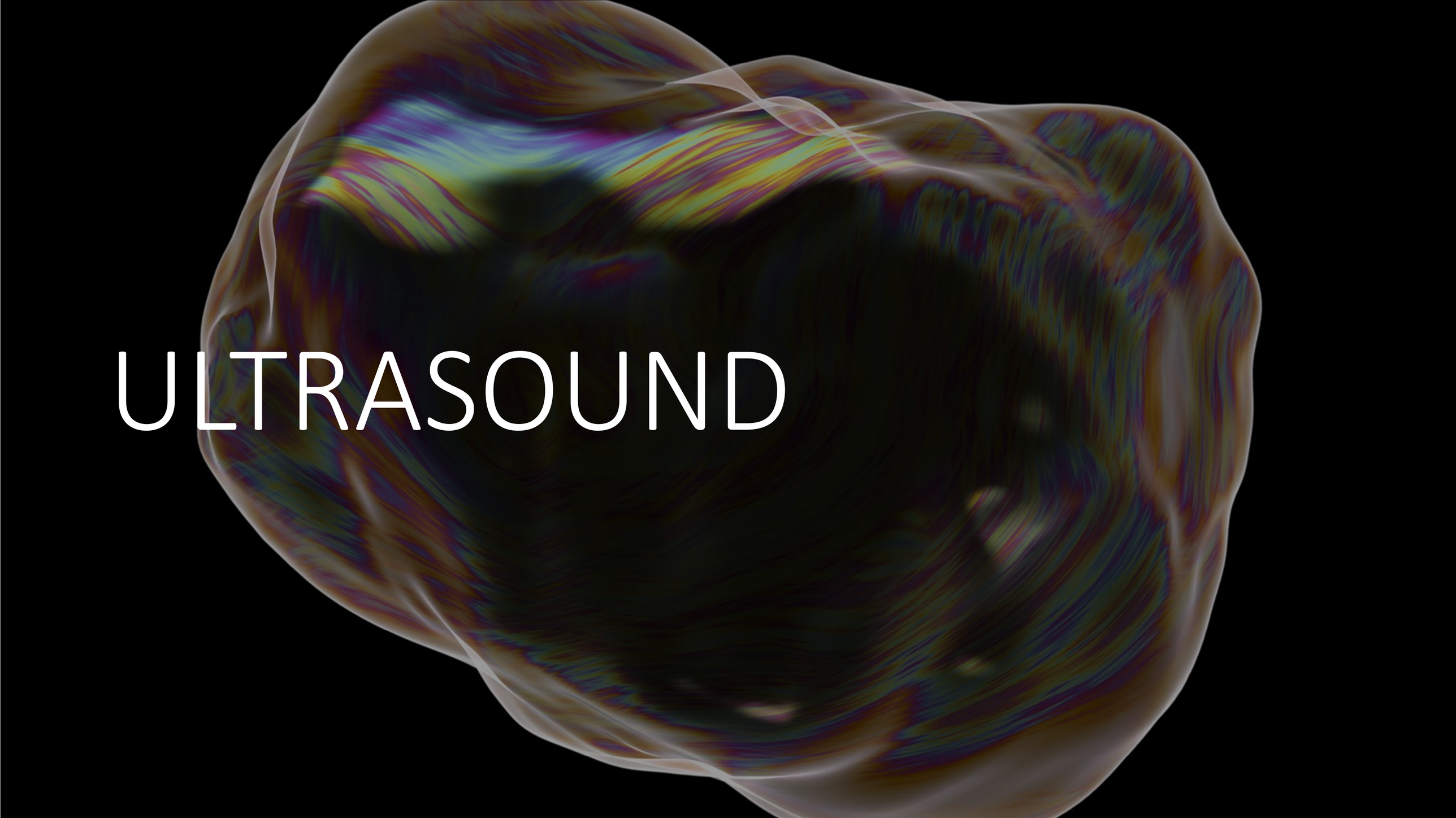
Risk Category: Admission		
Low Risk (<1%)	Medium Risk (1-10%)	High Risk (>10%)
No previous CD	>/= 4 prior CD **w/o** placenta previa (0.8-4.7%)	US findings consistent with PAS
No previous uterine surgery	Placenta previa and **no** prior CD (3.3%)	>/= 2 CD **w/** placenta previa (11-67%)
Spontaneous conception	Prior classical CD	Prior history of PASD (13-28%)
</= 3 Prior CD **w/o** placenta previa (0.03-0.1%)	>/= 2 prior D&C or hysteroscopy	
	Prior uterine surgery, pelvic irradiation or endometrial ablation	
	IVF Conception	
Anticipatory Interventions		
Routine delivery management	Patient stable. Obtain MFM consult and further imaging per perinatal guideline (link)	Patient stable. Obtain MFM consult and further imaging per perinatal guideline (link)
Document PPH Risk stratification	Patient unstable alert appropriate personnel and prepare for delivery per PASD workflow (link)	Patient unstable alert appropriate personnel and prepare for delivery per PASD workflow (link)
	Document PPH Risk stratification	Document PPH Risk stratification

Do you have prior cesarean deliveries? 1 pt

Have you been diagnosed with placenta previa? 1 pt

Have you been diagnosed with placenta accreta? 2 pt

Any score of 2 or higher = risk for PAS, notify MD


ULTRASOUND

“CSP = Baby PAS”

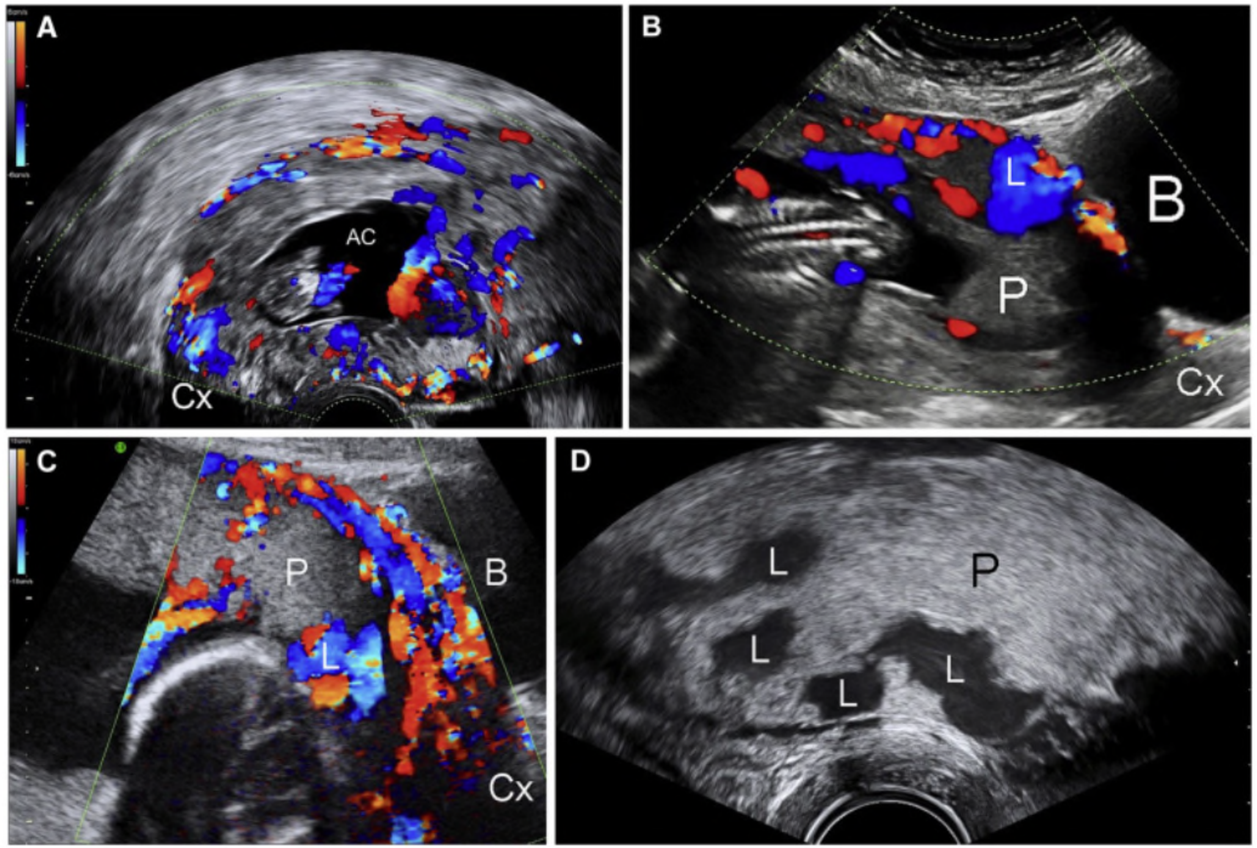


Figure 1 Transvaginal and transabdominal abdominal ultrasound views in case of a CSP

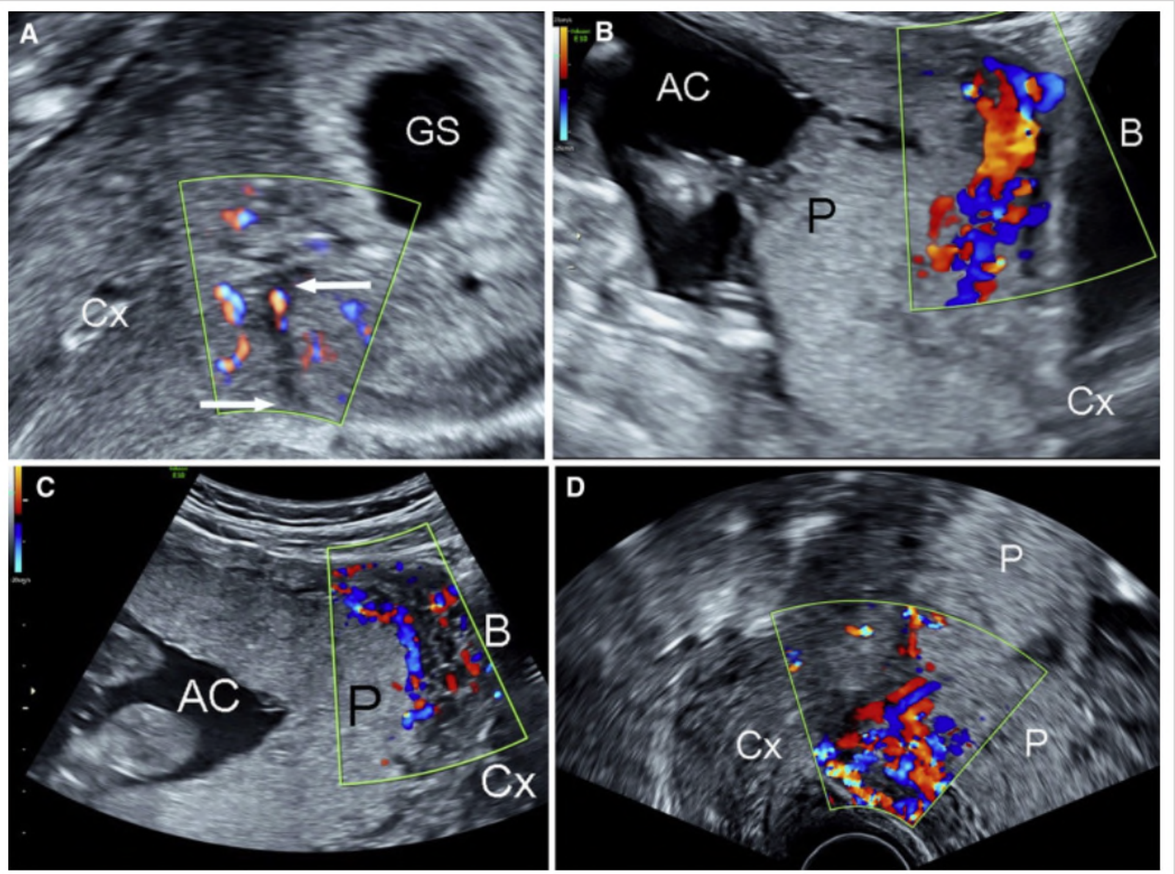
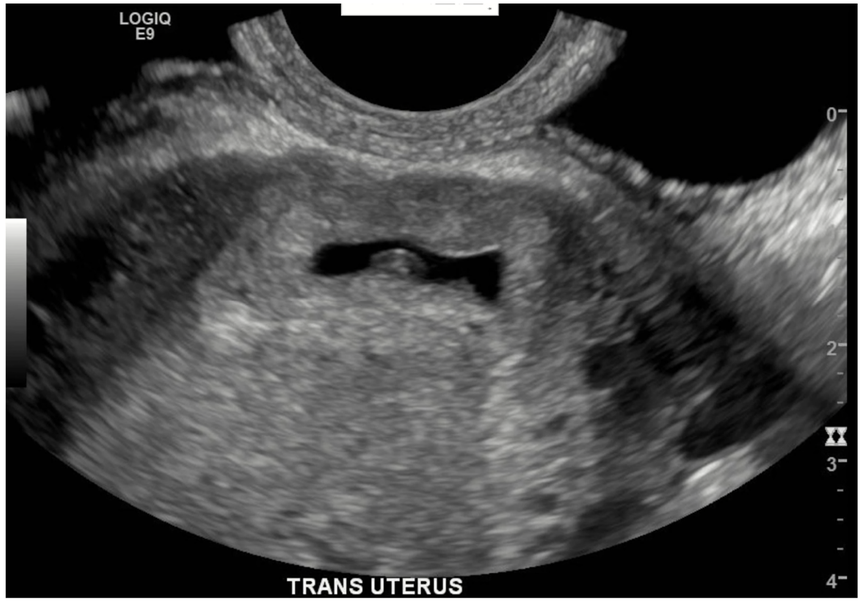


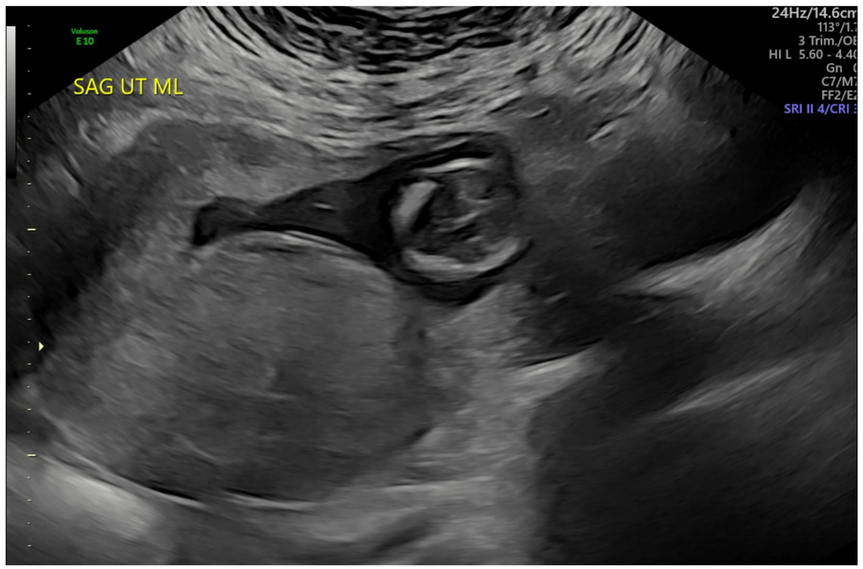
Figure 4 Transvaginal and transabdominal ultrasound views in control case

Jauniaux E, Zosmer N, De Braud LV, Ashoor G, Ross J, Jurkovic D. Development of th utero-placental circulation in cesarean scar pregnancies: a case-control study. *Am J Obstet Gynecol*. 2022;226(3):399.e1-399.e10. doi:10.1016/j.ajog.2021.08.056

When?



< 9 weeks



> 12 weeks

Early 1st Trimester (<9 weeks)

At < 9 weeks, much easier to discern whether “on the scar” or “in the niche”

After 12 weeks, gestational sac may grow into the endometrial cavity

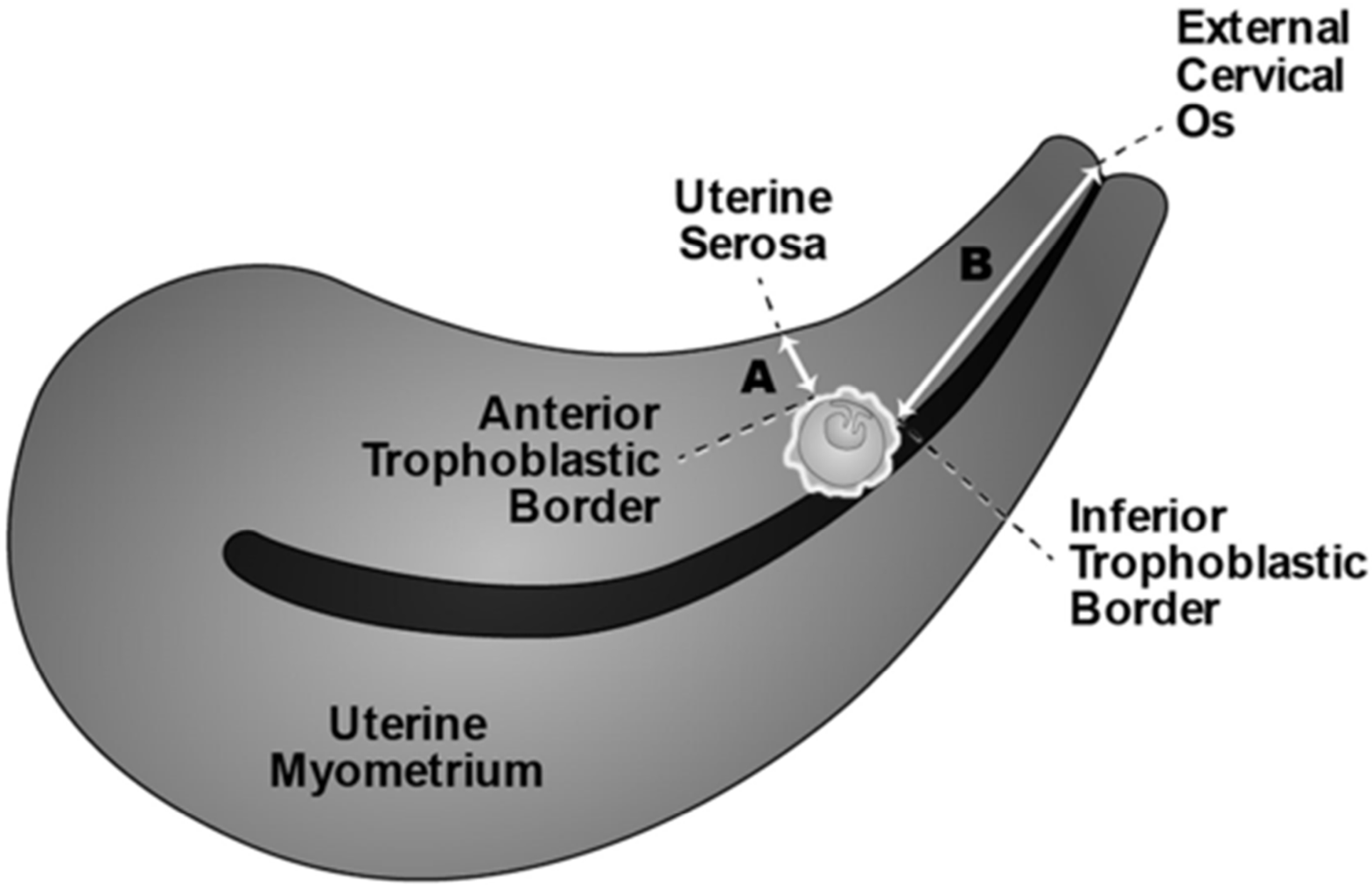
Things to look for:

- ✓ Retroverted uterus (scar tethering)
- ✓ Low implantation (lower ½ of uterus)
- ✓ Empty/near empty endometrial stripe
- ✓ Proximity to bladder (“cross over sign”)
- ✓ Hypervascularity on color Doppler
- ✓ Lacunae

Symptoms may include:

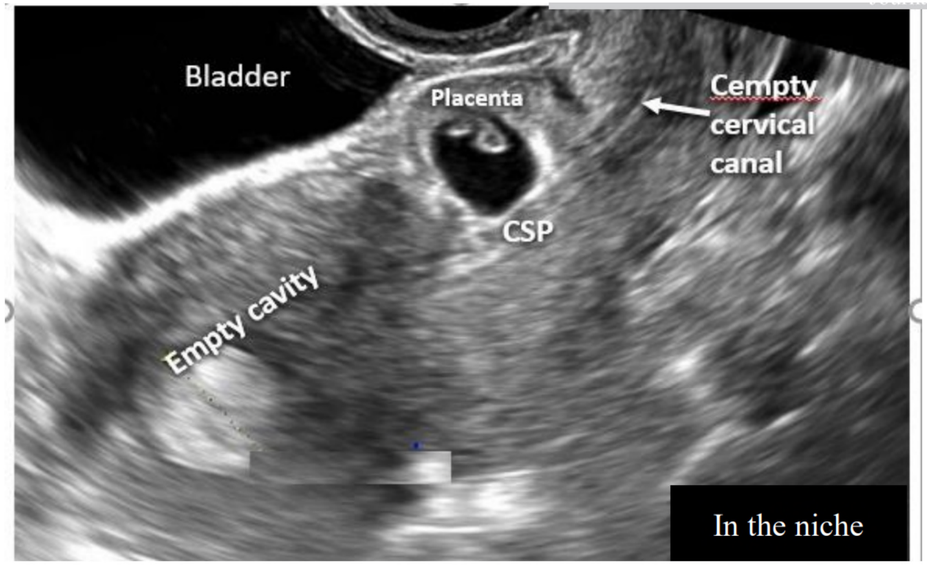
- ✓ *Spotting/bleeding*
- ✓ *Cramping*
- ✓ *Low implantation that looks like inevitable abortion*

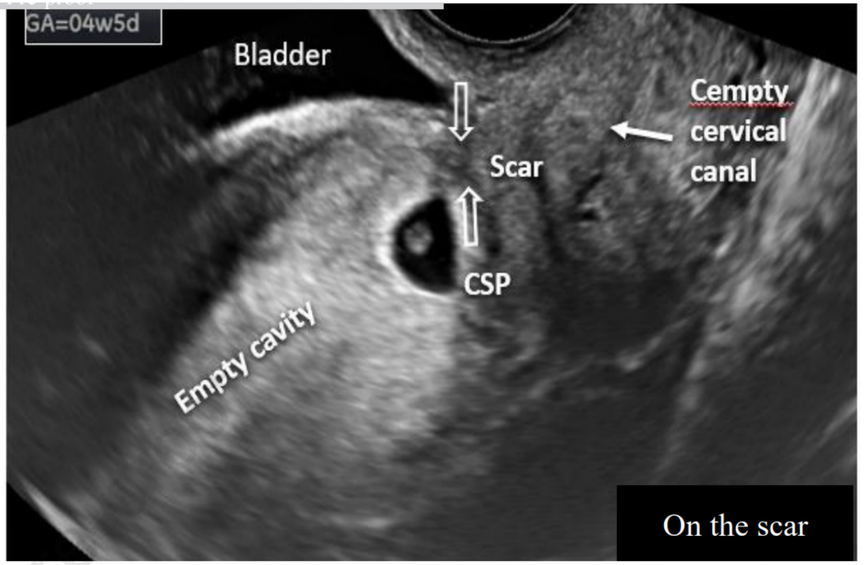
Low Implantation, Anterior myometrial thickness < 3mm

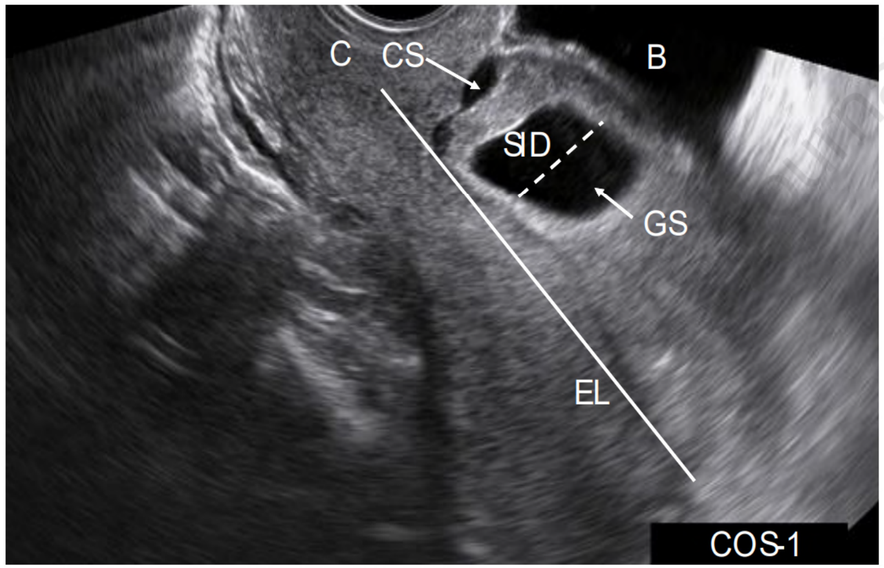


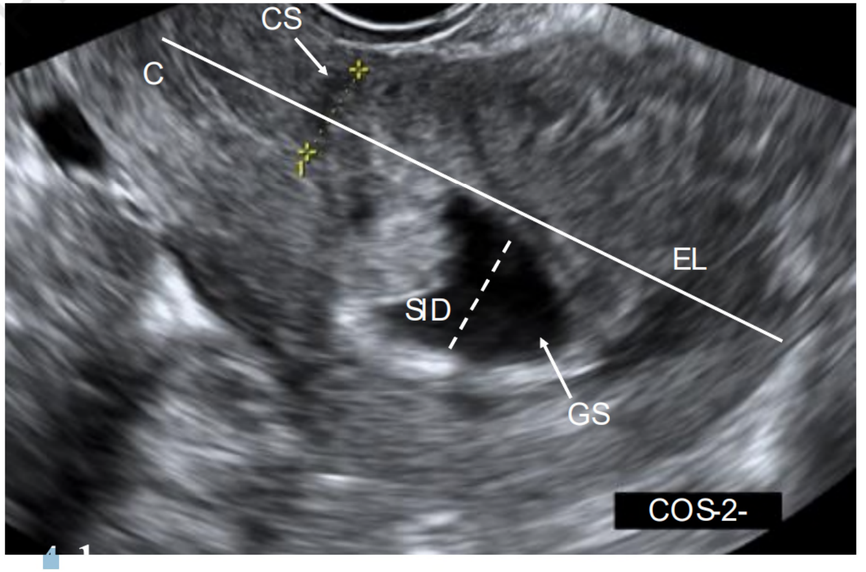
Rac MW, Moschos E, Wells CE, McIntire DD, Dashe JS, Twickler DM. Sonographic Findings of Morbidly Adherent Placenta in the First Trimester. J Ultrasound Med. 2016 Feb;35(2):263-9.

First trimester prediction of uterine rupture in cesarean scar pregnancy









Calì G, Calagna G, Khalil A, Polito S, Labate F, Cucinella G, D'Antonio F. First trimester prediction of uterine rupture in cesarean scar pregnancy. Am J Obstet Gynecol. 2022 Apr 20:S0002-9378(22)00305-2. doi: 10.1016/j.ajog.2022.04.026. Epub ahead of print. PMID: 35460625.

First trimester prediction of uterine rupture in cesarean scar pregnancy

Table 1: General characteristics of the study population**.**

Characteristics	**Overall population (n=119)**	**Uterine rupture (n=9)**	**No uterine rupture (n=110)**	**p-value**
Maternal characteristics				
Maternal age in years	33.66±4.2	33.22±5.7	33.70±4.1	0.744
Number of previous deliveries	2 (1-3)	2 (1-3)	2 (1-3)	
Number of previous CS	2 (1-3)	2 (1-3)	2 (1-3)	
"COS classification"				
COS1	18.5 (22)	100 (9)	11.82 (13)	***<0.001***
COS2	88.2 (97)	0 (0)	88.18 (97)	***<0.001***
"In the niche vs on the scar" classification				
In the niche	19.3 (23)	100 (9)	12.7 (14)	***<0.001***
On the scar	80.7(96)	0 (0)	87.3 (96)	***<0.001***
Histopathology				
Placenta accreta	37.8 (45)	0 (0)	37.8 (45)	***0.013***
Placenta increta	22.7 (27)	0 (0)	22.7 (27)	0.207
Placenta percreta	39.5 (47)	100 (9)	34.6 (38)	***<0.001***

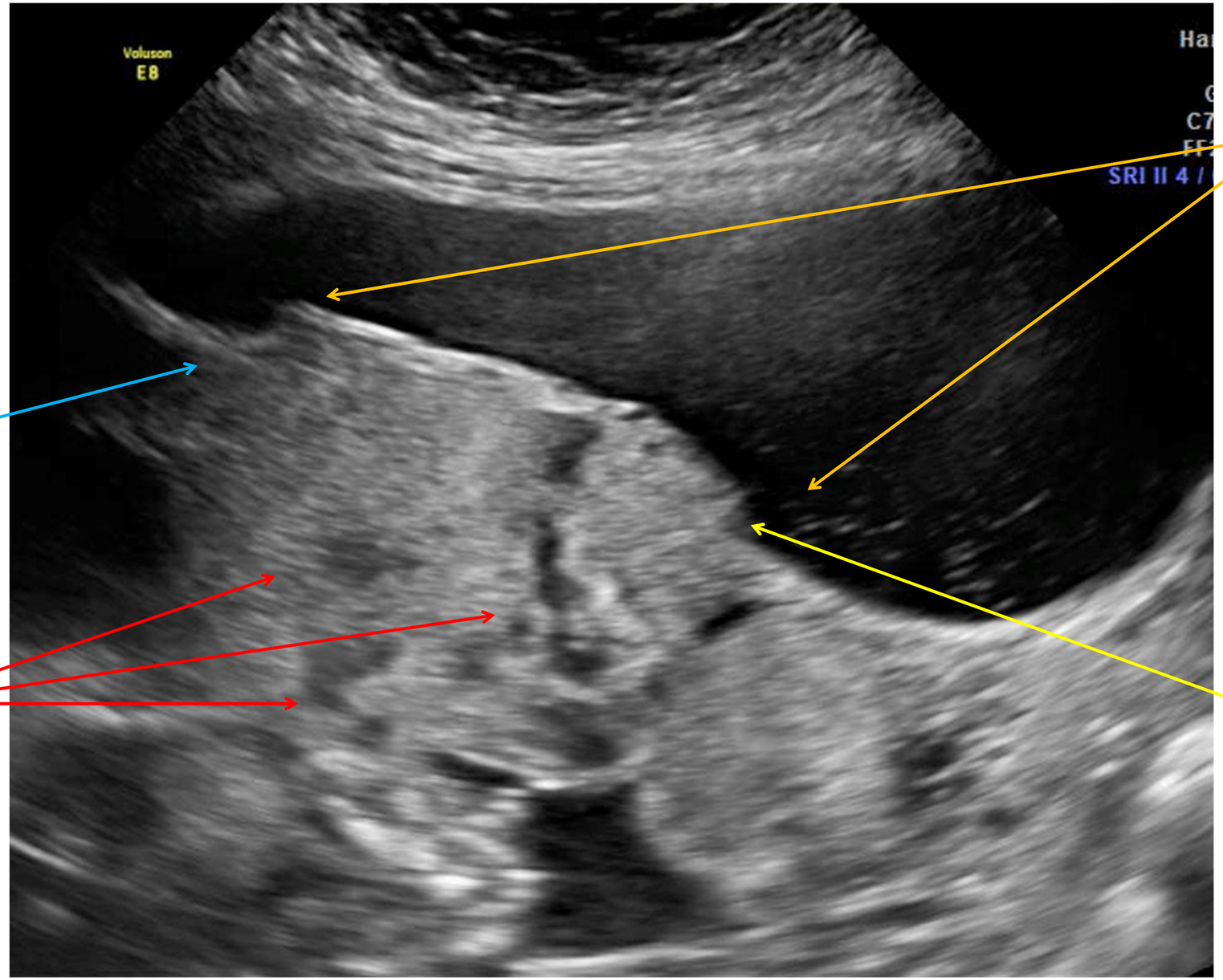
Calì G, Calagna G, Khalil A, Polito S, Labate F, Cucinella G, D'Antonio F. First trimester prediction of uterine rupture in cesarean scar pregnancy. Am J Obstet Gynecol. 2022 Apr 20:S0002-9378(22)00305-2. doi: 10.1016/j.ajog.2022.04.026. Epub ahead of print. PMID: 35460625.

Early Detection - Ultrasound

Partially filled bladder!

Loss of normal hypoechoic zone

Turbulent placental lacunae



Bulging outside normal serosal plane

Irregular, “dot-dashed” bladder line

Baylor College of Medicine
GIVING LIFE TO POSSIBLE

Texas Children's Hospital

Placenta Lacunae

- Irregular hypoechoic spaces within placenta containing vascular flow

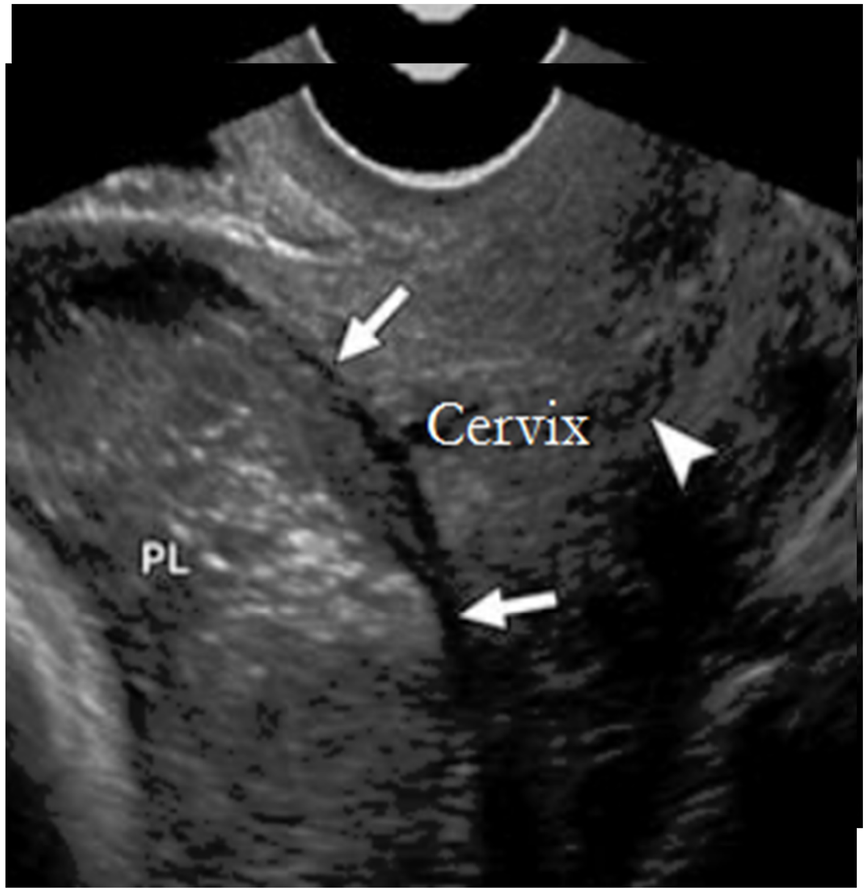
Multiple ≥ 3
Large size ≥ 2 cm
Irregular border

Shainker et al. Am J Obstet Gynecol 2021

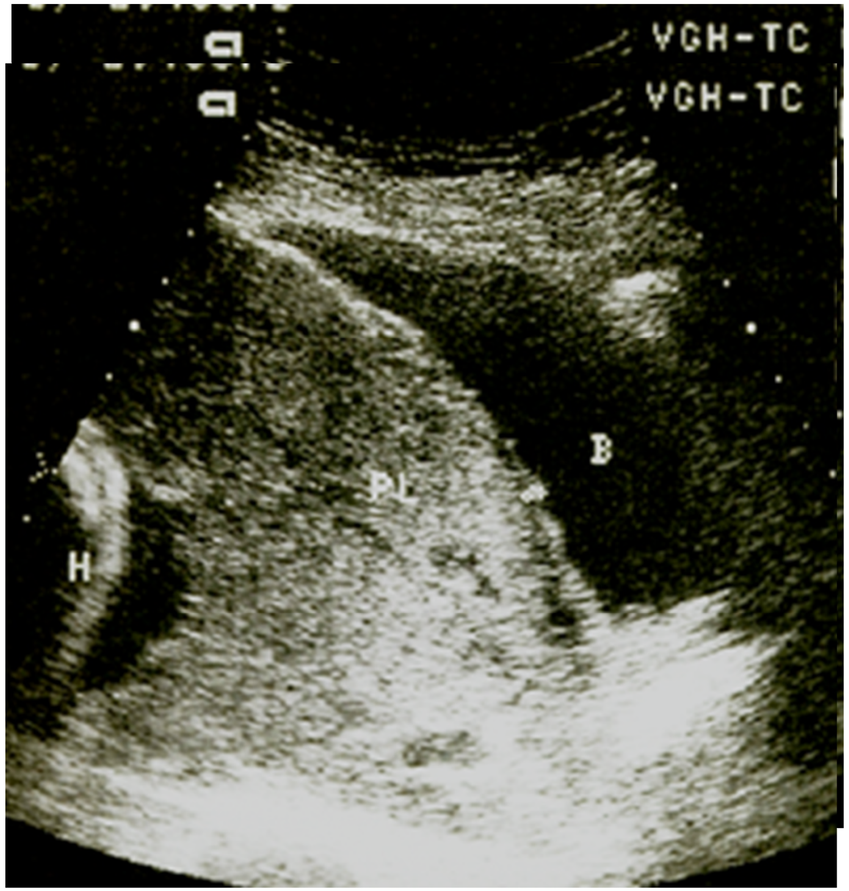
Baylor College of Medicine
GIVING LIFE TO POSSIBLE

Texas Children's Hospital

“Clear space” and “bladder line” Retroplacentac Hypoechoic Zone



Visible <u>echolucent</u> uteroplacental “clear space”



Note LACK of <u>echolucent</u> uteroplacental “clear space”and loss of “bladder line”

Myometrial Thinning

Myometrium < 1 cm

Shainker et al. Am J Obstet Gynecol 2021

Baylor College of Medicine
GIVING LIFE TO POSSIBLE

Texas Children's Hospital

Abnormal Uterine Contour

Fig. 1 – 2D Greyscale image of the placenta, in transverse view. Note the bulging appearance of the placenta toward the bladder and marked thinning of myometrium (arrows). Multiple, irregular lacunae (dark spaces, asterisk) can be seen.

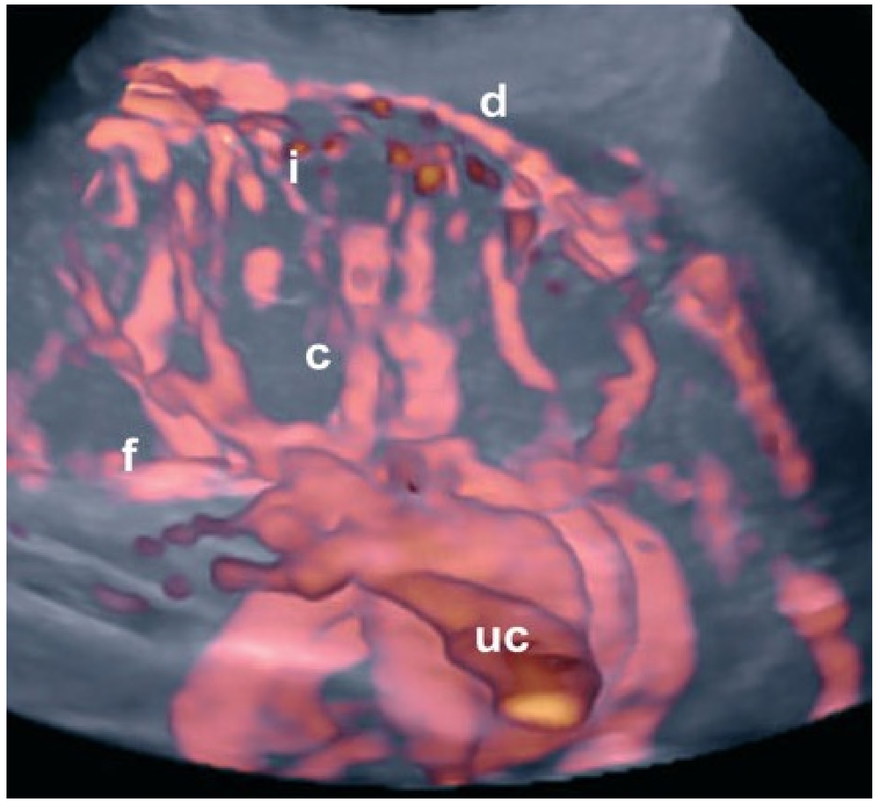
Belfort MA et al. Semin Perinatol 2018 .

Baylor College of Medicine
GIVING LIFE TO POSSIBLE

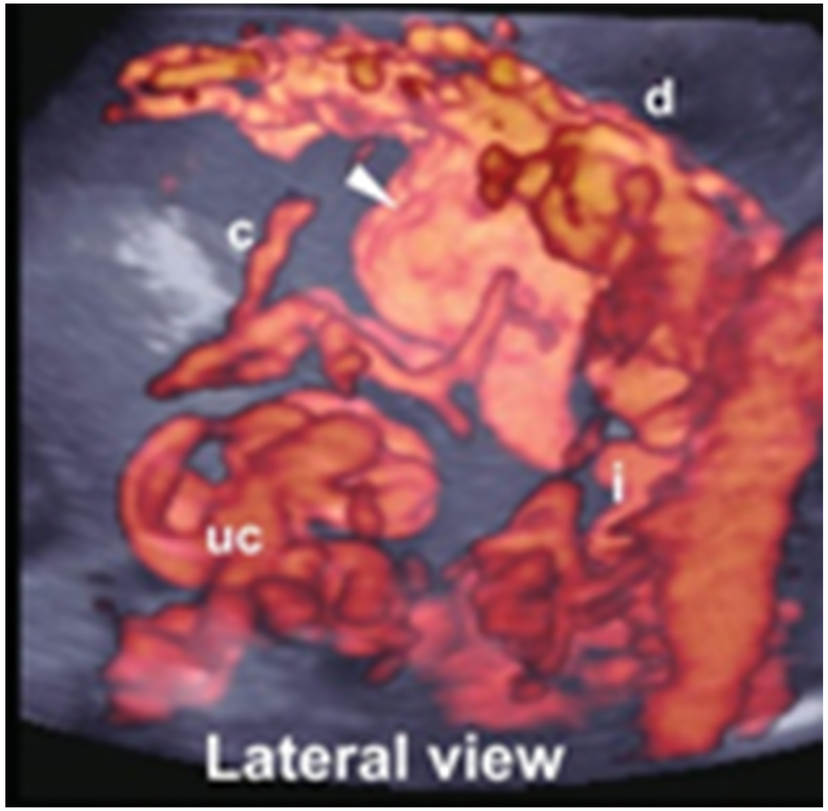
Texas Children's Hospital

US Features - Power Doppler

Normal



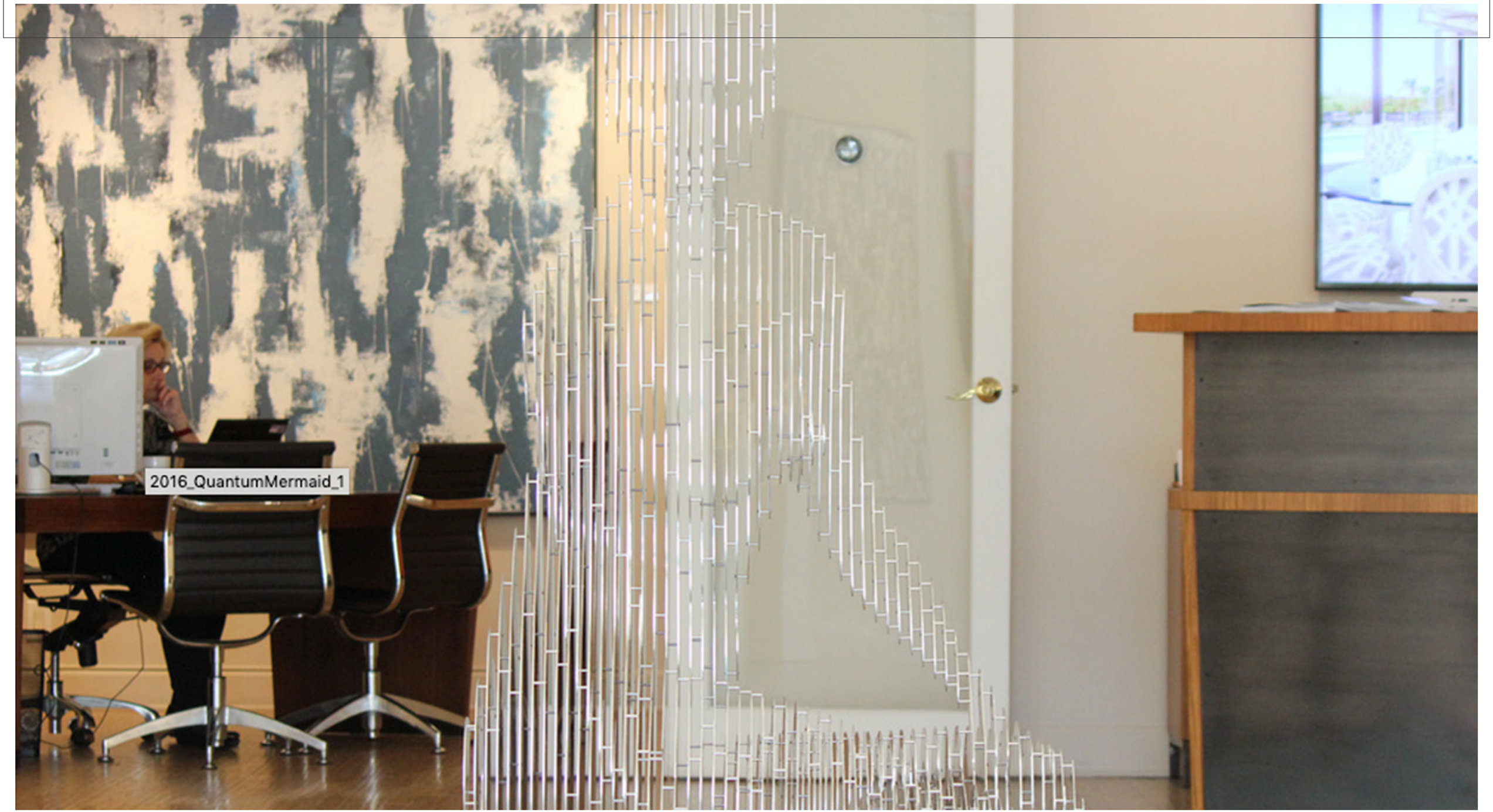
Percreta



Shih et al. Ultrasound Obstet Gynecol. 2009;33:193-2

Baylor College of Medicine
GIVING LIFE TO POSSIBLE

Texas Children's Hospital

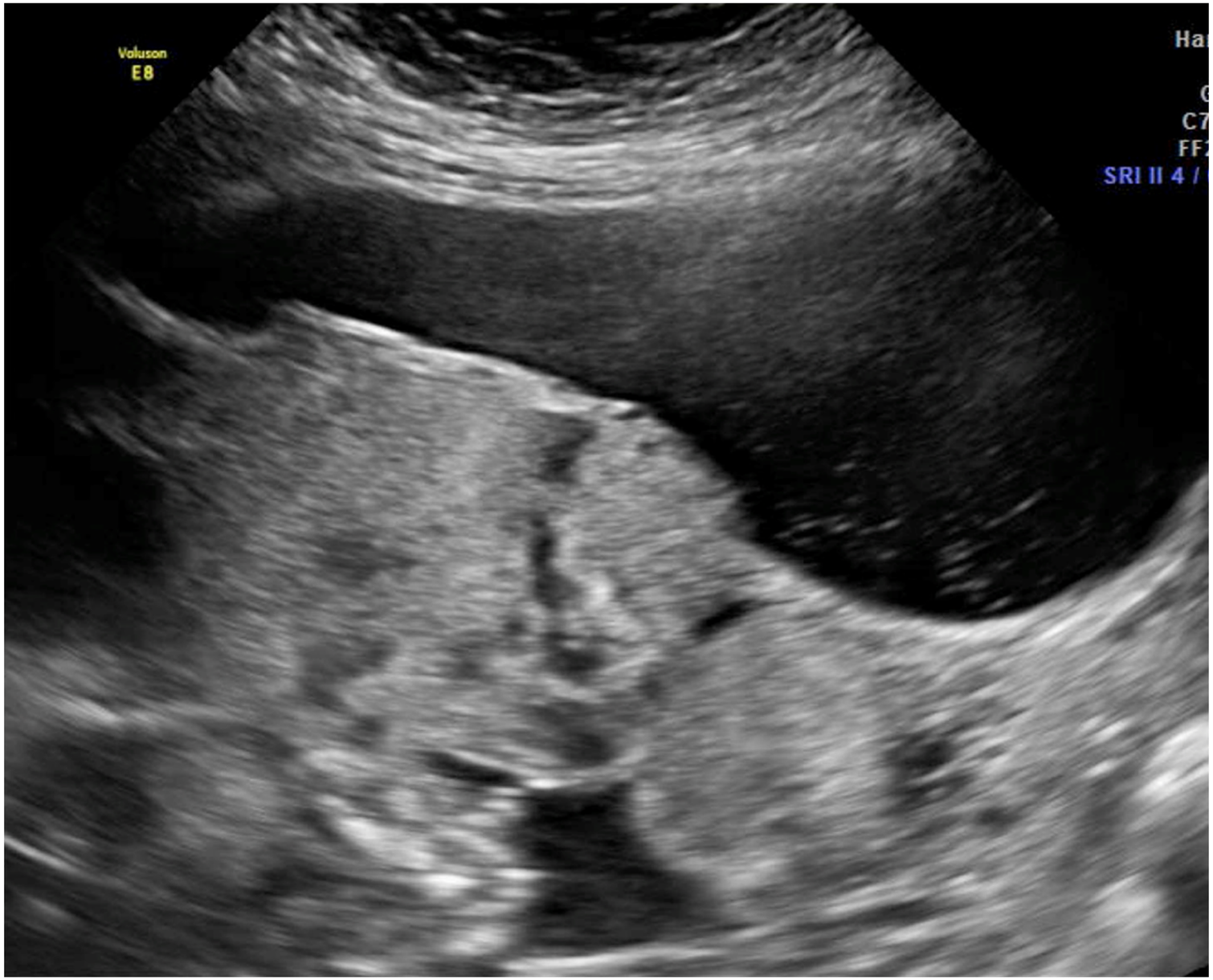

2016_QuantumMermaid_1

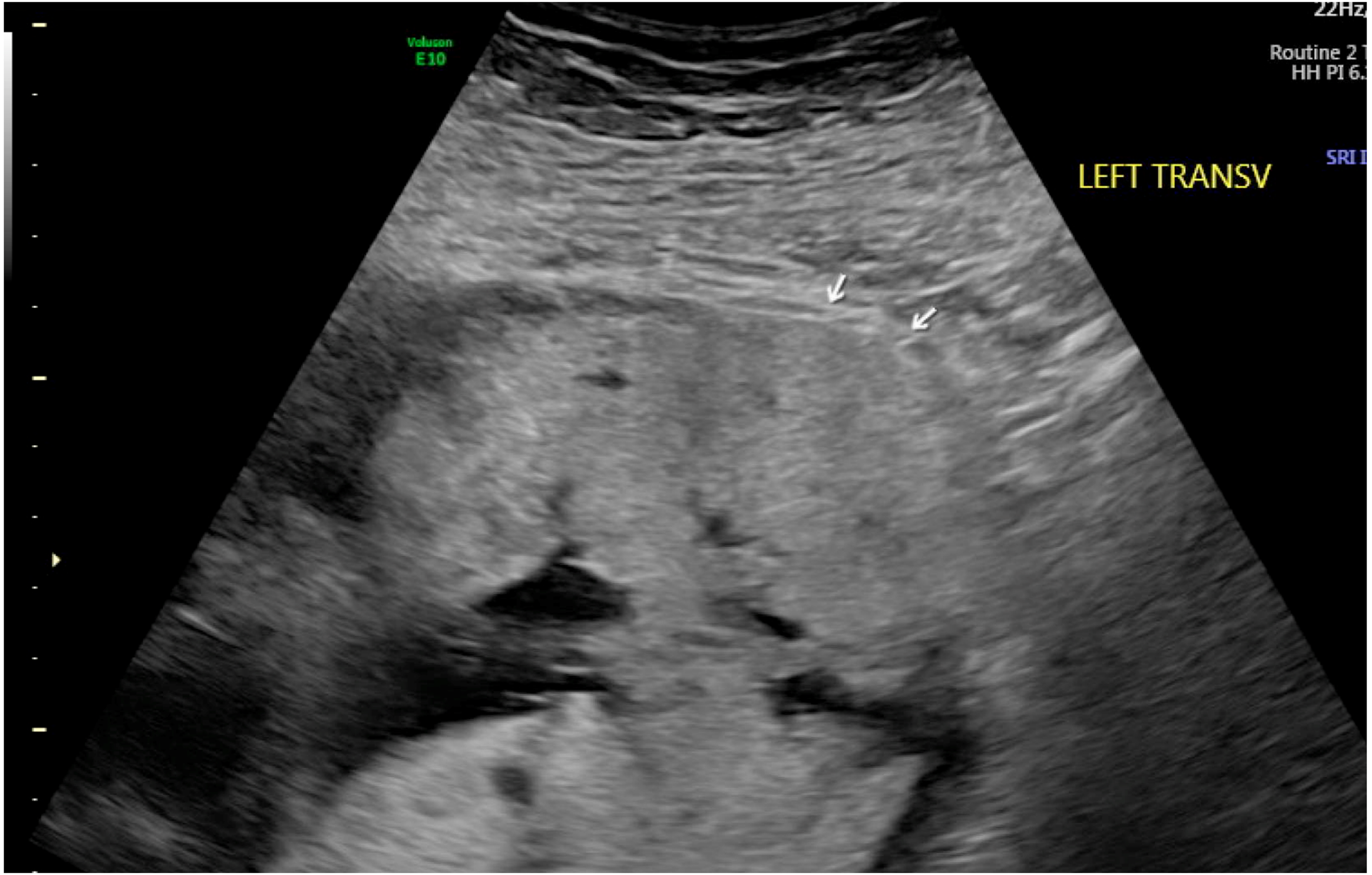
Angle of insonation matters

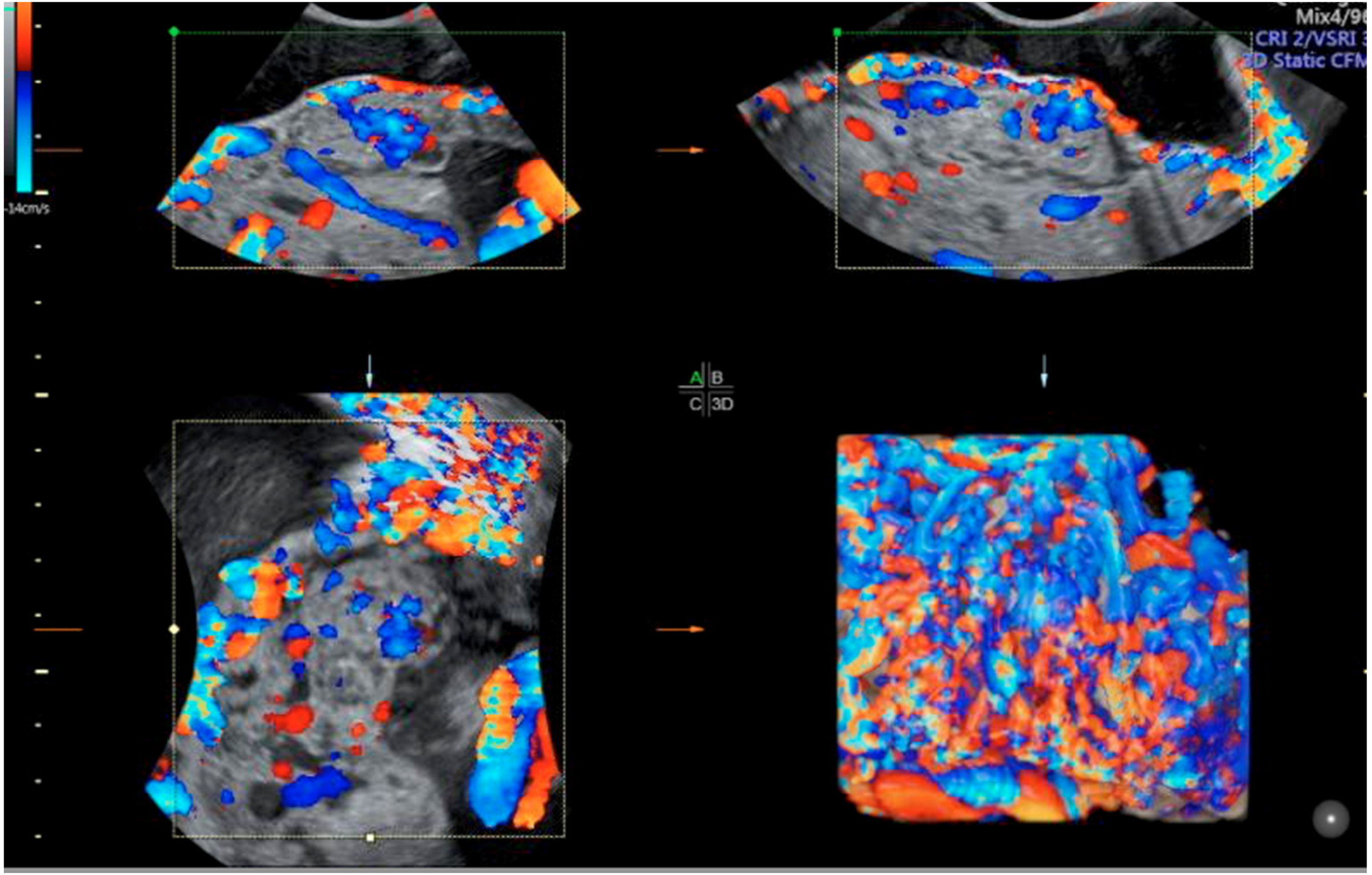
Able to view the image well when at the proper angle

- Quantum Mermaid, 2016 by Julian Voss-Andreae


Voluson
E10
B: 134.6mm
C: 54.1mm
A: 44.9mm


Voluson
E8


Voluson
E10
22Hz
Routine 2
HH PI 6.
SRI
LEFT TRANSV


-14cm/s
Mix4/9
CRI 2/VSRI
2D Static CFM
A
B
C
3D

ULTRASOUND in Obstetrics & Gynecology

isuog

Original Paper | Open Access

Separation sign: novel ultrasound sign for ruling out diagnosis of placenta accreta spectrum

R. X. Allwood, A. Self, S. L. Collins

First published: 15 July 2022 | https://doi.org/10.1002/uog.26021

ULTRASOUND in Obstetrics & Gynecology

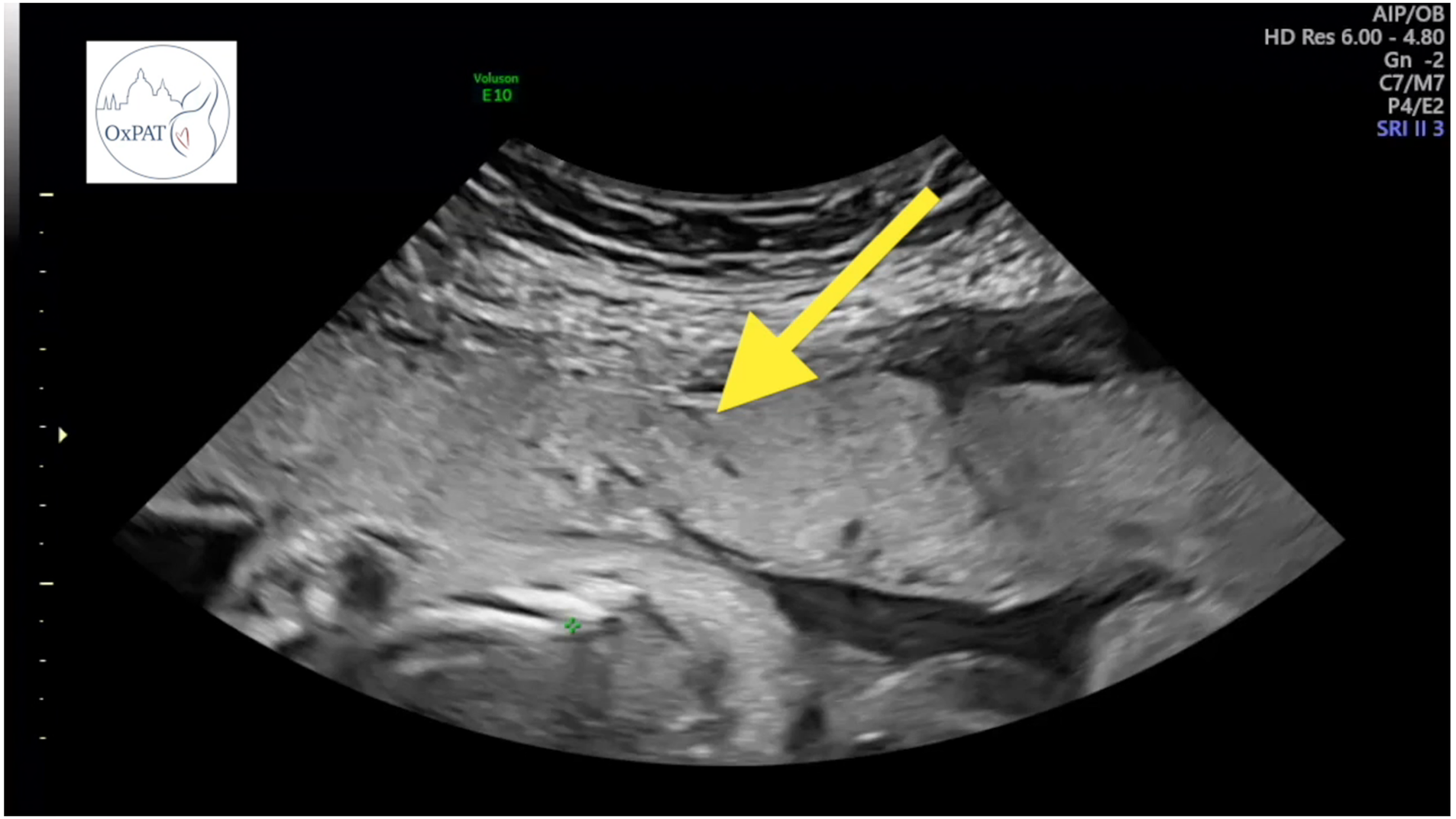
isuog

Original Paper | Open Access

Separation sign: novel ultrasound sign for ruling out diagnosis of placenta accreta spectrum

R. X. Allwood, A. Self, S. L. Collins

First published: 15 July 2022 | https://doi.org/10.1002/uog.26021



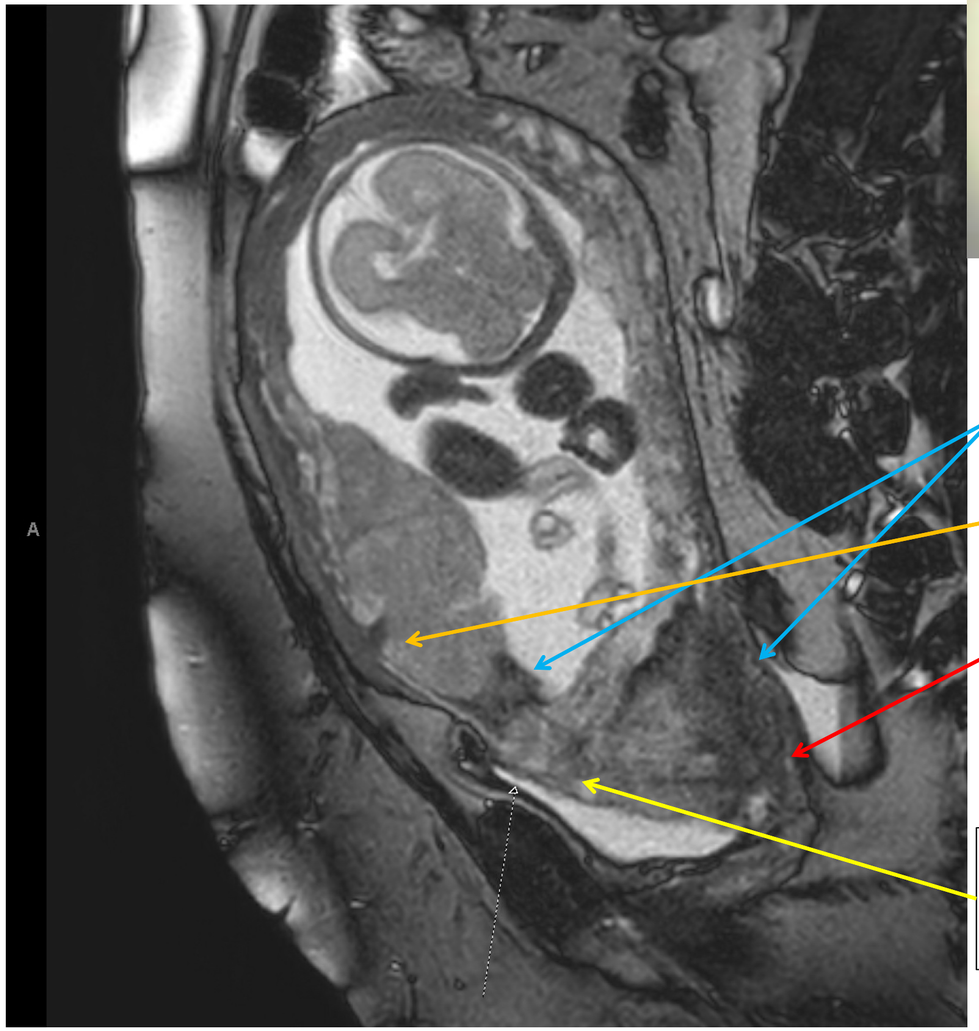
Of the 24 women with a negative separation sign, three (12.5%) had normal placental separation and 21 (87.5%) were diagnosed with PAS.

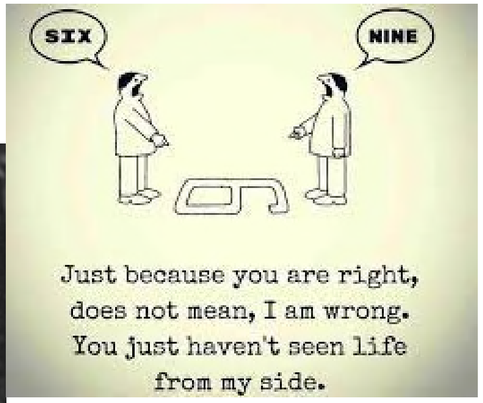
Sensitivity of 98.2% (95% CI, 94.8–99.6%) and specificity of 100% (95% CI, 83.9–100%).

In the high-risk cohort (*n* = 35), a positive separation sign remained a **reliable predictor of normal placental separation, with a positive predictive value of 100%,** sensitivity of 88.9% (95% CI, 65.3–98.6%) and specificity of 100% (95% CI, 80.5–100%).

Early Detection – MRI

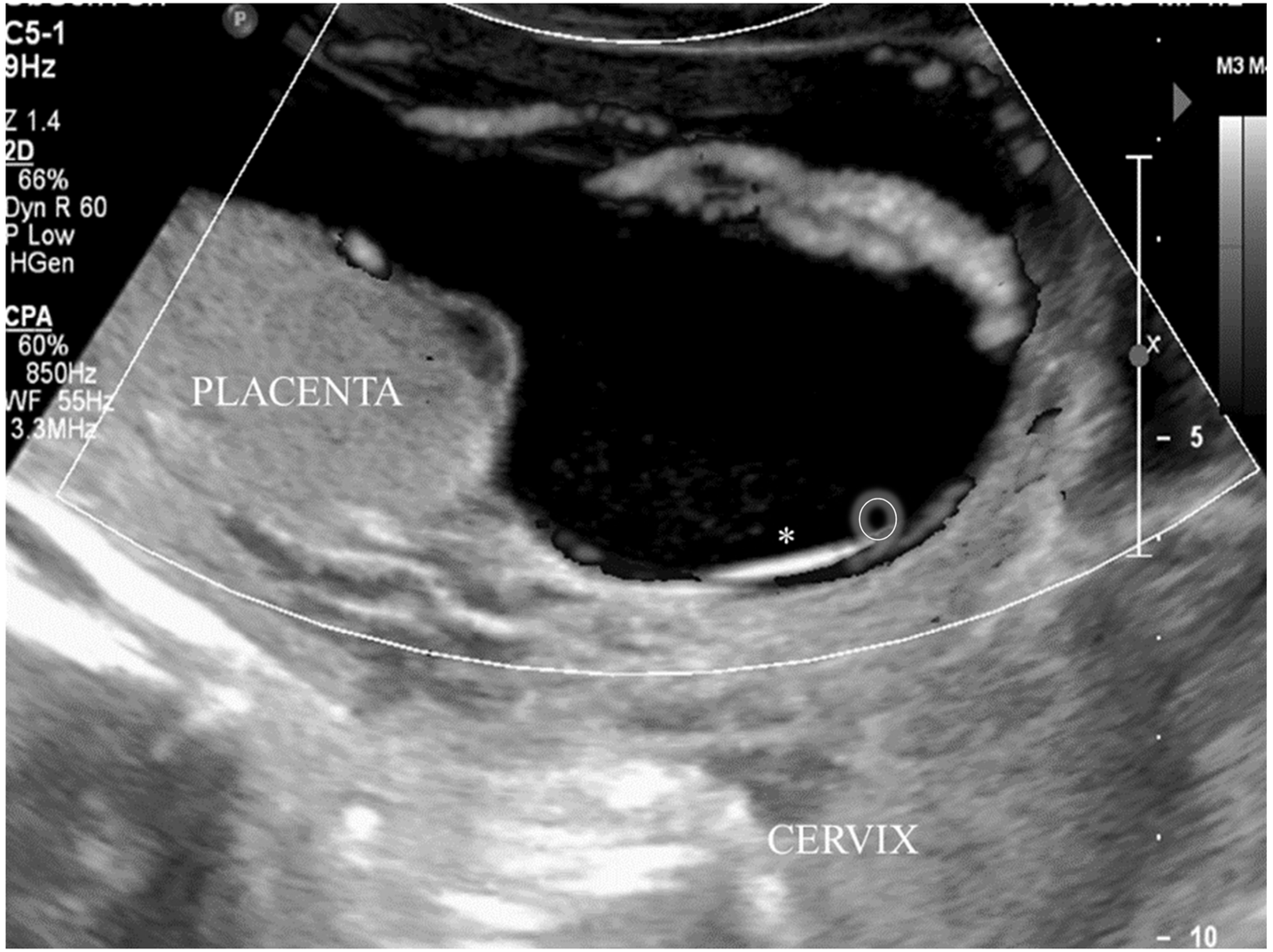
- Adjunct imaging when placenta cannot be completely seen with ultrasound
- More expensive
- **Not universally available**
- Accuracy of read **depends upon imaging quality and experience** of reading physician
- May change diagnosis
  - Not “better than” ultrasound, but viewing from a different modality





* Acknowledge the limitations and capabilities of each imaging modality, local resources, to improve safety planning

Vasa Previa



Fox, KA et al, “The Placenta as a Critical Care Issue, “ Critical Care Obstetrics 6th Ed, Ch 49, p. 821-836, Phelan (Ed) , Wiley Blackwell, c 2019.

To SCAN or NOT to scan….?

Placenta Accreta Spectrum may be limited to just above the cervix – SCAN

Hypervascularity/Vasa Previa may be seen near the cervix, but only visible transvaginally – SCAN

A healthy rim of myometrium superior to the cervix may be delineated which may open the consideration for focal resection and repair -- SCAN

No visible cervix may be identifiable due to deep placental extension/cervical implantation – SCAN

Actively bleeding or known cervical imaging– NO NEED TO SCAN

One study reports that association of short cervix NOT associated with preterm labor in the setting of PAS

Conclusions

1. Screening for clinical risk factors is the first step

2. Screening can be tailored to any level facility, and ONLY works when done

3. You WILL miss 100% of the placental abnormalities for which you do not look → Evaluate the entire placenta (and uterus/cervix)

4. Ultrasound is a highly sensitive, non-invasive screening tool for placental evaluation

THANK YOU!

NEONATAL | MATERNAL | PEDIATRIC • INTENSIVE CARE TRANSPORT TEAM •

Texas Children's Hospital®

kangaroo crew®

For transfers please call:
832-824-5550

Texas Children's Hospital®
Pavilion for Women

Clinic: 832-826-4636
Transfer Center: 832-824-5550