Detection of abnormally invasive placenta: What are we looking for?

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BMUS Obstetric study day September 2024

Topics to be covered

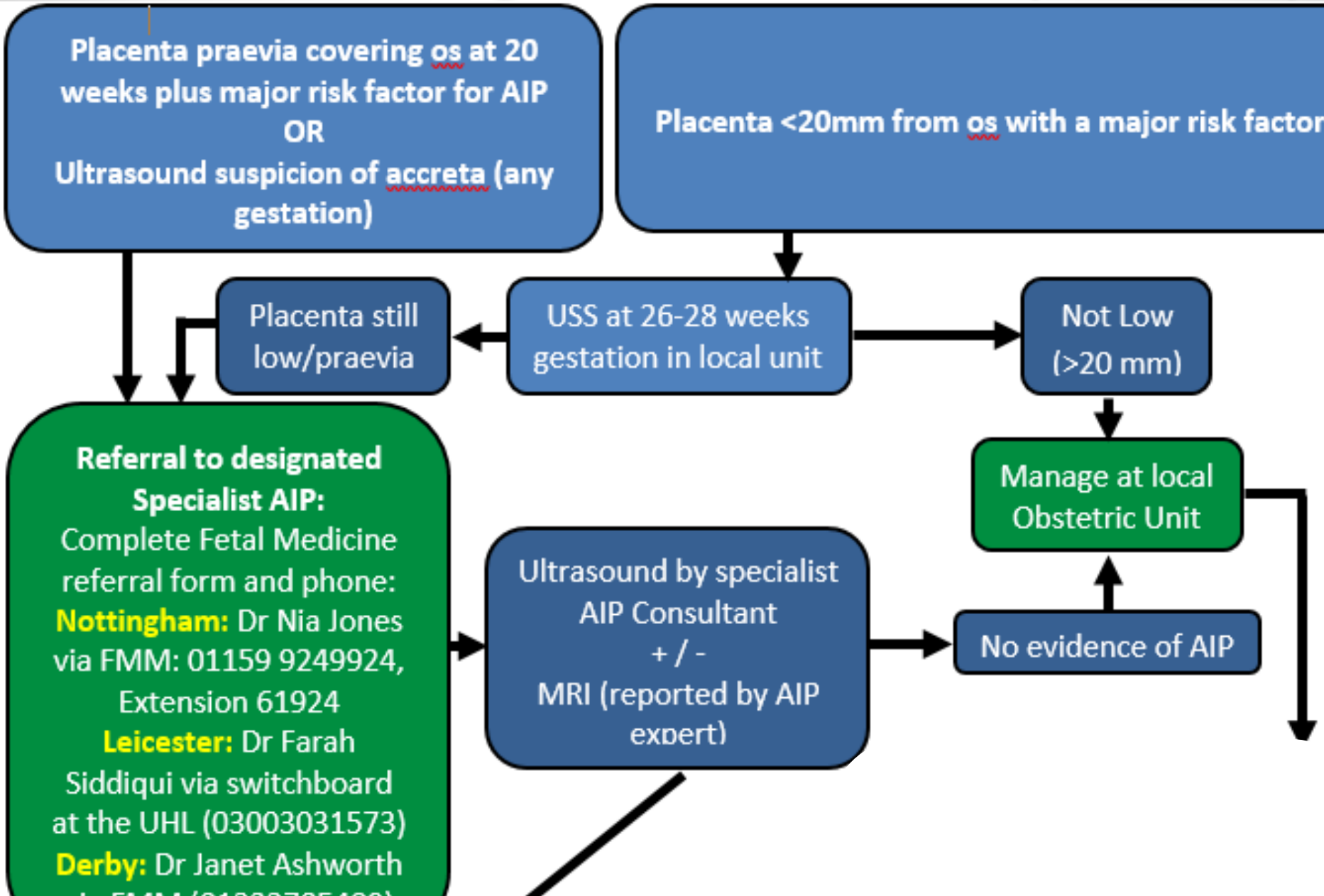
- My background
- East Midlands AIP service/pathway
- Background: pathogenesis and risk factors
- Importance of correct antenatal diagnosis
- MRI- what does this add?
- Ultrasound signs of AIP
- Cases
- **My six key messages for sonographers**

My background in AIP

- PhD awarded 2011 : 'The Development of modern imaging techniques to study placentation'
- Consultant Obstetrician and sub-specialist in Feto-Maternal Medicine in Nottingham in 2013
- Internal placental referrals from outset
  - Diagnosis can be difficult
  - Incorrect diagnosis can result in significant morbidity or overtreatment
  - Desire to establish an MDT to share decision making and diagnosis (lonely place!)
- National discussion on establishing regional services (Accreta symposium Glasgow June 2016)
- East Midlands regional meeting to establish service: first meeting 8.11.16
- EM regional guideline and pathway development
  - Started early 2017 and ratified September 2018

East Midlands regional AIP service pathway

Antenatal diagnosis- Referral pathway



Key message One:

- **Ask woman with a placenta praevia if they have undergone previous LSCS**

- Minimal additional work for sonographer
- Better risk assessment (prior risk known- will get to this later)

Risk factors

Major Risk Factors	History of: • Previous AIP • Caesarean section • Previous trachelectomy • Suspected scar ectopic in this pregnancy

PLACENTA COVERING OS *PLUS* ONE MAJOR RISK FACTOR	**PLACENTA < 20mm FROM OS WITH A MAJOR RISK FACTOR**
↓	↓
FOLLOWING COMPLETED DETAILED SCAN REFER TO REGIONAL AIP CENTRE	**RESCAN 26-28 WEEKS LOCALLY. IF PLACENTA <20MM FROM OS REFER TO REGIONAL AIP CENTRE**

Key message Two:

- **Risk is highest if placenta covers the cervical os in women with previous LSCS**

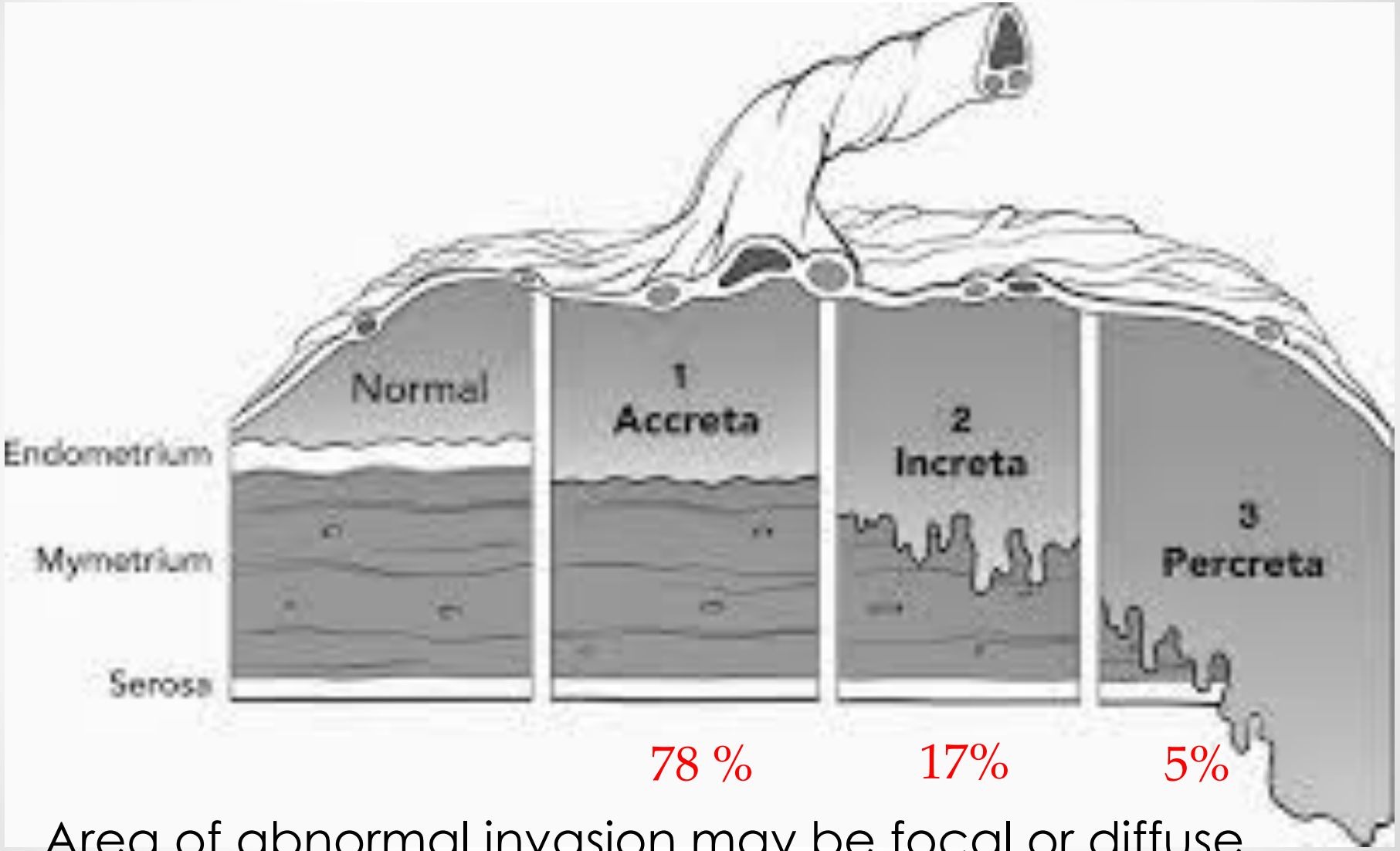
- Remember lower segment does not exist in non-pregnant state and early pregnancy therefore placenta covering the os in early placentation likely to be a greater risk that those that are low lying but not covering the os

What is an AIP?

Invasive placentation: pathogenesis

- Occurs when some / all of placenta attaches directly to the myometrium: no intervening decidua
- Exact pathogenesis unknown. Proposed hypotheses:
  - Mal-development of decidua
  - Excessive trophoblastic invasion
  - Both problems
- Failure of placenta to separate normally at the time of delivery
- Risk of subsequent haemorrhage and damage to other organs during removal of the placenta

Invasive placentation: Grading



- Area of abnormal invasion may be focal or diffuse and vary in depth of invasion

Risk factors?

Risk factors for invasive placentation

The major two risk factors are :

1. placenta praevia
2. previous uterine surgery

Table 4. Placenta Previa and Placenta Accreta by Number of Cesarean Deliveries

Cesarean Delivery	Previa	Previa*:Accreta† [n (%)]	No Previa‡:Accreta† [n (%)]
First§	398	13 (3.3)	2 (0.03)
Second	211	23 (11)	26 (0.2)
Third	72	29 (40)	7 (0.1)
Fourth	33	20 (61)	11 (0.8)
Fifth	6	4 (67)	2 (0.8)
≥ 6	3	2 (67)	4 (4.7)

* Percentage of accreta in women with placenta previa.
† Increased risk with increasing number of cesarean deliveries; $P < .001$.
‡ Percentage of accreta in women without placenta previa.
§ Primary cesarean.

Silver et al. (2006) *Obstet. Gynaecol*

Key message Three:

Risk is based on number of previous LSCS in women with placenta praevia

Previous LSCS	Risk of AIP if anterior placenta praevia
0	<5%
1	10%
2	40%
3 or more	67% (or 2/3)

Risk much lower with a posterior placenta praevia

Incidence?

Recent changes

- **Increased incidence**
  - **1970s: 1/4000**
  - **1980s 1/2500**
  - **1992-2002 1/500**
    - **USA statistics**
- Increased Caesarean section rates
- Improved diagnostic skills (high risk women)

Antenatal diagnosis: why is it important we get the diagnosis right?

Importance of antenatal diagnosis

- Definitive diagnosis
- Delivery planning
  - multi-professional team: fetal medicine specialist, obstetrician, obstetric anaesthetist, gynaecologist, urologist, interventional radiologist
- Discussion of surgical approach to delivery
- Preparation for hysterectomy if needed
- Cell salvage use
- Blood products to be readily available
- Appropriate counselling of patient

- NB: RCOG placenta praevia/accreta care bundle

Patient counselling

- Details of diagnosis and suspected extent of invasion
- Avoid sexual intercourse
- Admission if any vaginal bleeding. Discuss elective antenatal admission
- Option of sterilisation if uterus conserved and risk of AIP in subsequent pregnancy
- Risks to be discussed
  - Preterm delivery
  - Antepartum haemorrhage
  - Risk of severe haemorrhage
  - Need for blood transfusion and cell salvage
  - Potential for hysterectomy. May be the preferred option.
  - Damage to surrounding structures, particularly bladder and ureters
  - Potential risk of death (up to 7% for placenta percreta)

Regional abnormal invasive placentation service

Elements of planning

- Confirmation of diagnosis
- Assessment for evidence of extra-uterine invasion
- Timing of elective surgery including date and team
- Timing of admission
- Surgical planning:
  - Planned anaesthesia
  - Cystoscopy and/or ureteric stenting
  - Interventional radiology
  - Patient positioning (supine or lithotomy)
  - Planned abdominal incision (Pfannenstiel or midline)
  - Operative plan- removal of placenta, surgical resection, hysterectomy, conservative (placenta left in situ)
  - Anticipated parametrial or paravesical dissection
  - Anticipated transfusion requirements
  - Team members to be present for delivery (elective and emergency)

Surgical management of morbidly adherent placenta

- Consider uterine incision distant to the placenta (classical, high transverse or fundal incision). Pre-operative USS can identify best site
- May reduce bleeding: utero-placental blood flow 700-900 ml/min at term

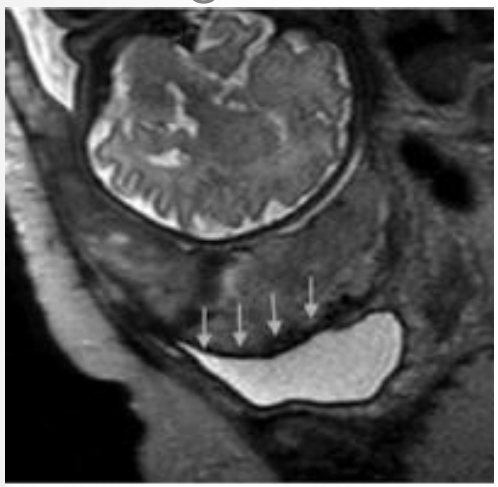
UKOSS study

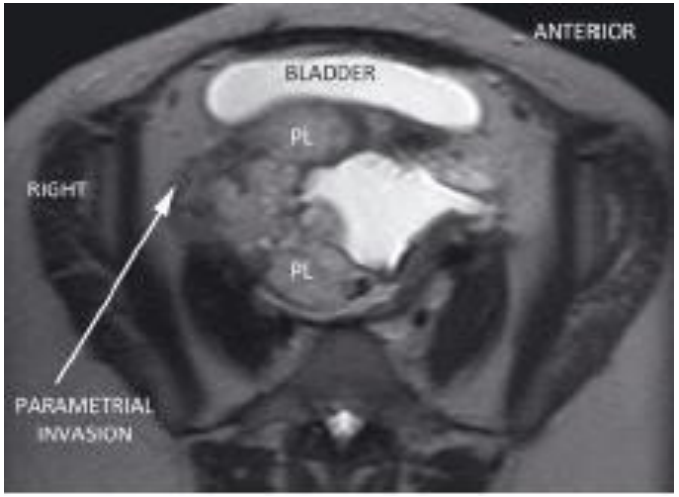
- All women with invasive placentation) in UK over 1 year period, starting May 2010
- Population based prospective cohort study
- Incidence: 1.7 per 10,000 maternities (95% confidence interval 1.4 – 2.0) i.e. **133 cases** out of 798,634 maternities
- **50 % (66/133) suspected antenatally**
  - 95% (63) had a placenta praevia and previous Caesarean (20/30 with no AN diagnosis also had a placenta praevia and previous Caesarean)
  - 97% (64) had a placenta praevia
  - Diagnostic tools: 42 % (28) USS and MRI / 48 % (32) USS only / 9 % (6) MRI only
- **Antenatal diagnosis associated with:**
  - **reduced levels of haemorrhage (2800 ml vs 6100 ml; p=0.008)**
  - **reduced need for transfusion (59 % vs 94 %; p=0.014)**
- No attempt to remove placenta associated with less bleeding

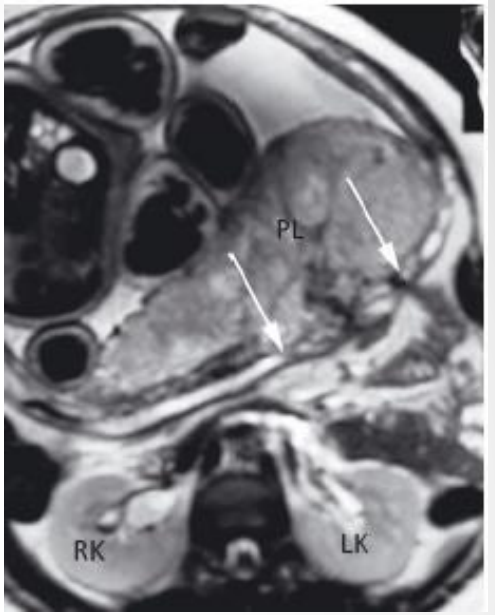
MRI- what does this add?

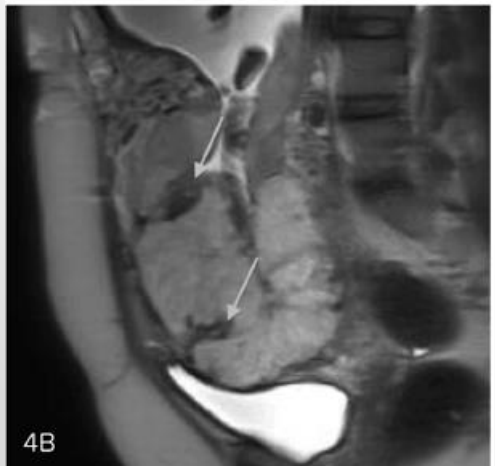
MRI features

- Uterine bulging
- Heterogeneous signal intensity within the placenta
- Dark intra-placental bands (T2-weighted)
- Focal interruption of myometrium
- Tenting of bladder









Images: Riteau (2014) *Plos ONE*

Palacios-Jaraquemada (2013) *Acta Obstet Gynecol*

MRI may be of benefit

- Ambiguous USS findings
- Obesity
- Posterior placenta accreta suspected*
- Previous myomectomy*
- Suspected parametrial involvement

* USS beam impeded by fetal head or scar tissue

Should we use USS or MRI for diagnosis?

Ultrasound Obstet Gynecol 2013; 42: 509–517
Published online 2 October 2013 in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/uog.13194

Prenatal identification of invasive placentation using ultrasound: systematic review and meta-analysis

F. D'ANTONIO, C. IACOVELLA and A. BHIDE

Fetal Medicine Unit, Division of Developmental Sciences, St George's University of London, London, UK

KEYWORDS: invasive placental implantation; placenta accreta; prenatal diagnosis; ultrasound

- 23 studies; 3707 pregnancies.
- Prevalence of invasive placentation 9.3 %
- Subjects mainly placenta praevia and history of previous uterine surgery

Ultrasound Obstet Gynecol 2014; 44: 8–16
Published online 2 June 2014 in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/uog.13327

Prenatal identification of invasive placentation using magnetic resonance imaging: systematic review and meta-analysis

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KEYWORDS: invasive placental implantation; MRI; placenta accreta; prenatal diagnosis

- 18 studies; 1010 pregnancies
- Prevalence of invasive placentation 75 % (varied from 20 - 97 % in studies)

Impact of prevalence on diagnostic accuracy results

Truth

Test Result	Disease (number)	Non Disease (number)	Total (number)
Positive (number)	10 **A** (True Positive)	40 **B** (False Positive)	50 $T_{Test\ Positive}$
Negative (number)	5 **C** (False Negative)	45 **D** (True Negative)	50 $T_{Test\ Negative}$
	15 $T_{Disease}$	85 $T_{Non\ Disease}$	100 Total

- Prevalence 15% or(15/100)x100
- Sensitivity (10/15)x100= 67%; specificity (45/85)x100= 53%
- **PPV** (10/50)x100**= 20%;** **NPV** (45/50)x100**= 90%**

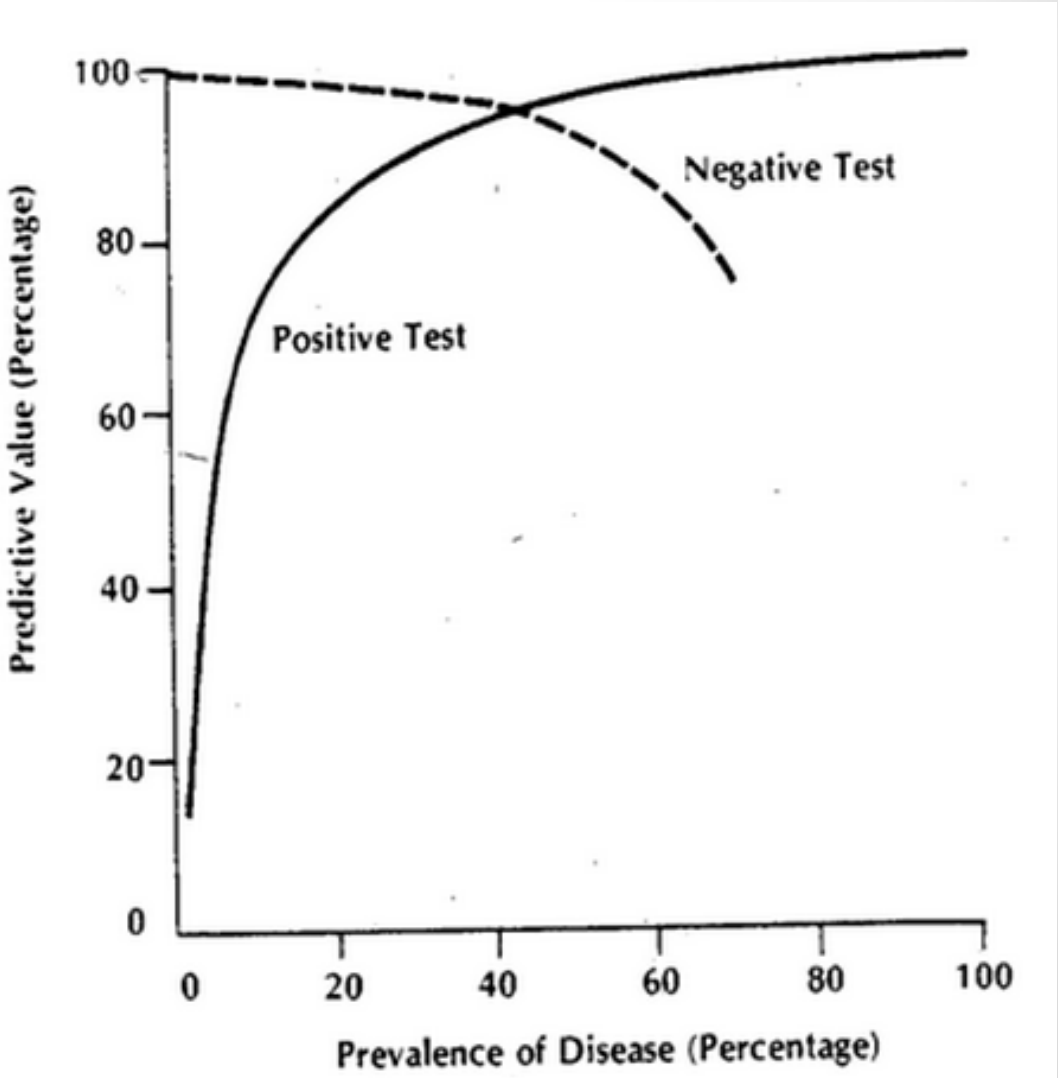
Truth

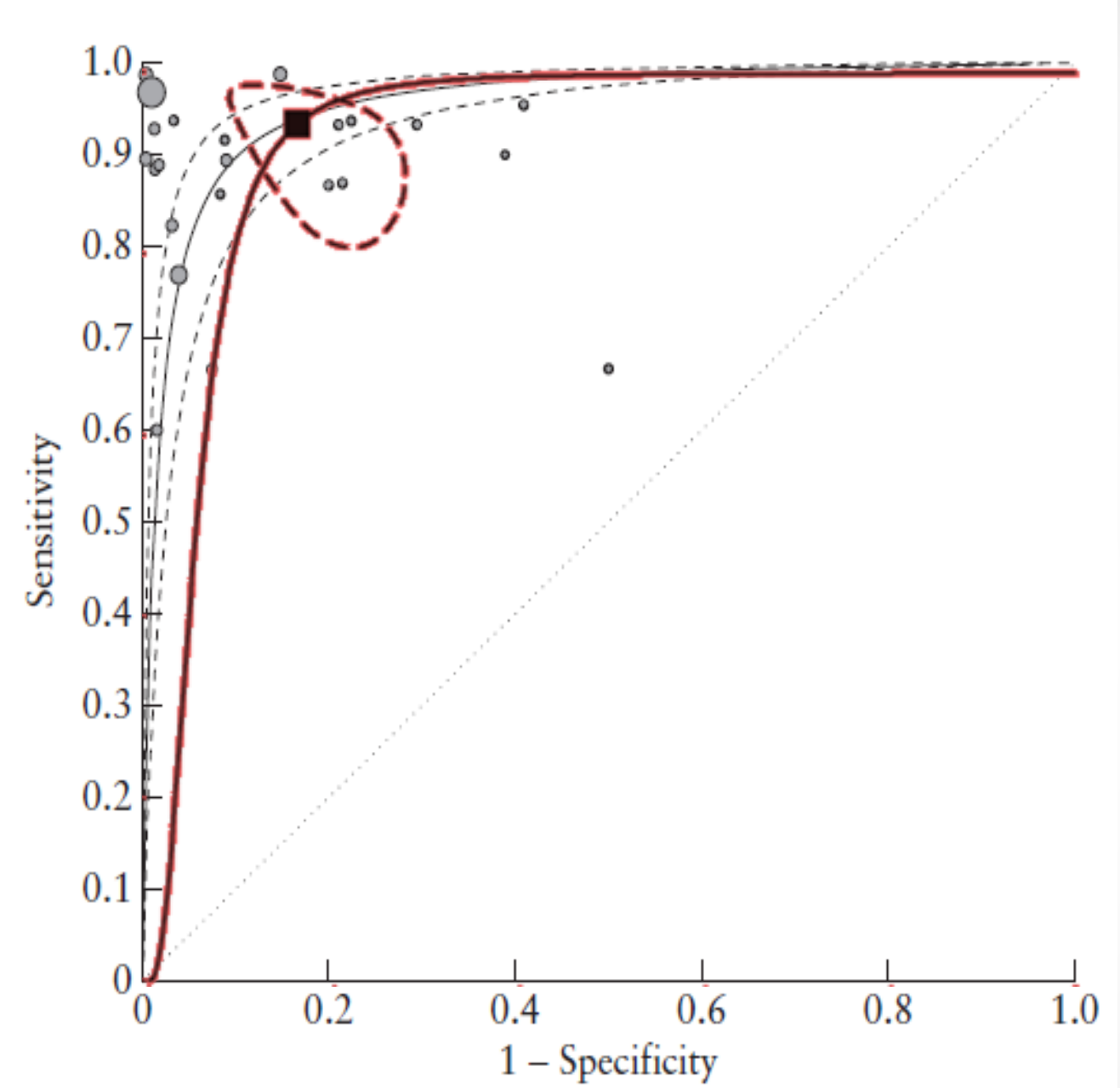
Test Result	Disease (number)	Non Disease (number)	Total (number)
Positive (number)	20 **A** (True Positive)	33 **B** (False Positive)	53 $T_{Test\ Positive}$
Negative (number)	10 **C** (False Negative)	37 **D** (True Negative)	47 $T_{Test\ Negative}$
	30 $T_{Disease}$	70 $T_{Non\ Disease}$	100 Total

- Prevalence 30% or(30/100)x100
- Sensitivity and specificity unchanged
- **PPV** (20/53)x100**= 38%**; **NPV** (37/47)x100**= 79%**

Impact of prevalence of predictive value of test

- Positive and negative predictive values are influenced by the prevalence of disease in the tested population
- High prevalence setting: more likely that those with test positive truly have disease compared with low prevalence population





ROC curves for diagnostic accuracy of USS overall (black) and MRI (red) for invasive placentation. Adapted from Systematic Review: D'Antonio (2013) *Ultrasound Obstet Gynecol* and D'Antonio (2014) *Ultrasound Obstet Gynecol* respectively

Test accuracy

	USS Result (95% CI)	MRI Result (95% CI)
Sensitivity	**97 5 (87.2 – 93.6) %**	**94.4 (86.0 – 97.9) %**
Specificity	**96.9 (96.3 – 97.5) %**	**84.0 (76.0 – 89.8) %**
Positive likelihood ratio	**11.0 (6.1 – 20.1)**	**5.91 (3.73 – 9.39)**
Negative likelihood ratio	**0.16 (0.11 – 0.20)**	**0.07 (0.02 – 0.18)**

- No difference in sensitivity (p=0.24) or specificity (p=0.91) between USS and MRI
- N=4 studies; 255 pregnancies
- Not all blinded to result of previous investigation

D'Antonio (2013) *Ultrasound Obstet Gynecol;* D'Antonio (2014) *Ultrasound Obstet Gynecol*

Ultrasound signs of AIP

Key message Four:

- **Not looking for previous LSCS scar but for evidence of disordered architecture in placenta**

- Be systematic in looking through the whole placenta otherwise you might miss small areas of localised AIP (see case 3)

Ultrasound features for diagnosis: Greyscale

- Loss or irregularity of the retroplacental sonolucent (clear) zone
- Thinning or disruption of the hyperechoic serosa–bladder interface (bladder wall interruption)
- Presence of focal exophytic masses invading the urinary bladder
- Placental bulge
- Abnormal placental lacunae

Loss of the retroplacental sonolucent (clear) zone

- Loss or irregularity of hypoechoic plane in myometrium underneath placental bed
- Likely to represent penetration of villi through decidua basalis into myometrium

FIGURE 6
Impact of probe pressure and bladder filling on placental bed ultrasound features

Transabdominal ultrasound longitudinal views of same part of placental (P) bed of low-lying P at 32 weeks using same machine settings. Full bladder (B) with **A**, minimal and **B**, increased probe pressure. **C**, Empty B and minimal probe pressure. Note changes in clear zone (arrows).

Jauniaux. Pathophysiology and ultrasound imaging of placenta accreta spectrum. Am J Obstet Gynecol 2018.

Figure 1. Loss of the normal retroplacental clear space on ultrasonography.

doi:10.1371/journal.pone.0094866.g001

- Images: Riteau (2014) *Plos ONE*

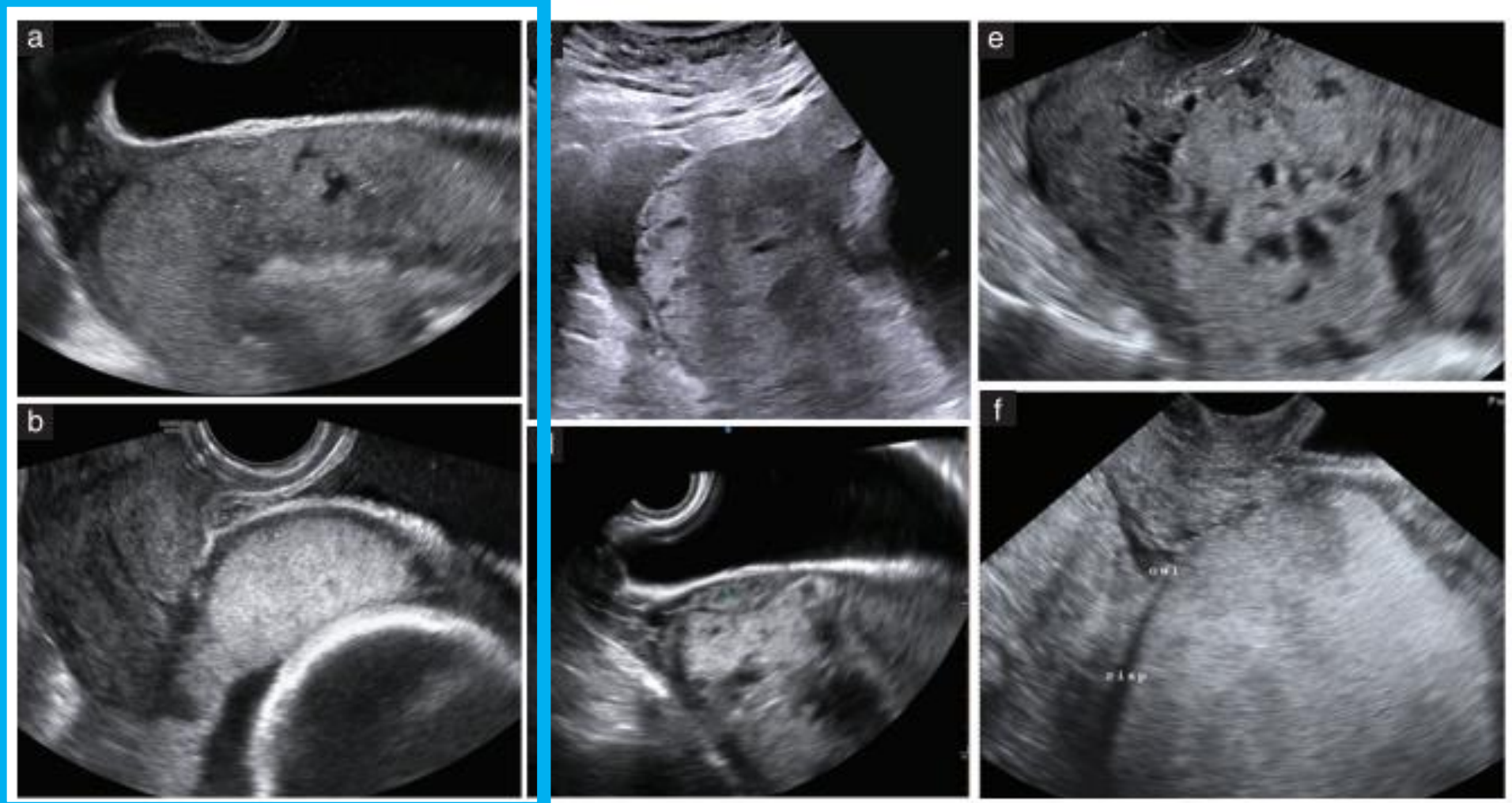
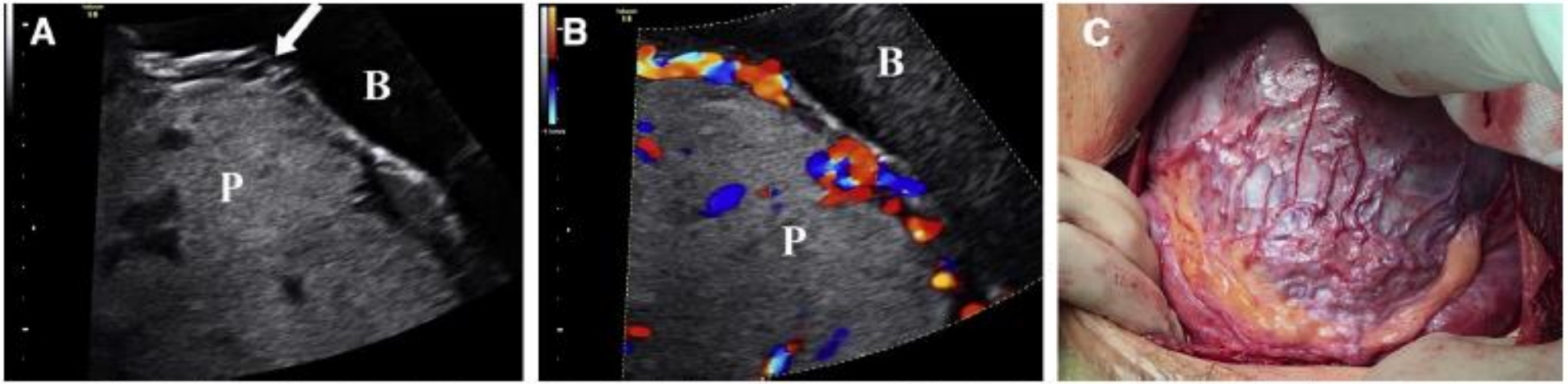


Figure 1 Grayscale ultrasound images obtained at 30–32 weeks' gestation, showing presence (a,c,e) and absence (b,d,f) of sonographic signs of placenta accreta spectrum disorder. (a,b) Obliterated (a) and normal (b) hypoechogenic space between uterus and placenta; (c,d) interrupted (c) and normal (d) hyperechogenic interface between uterine serosa and bladder wall; (e,f) presence (e) and absence (f) of abnormal placental lacunae.

Thinning or disruption of the hyperechoic serosa–bladder interface

- Loss, interruption or irregularity of bright bladder wall i.e. the hyperechoic band or line between the uterine serosa and bladder lumen

FIGURE 14
Ultrasound and macroscopic impact of invasive placentation on the utero-bladder interface

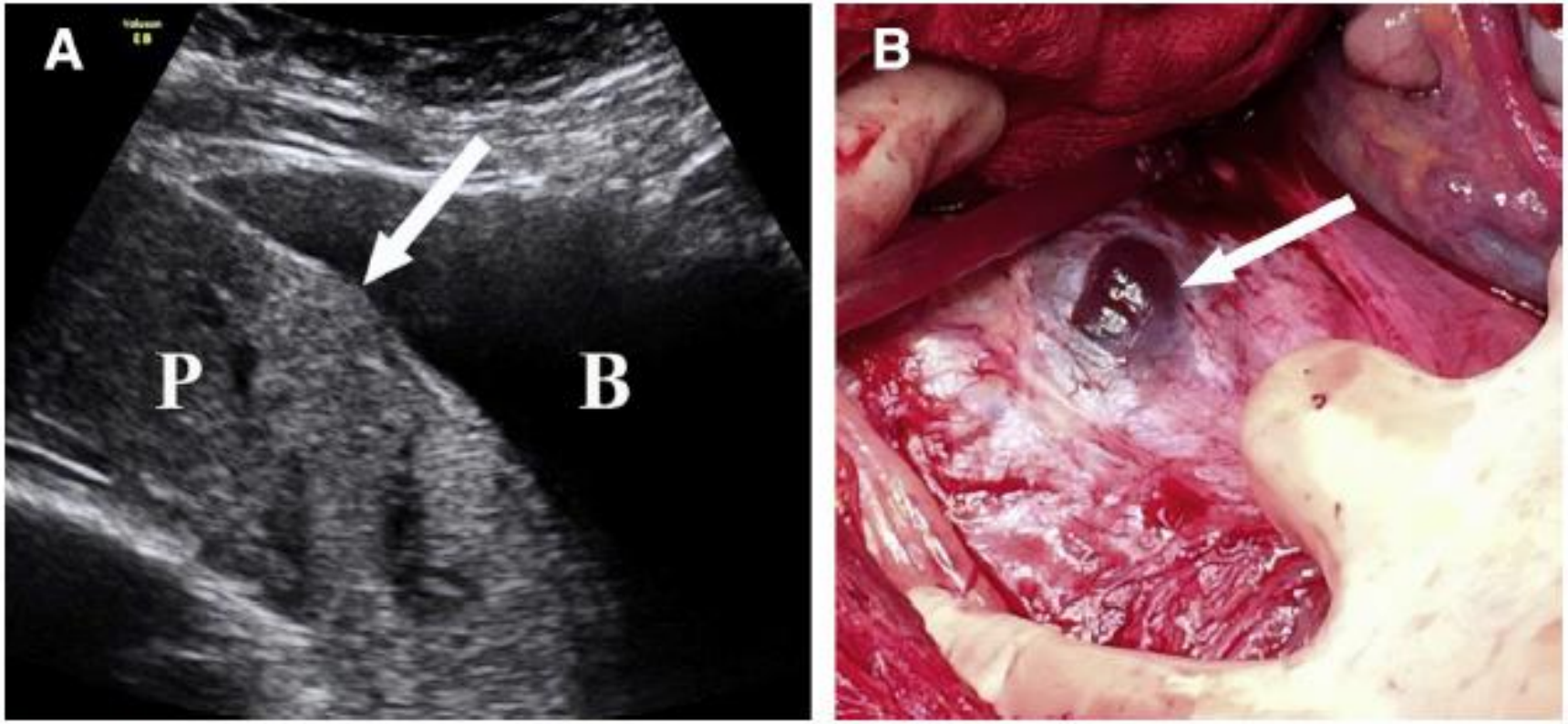


Placenta (P) previa increta. Transabdominal ultrasound longitudinal views at 28 weeks. **A**, Bladder (B) bulge demonstrating B wall interruption (arrow) and **B**, bridging vessels on color Doppler imaging. **C**, Surgery at 34 weeks showing extensive neovascularity and myometrial distension over increta area.

Jauniaux. Pathophysiology and ultrasound imaging of placenta accreta spectrum. Am J Obstet Gynecol 2018.

FIGURE 8

Myometrial thinning under placental bed and cesarean scar defect

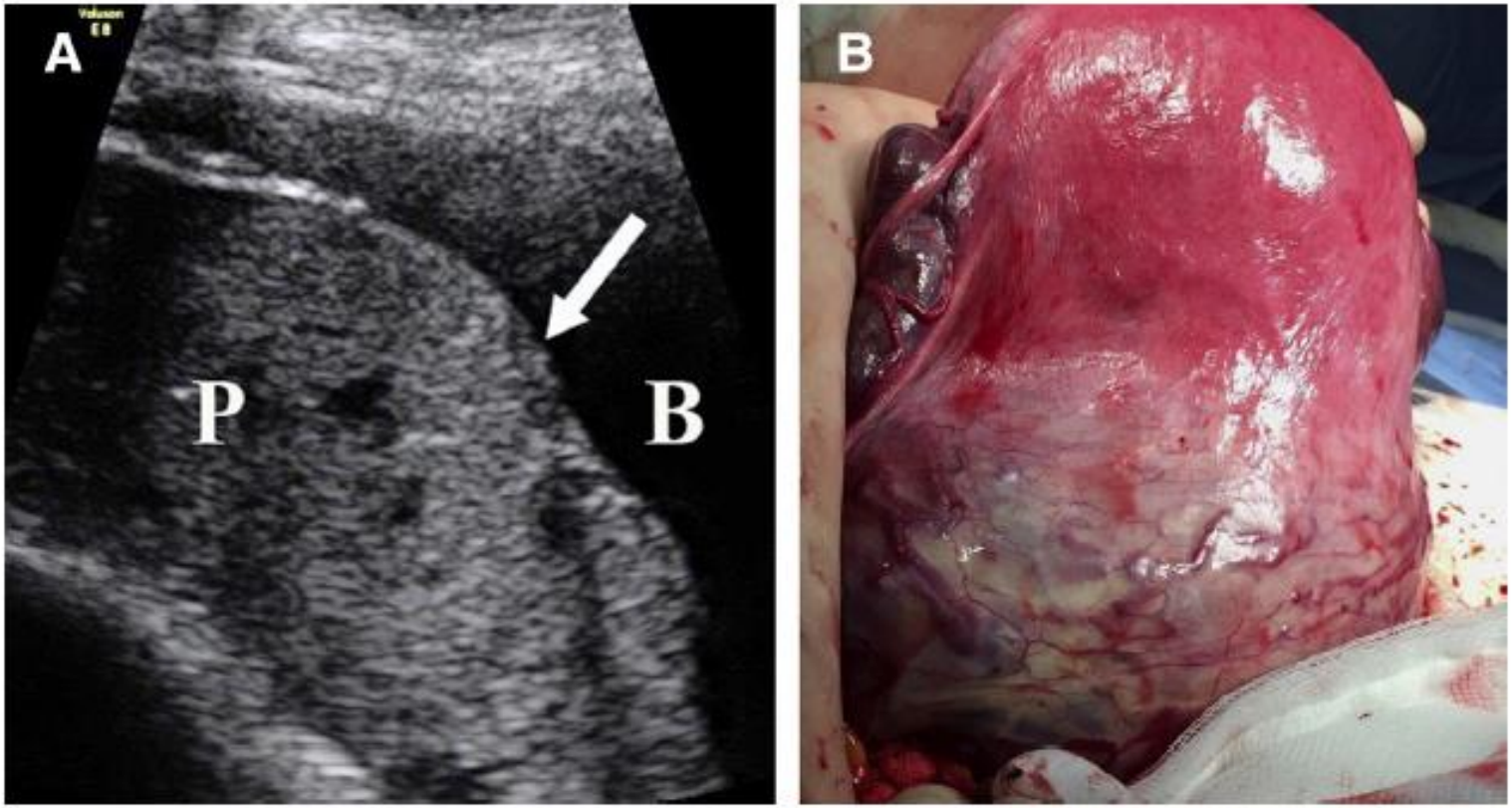


Myometrial thinning secondary to uterine thinning at scar defect. **A**, Transabdominal ultrasound longitudinal view of placenta (P) previa at 36 weeks showing myometrium defect (arrow) under bladder (B). Note absence of clear zone and myometrium in area. **B**, Findings at surgery later same day of "uterine window" (arrow).

Jauniaux. Pathophysiology and ultrasound imaging of placenta accreta spectrum. Am J Obstet Gynecol 2018.

FIGURE 9

Invasive placenta previa showing no interface between placental bed and bladder wall



Myometrial thinning secondary to abnormally invasive placenta (P) accreta. **A**, Transabdominal ultrasound longitudinal view of P previa at 36 weeks showing no clear zone or myometrium detectable (arrow) between P and bladder (B). **B**, Findings at surgery later same day showing neovascularization and myometrial distension over accreta area.

Jauniaux. Pathophysiology and ultrasound imaging of placenta accreta spectrum. Am J Obstet Gynecol 2018.

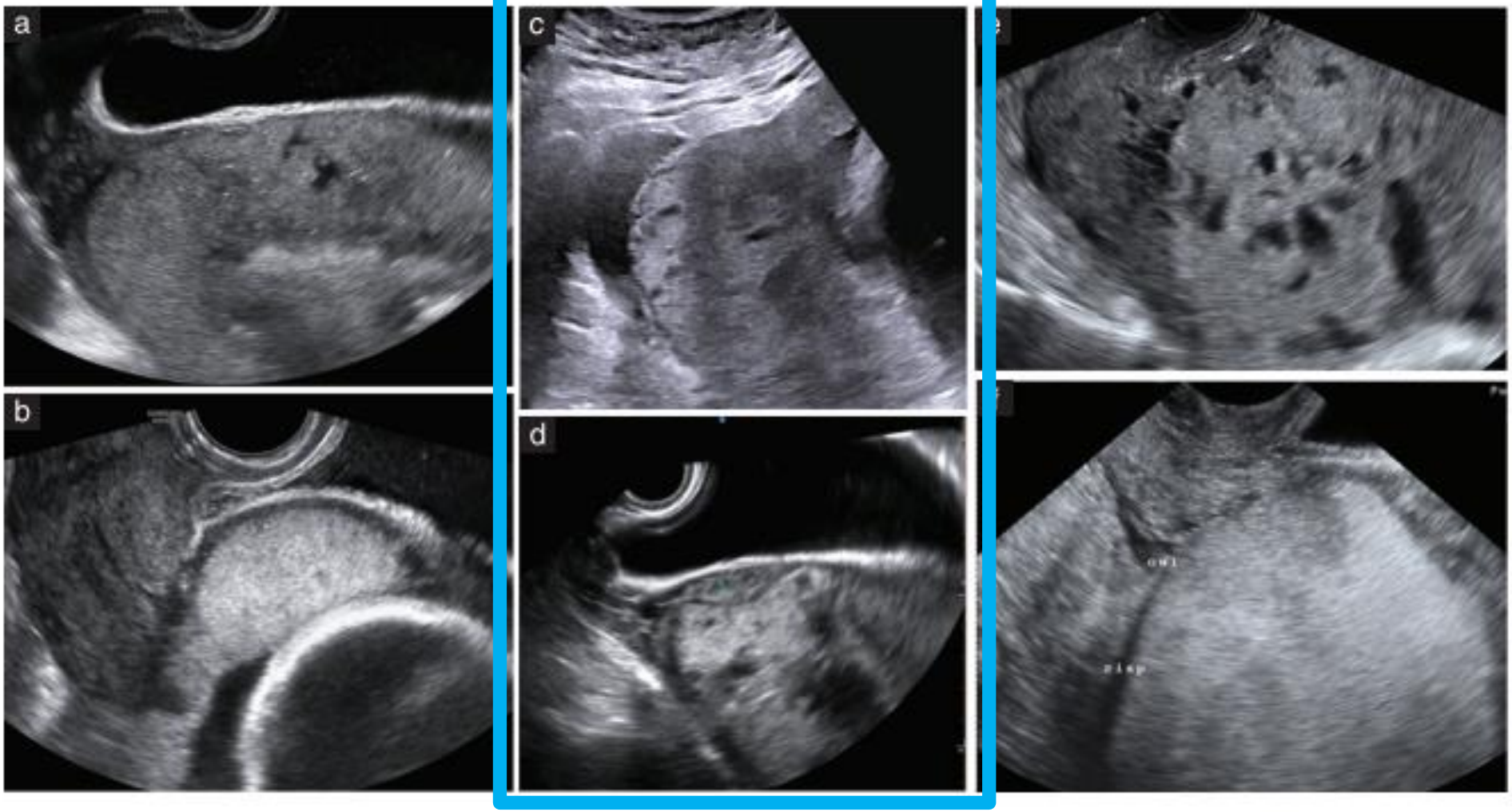


Figure 1 Grayscale ultrasound images obtained at 30–32 weeks' gestation, showing presence (a,c,e) and absence (b,d,f) of sonographic signs of placenta accreta spectrum disorder. (a,b) Obliterated (a) and normal (b) hypoechogenic space between uterus and placenta; (c,d) interrupted (c) and normal (d) hyperechogenic interface between uterine serosa and bladder wall; (e,f) presence (e) and absence (f) of abnormal placental lacunae.

Presence of focal exophytic masses invading the urinary bladder

- Placental tissue seen breaking through uterine serosa and extending beyond it; most often seen inside filled urinary bladder

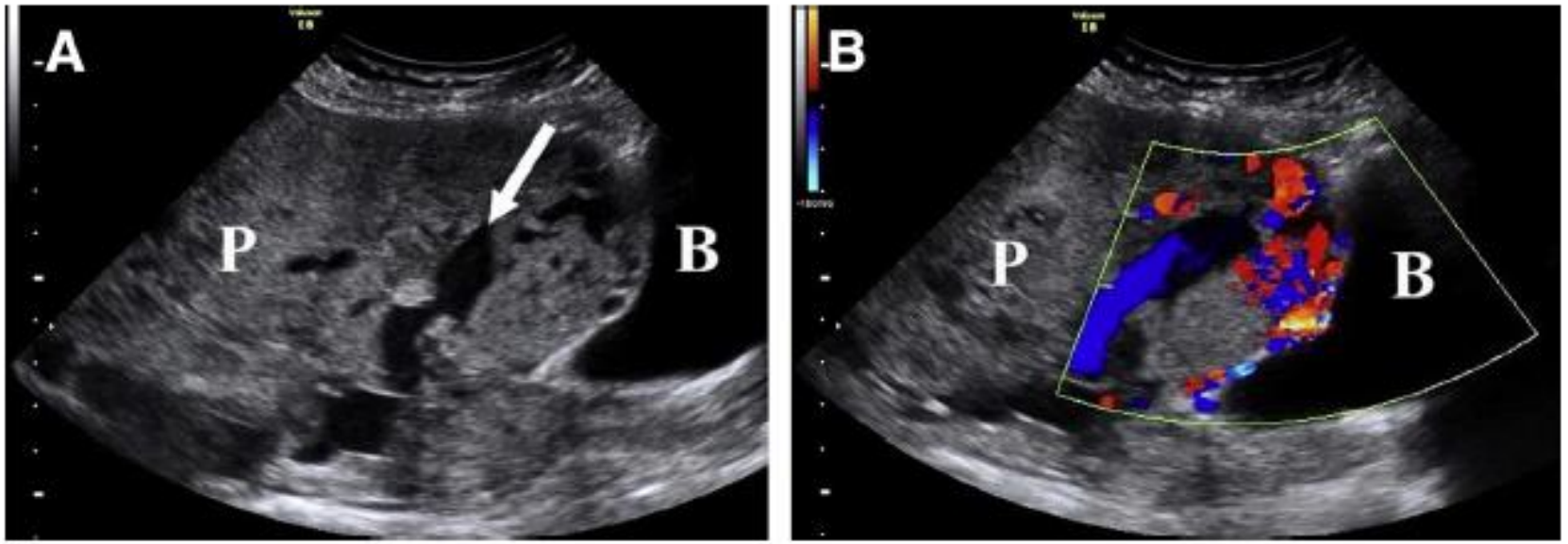
Figure 2. Uterine bulging and disruption of the hyperechogenic uterine serosa-bladder wall interface on ultrasonography.
doi:10.1371/journal.pone.0094866.g002

Images: Riteau (2014) *Plos ONE*

Abnormal placental lacunae

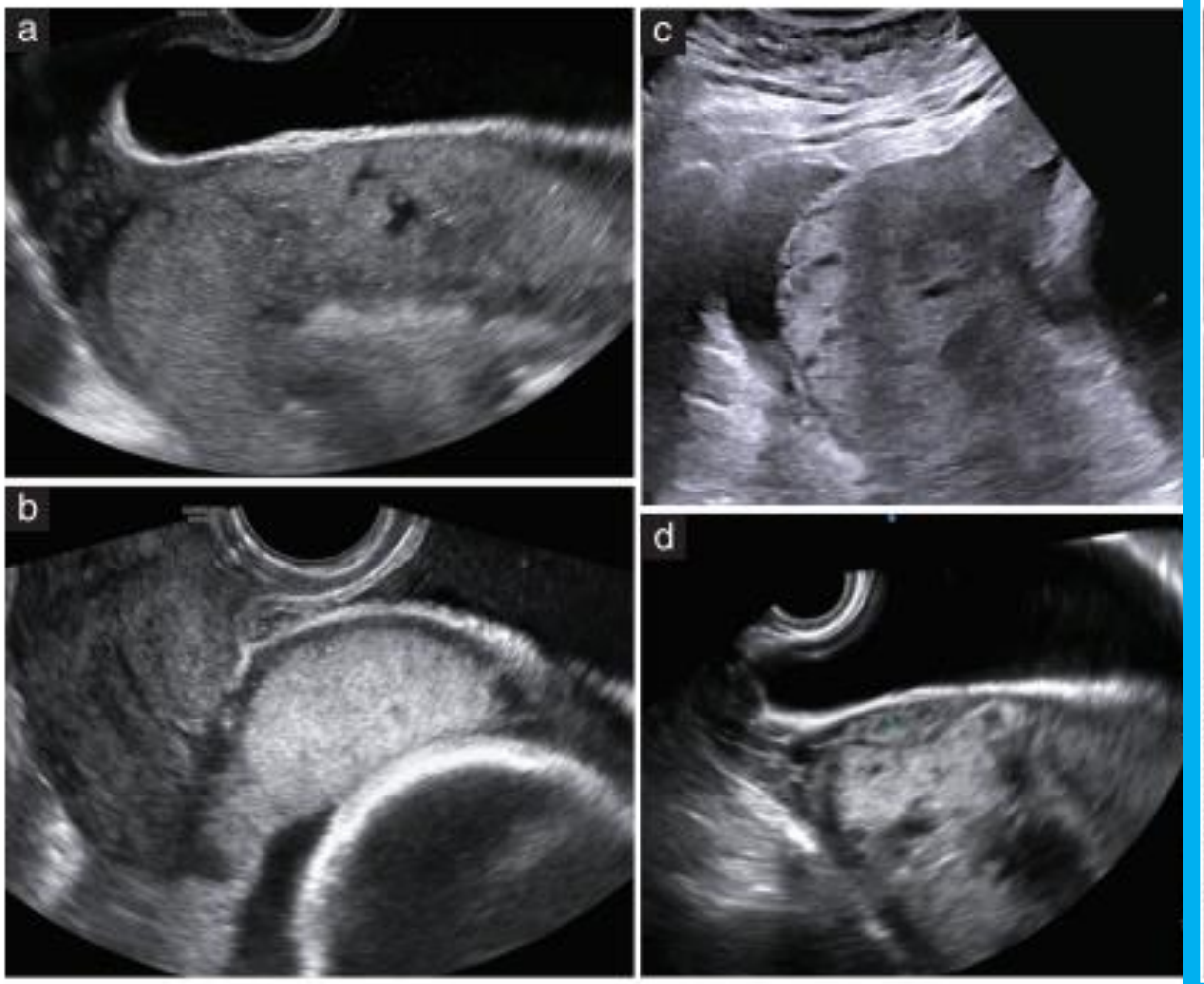
- Often multiple, large, irregular sonolucent areas "moth-eaten". May be localised. Contain turbulent flow

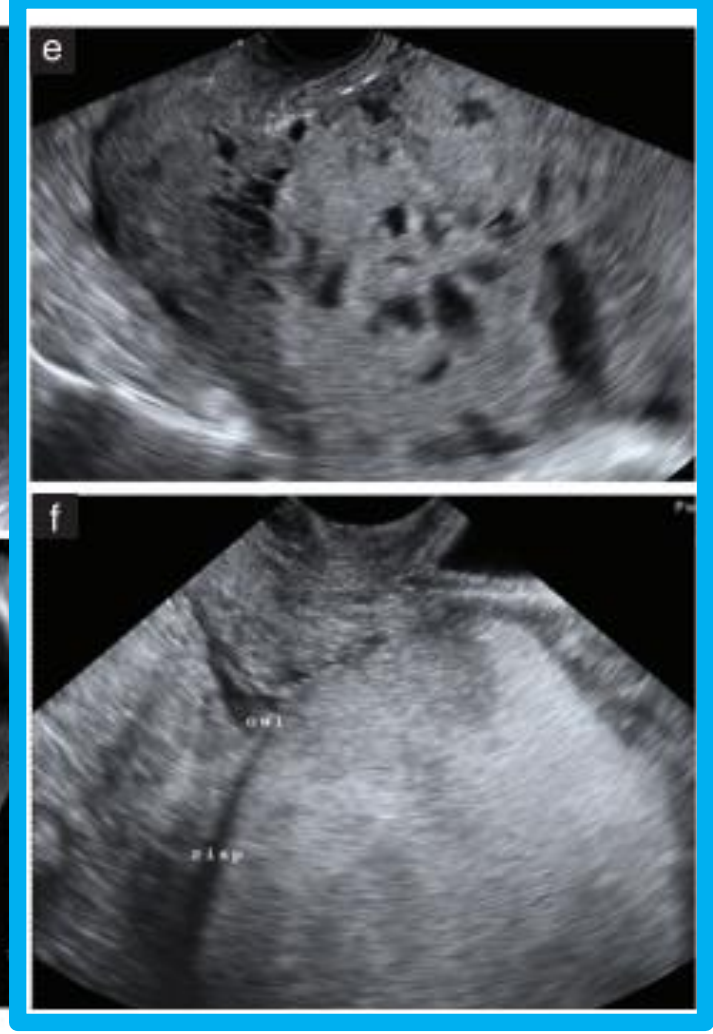
FIGURE 10
Moth-eaten features in invasive placenta previa



Transabdominal ultrasound longitudinal views of placenta (P) previa accreta at 36 weeks. **A**, "Moth-eaten" area with numerous lacunae of different size and shape secondary; and **B**, high-velocity, turbulent blood flow within lacunae on color Doppler imaging next to bladder (B).

Jauniaux. Pathophysiology and ultrasound imaging of placenta accreta spectrum. Am J Obstet Gynecol 2018.





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Ultrasound features for diagnosis:

Colour Doppler

- Vascular lacunae and feeder vessels leading from myometrium into lacunae causing turbulent flow on entry - diffuse or focal
- Utero-vesical hyper-vascularity (serosa–bladder interface)
- Sub-placental hyper-vascularity
- Bridging vessels - extending from placenta across myometrium, often perpendicular to myometrium, possibly beyond serosa into bladder or surrounding organs
  - Results from excessive dilatation of utero-placental circulation beyond spiral arteries (radial and arcuate arteries)
  - Associated with neovascularisation in peritoneum

Utero-vesical hypervascularity

- Striking colour Doppler signal between myometrium and posterior wall of bladder
- Probably indicates numerous, closely packed, tortuous vessels, multidirectional flow and aliasing artifact

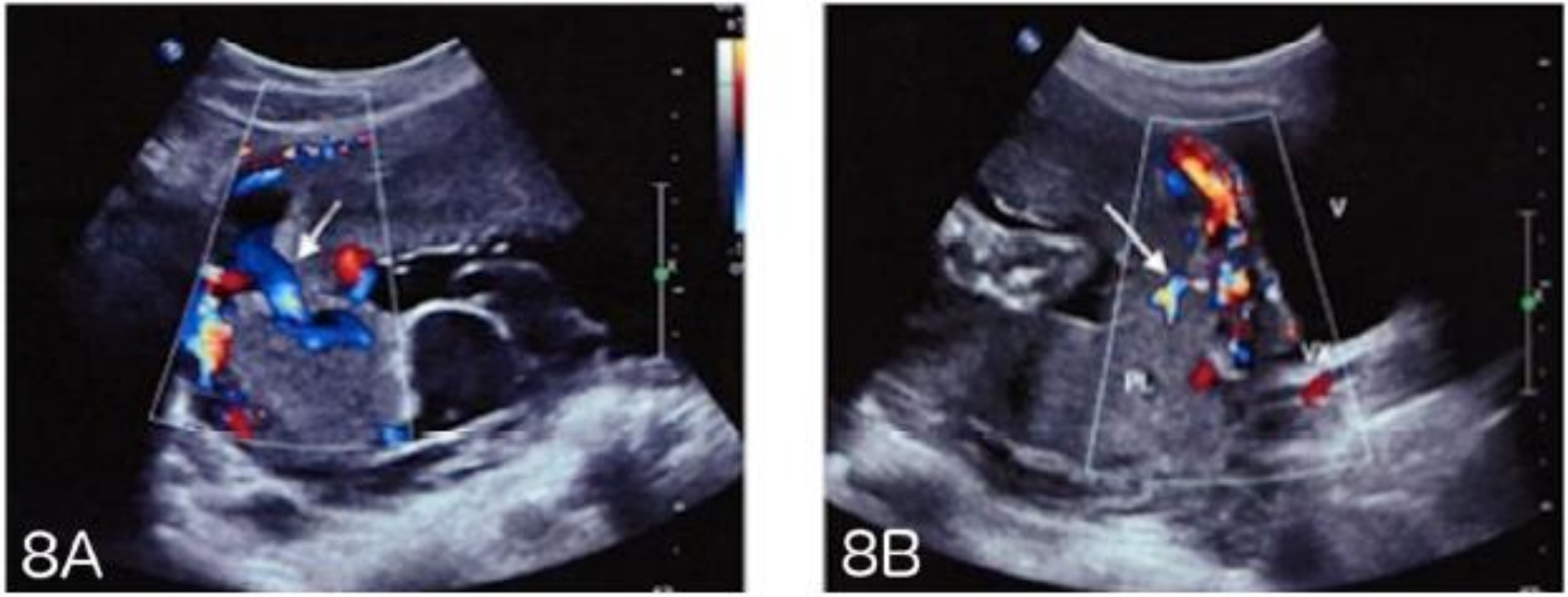


Figure 8. A–B - Intraplacental vascularization perpendicular to the myometrium and hypervascularization on ultrasound.
doi:10.1371/journal.pone.0094866.g008

Images: Riteau (2014) *Plos ONE*

Sub-placental hypervascularity

- Striking colour Doppler signal seen in placental bed

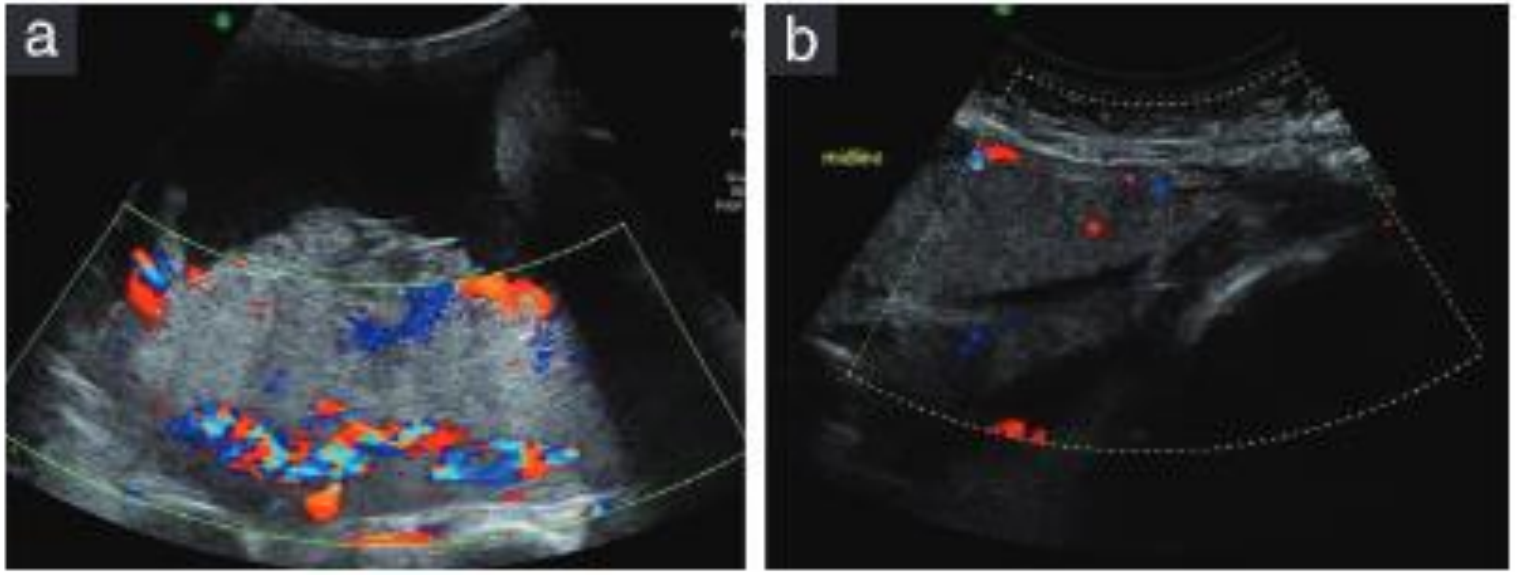
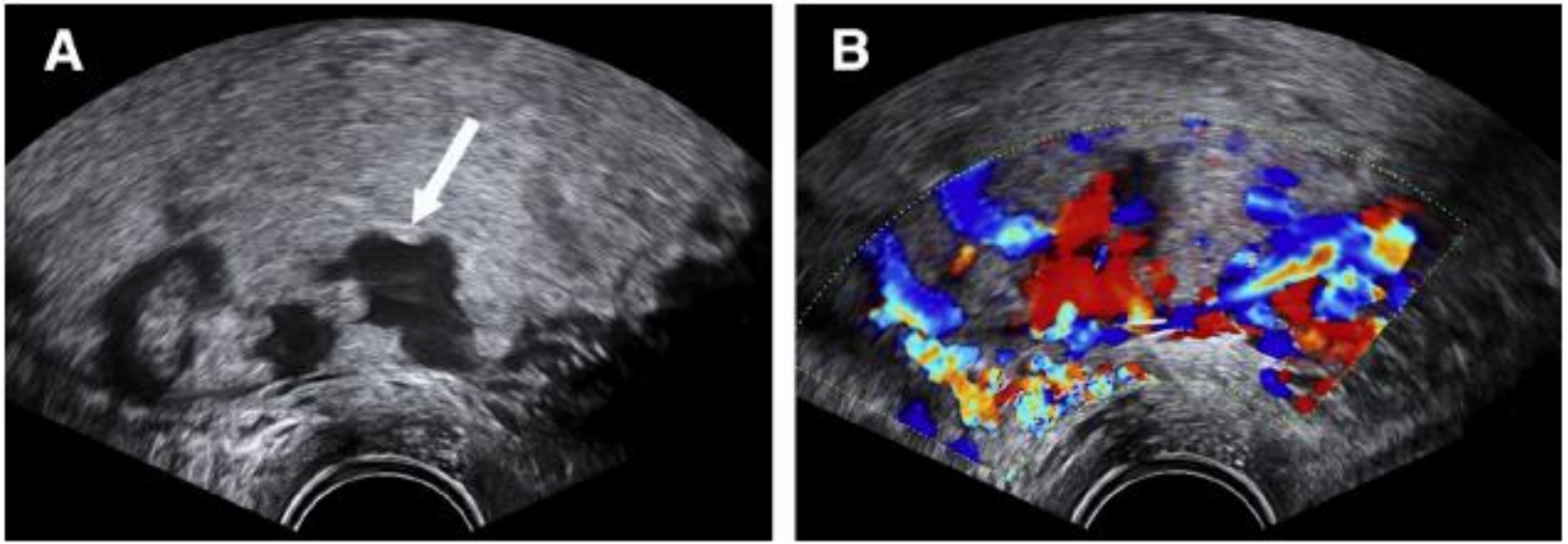


Figure 8 Subplacental hypervascularity (a) and a normal example for comparison (b) on color Doppler imaging.

Collins (2016) Ultrasound Obstet Gynecol

FIGURE 11

Lacunae distorting several cotyledons in a placenta previa increta



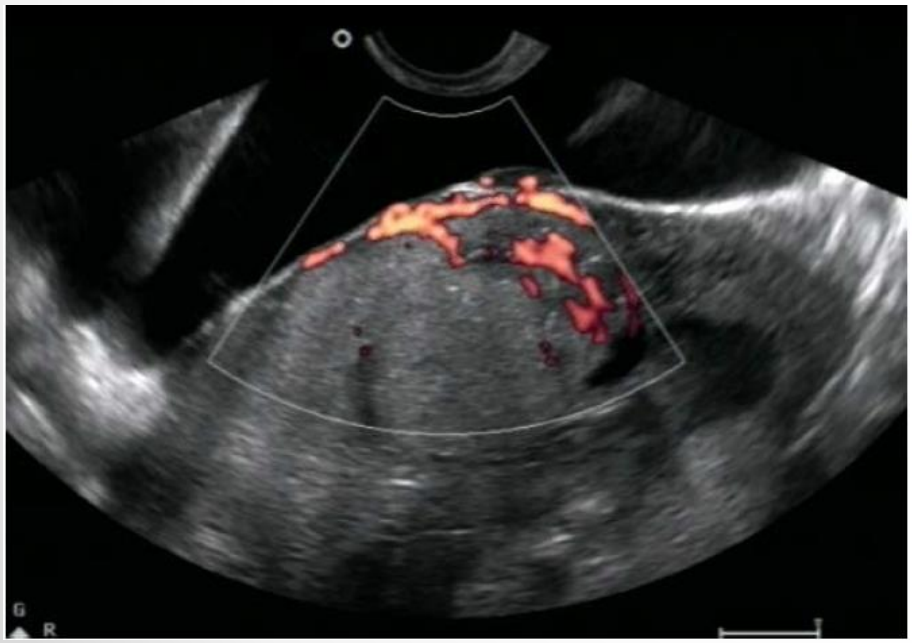
Transvaginal ultrasound views of placenta previa increta at 20 weeks. **A**, "Moth-eaten" appearance of placenta with numerous lacunae of different size and shape secondary (arrow); and **B**, high-velocity, turbulent blood flow within lacunae on color Doppler imaging.

Jauniaux. Pathophysiology and ultrasound imaging of placenta accreta spectrum. Am J Obstet Gynecol 2018.

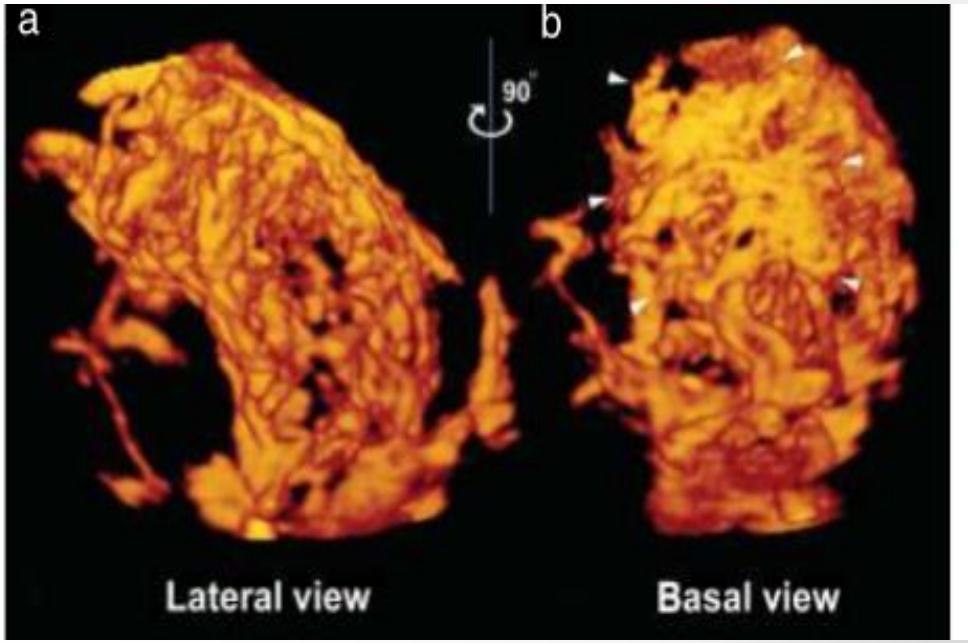
Ultrasound features for diagnosis:

Power Doppler

- Numerous coherent vessels involving the whole uterine serosa–bladder junction (basal view)
- Hypervascularity (lateral view)
- Inseparable cotyledonal and intervillous circulations, chaotic branching, detour vessels (lateral view)

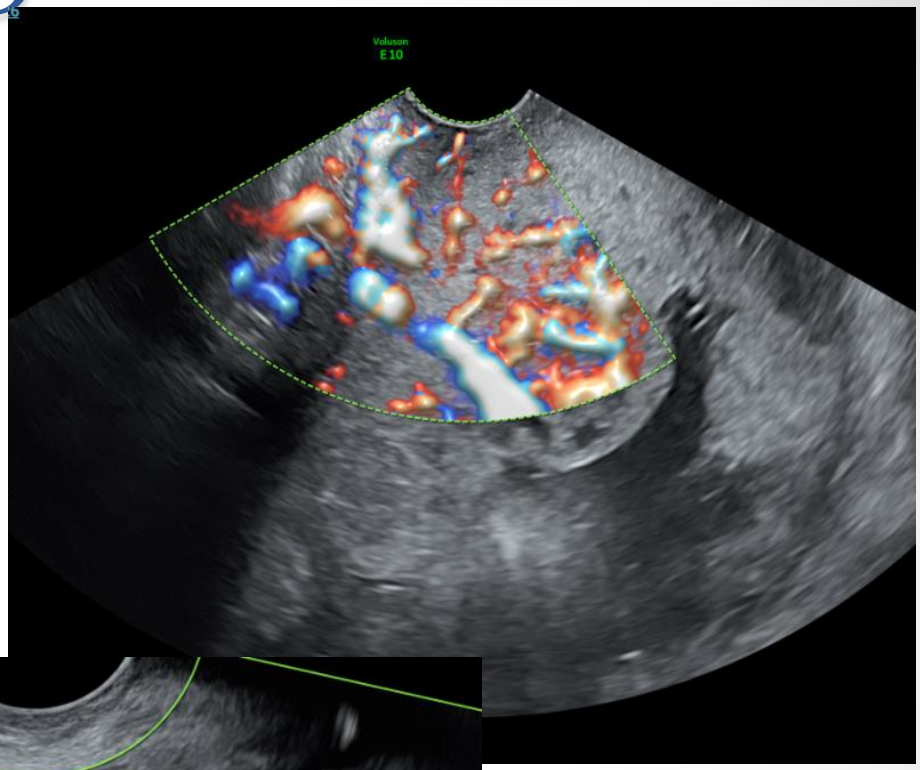


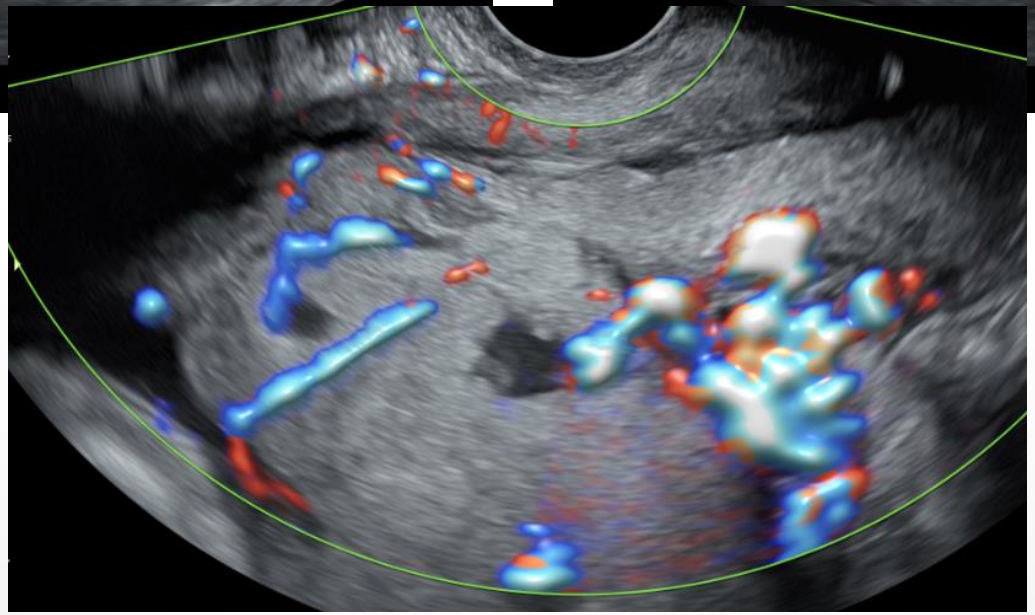
Pilloni (2015) *Ultrasound Obstet Gynecol*



Shih (2009) *Ultrasound Obstet Gynecol*

Bridging vessels





Which are the most important (prognostic) sign

- No USS sign or combination of signs specific for depth of invasion
- Multiple signs more likely than single sign to indicate AIP
- Combination of grey scale and colour Doppler imaging usual
- Prognostic scores have been developed but not established in clinical practice
-

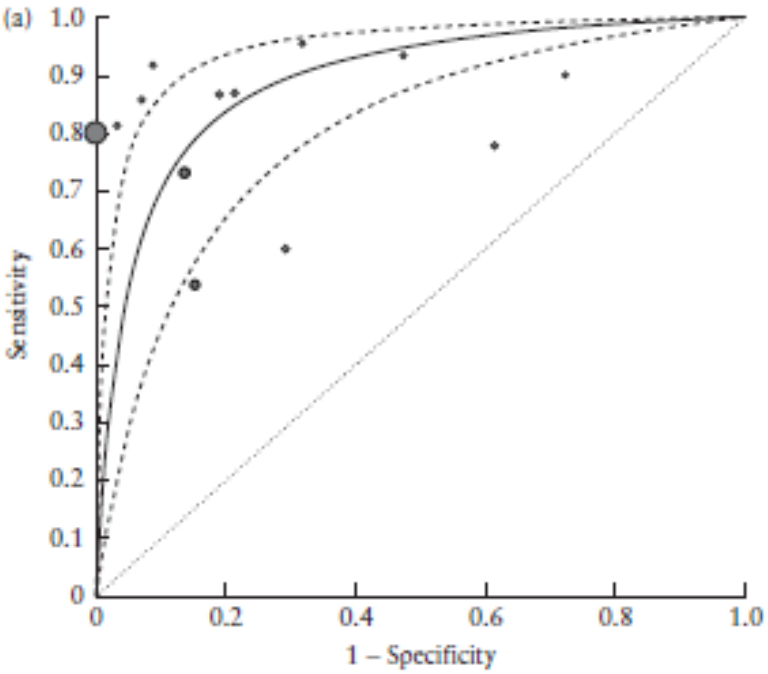
TABLE 4
Value of each parameter is added together to generate Placenta Accreta Index score

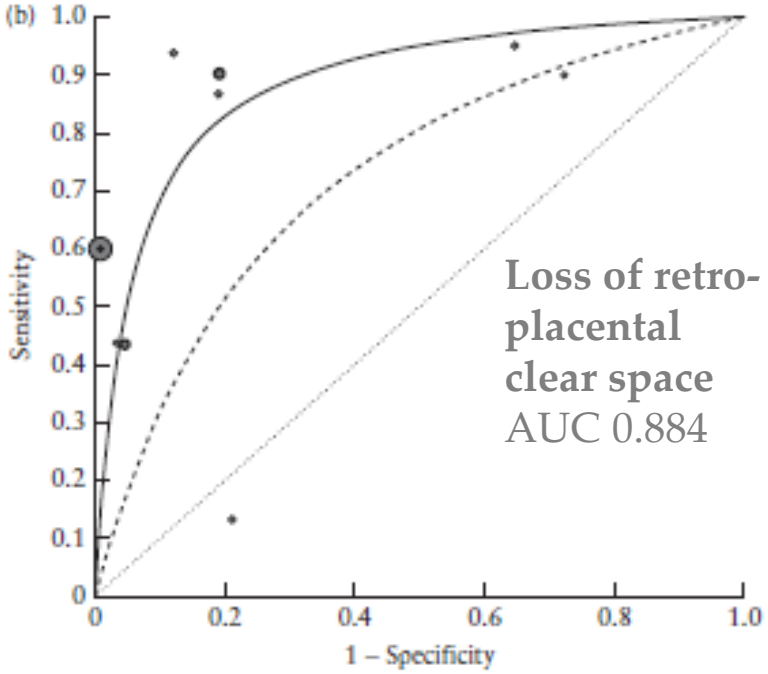
Parameter[a]	Value
≥2 cesarean deliveries	3.0
Lacunae	
Grade 3	3.5
Grade 2	1.0
Sagittal smallest myometrial thickness[b]	
≤1 mm	1.0
<1 but ≥3 mm	0.5
>3 but ≤5 mm	0.25
Anterior placenta previa[c]	1.0
Bridging vessels	0.5

[a] If parameter is not present, then value is 0; [b] Measured in sagittal plane; [c] If any portion of placenta is anterior.

Rac. Placenta Accreta Index. Am J Obstet Gynecol 2015.

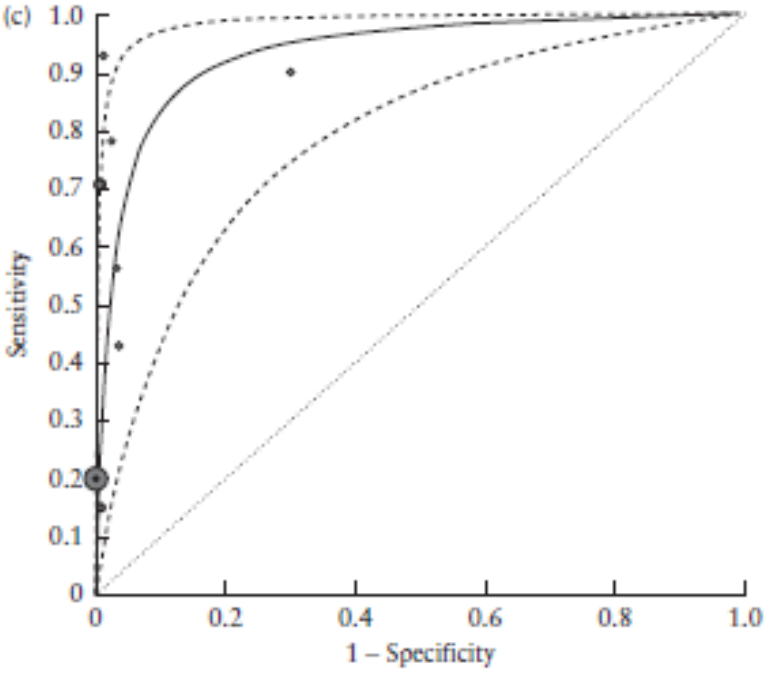
Placental lacunae
AUC 0.889

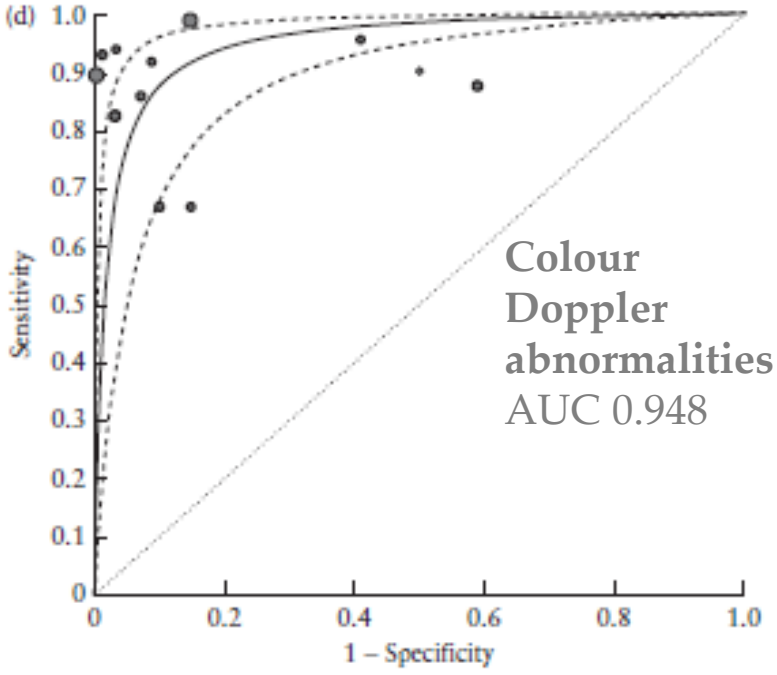




Loss of retro-placental clear space
AUC 0.884

Bladder-border abnormalities
AUC 0.934





Colour Doppler abnormalities
AUC 0.948

Key message Five:

- **Diagnosis is difficult**
- **Use all imaging features on USS for diagnosis**
- **Use MDT to increase diagnostic accuracy**

- Antenatal suspicion of presence or absence of AIP will alter care completely. Wrong diagnosis can lead to wrong operation by wrong team at wrong time and increase morbidity through over- or under-treatment

Key message Six:

- **Utilise regional specialist service and use MDT to increase diagnostic accuracy**

- **For sonographers: identify those high risk groups (previous LSCS and major praevia) and refer**

- I scan around 100 women/year to identify 10-15 cases.
- Involved in MDT discussion and care across three centres doing similar numbers
- Experience matters in diagnosis and recognising extent of problem

Newer imaging (USS) software

- 3D volume rendering ultrasound (crystal / realistic vue)

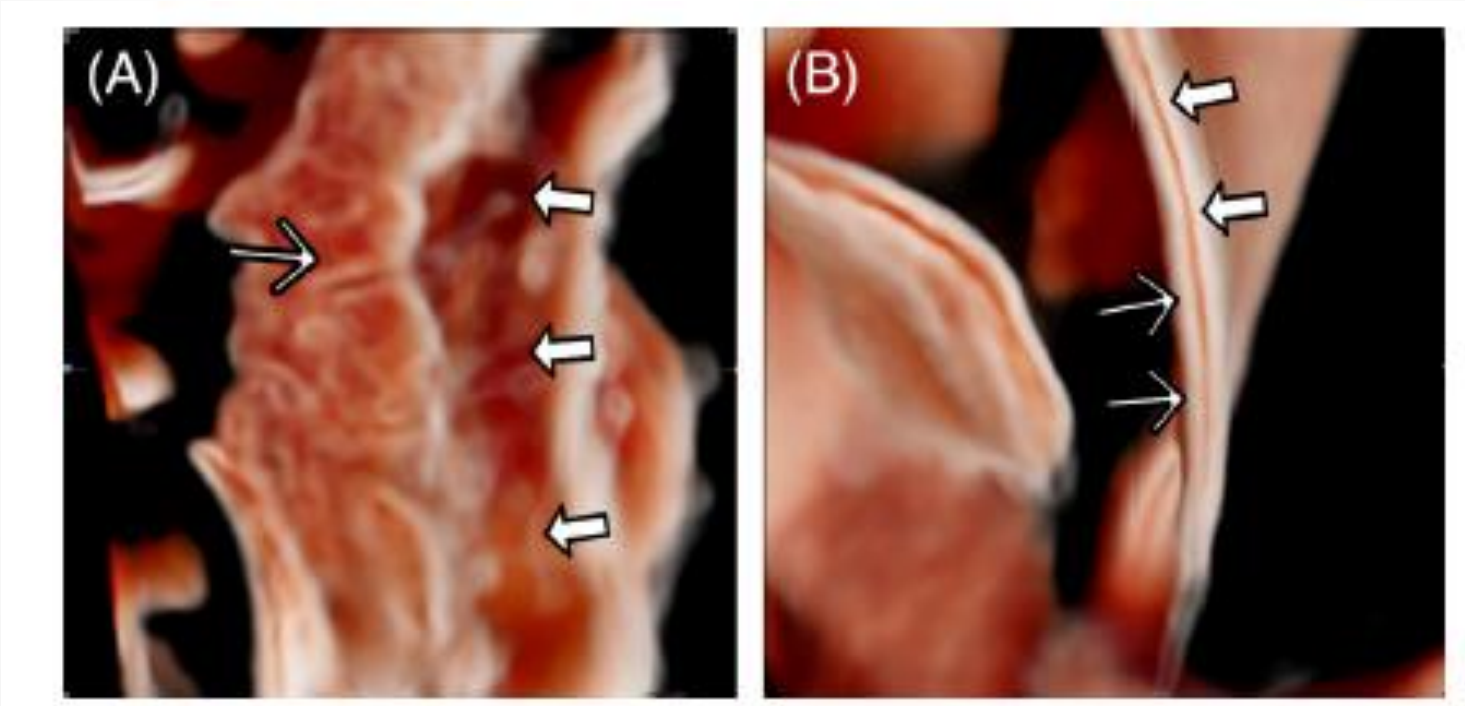


FIGURE 2 A, Retroplacental clear zone (⇒) in 3D VRU in normal placental implantation (→). B, Uterine wall (→) and bladder wall (⇒) form as two parallel line

Aryananda (2018) *Clinical Ultrasound*

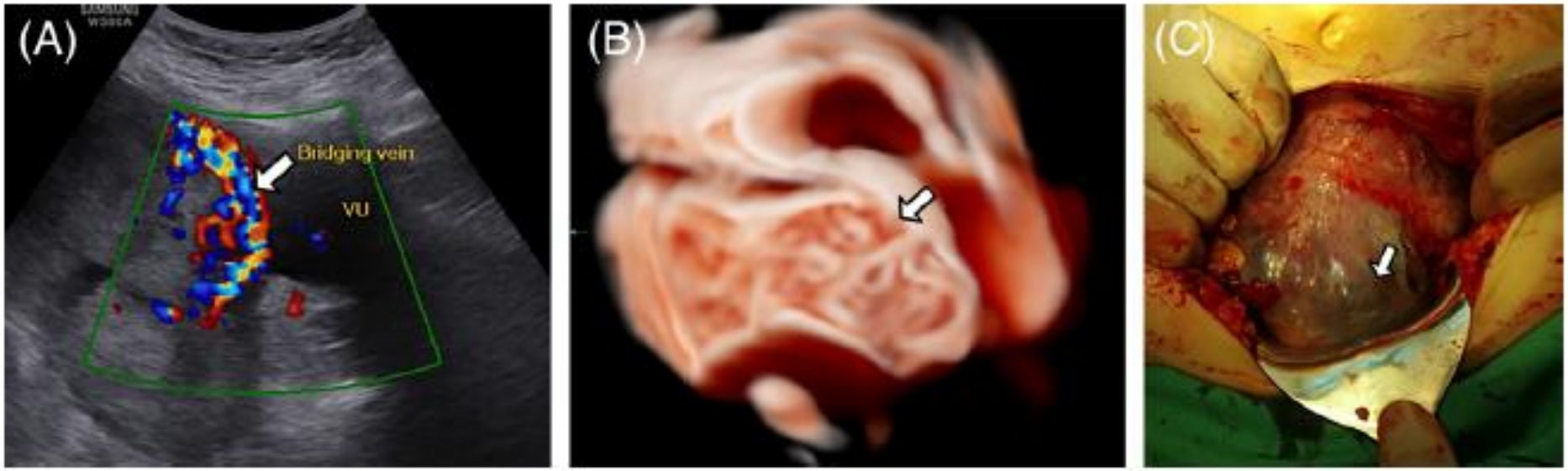


FIGURE 5 A, Vesicouterine bridging vessel in color Doppler US of placenta percreta (⇒). B, Discontinuity of uterine wall in 3D VRU (⇒). C, Placenta percreta was diagnosed during surgery (⇒)

CASES

Case 1: MC

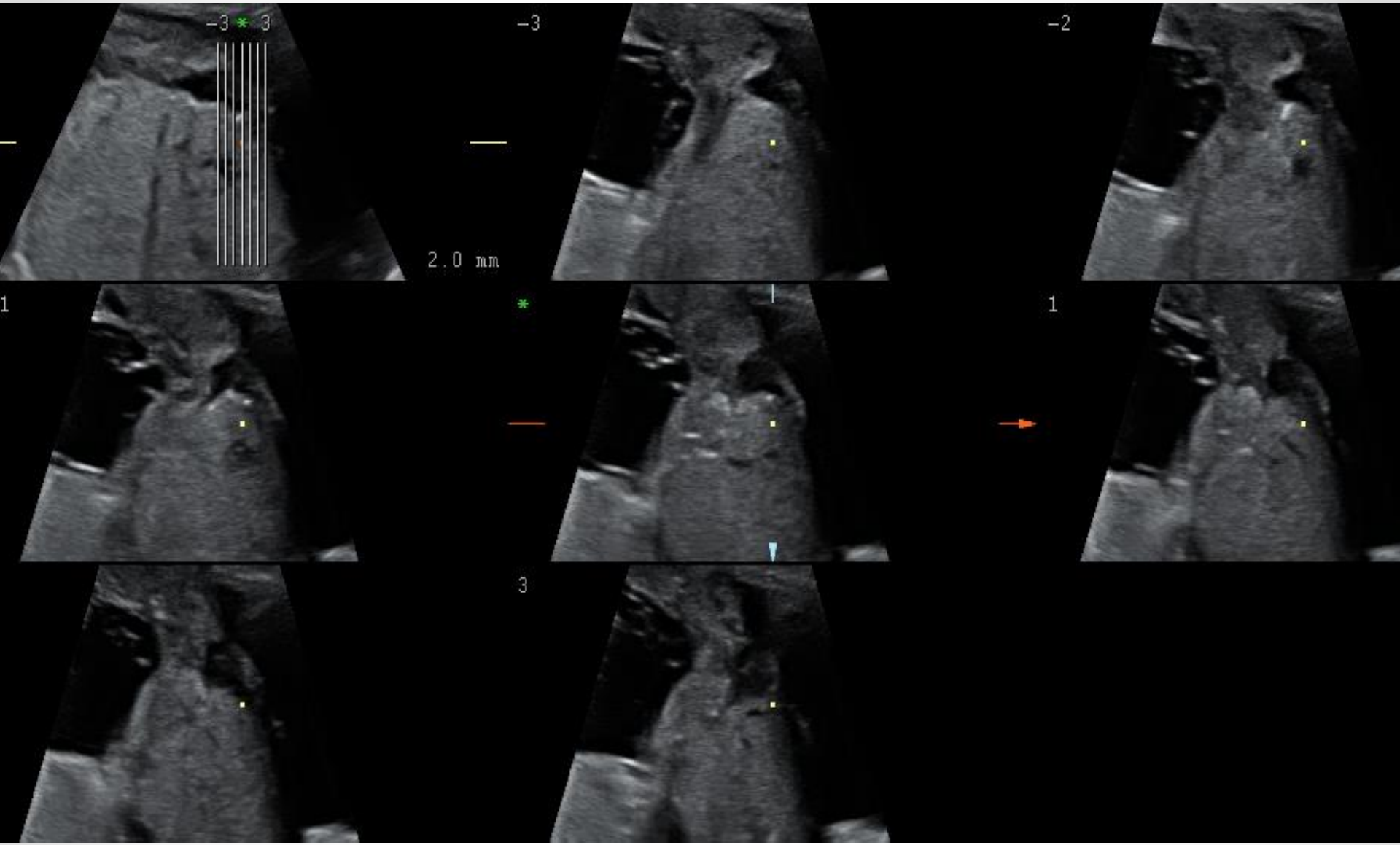
- 29 year old
- BMI 17 kg/m^2
- Smoker 10- 20/day through all pregnancies
- Para 4:
  - IUFD at 38 weeks, NVD, 2470 g
  - 36/40 IOL for IUGR, Emergency LSCS 1910 g
  - 39/40 Elective LSCS 2410 g
  - 37/40 Elective LSCS (IUGR) 2125 g

Antenatal care

- Booked at 12 weeks
  - Stop smoking
  - Serial growth scans 28/32/36 weeks
  - Recommend delivery by LSCS
- Detailed scan demonstrated placenta right lateral and covering os. Rescan arranged 32 weeks for placental location
- 31 weeks admitted with small PCB. USS arranged (previous DNA) placenta still covering os
- 33 weeks seen in FMM

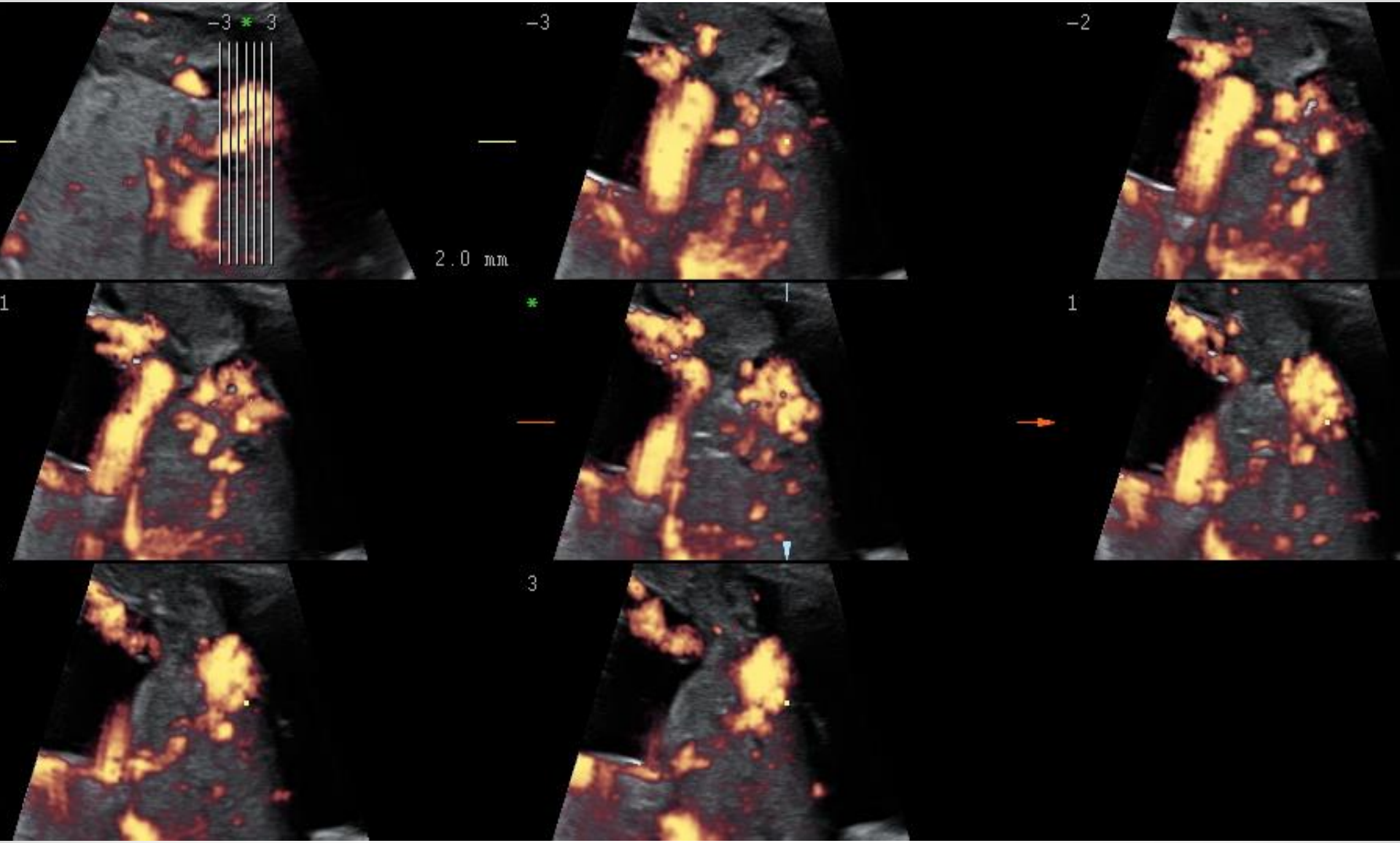
USS and MRI findings

- USS
  - Right lateral placenta extending mainly posteriorly
  - Placenta covers os
  - Moth-ball appearance on grey scale imaging and increased flow on Doppler anteriorly on the right
  - Clear demarcation between bladder and placenta suggesting that bladder not involved
  - Scan suggestive of a placenta accreta
- MRI
  - Placenta praevia. Myometrium intact
  - No evidence of accreta



Tomographic Ultrasound Imaging (TUI):

- allowing simultaneous viewing of multiple slices from a 3D volume set



Tomographic Ultrasound Imaging (TUI):
3D power Doppler volume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Management plan

- Admit from 34 weeks
- Caesarean section planned for 37/40
  - Input from Gynaecology, interventional radiology
  - If emergency LSCS required wait for consultant presence prior to delivery
  - Likely classical incision to avoid placenta
  - Significant chance of hysterectomy
- Further small APHs on ward at 34+/40 thus delivery brought forward to 36 weeks

Operative findings

- Pre-operative interventional radiology for internal iliac artery catheterisation
- Findings: Placenta penetrated through right lower uterine segment
  - Pelvic peritoneal covering intact
  - Placenta covering os with main body posterior
- Procedure: Classical uterine incision and live male delivered in good condition (1945 g)
  - Awaited placental separation- no separation
  - Proceeded to sub-total hysterectomy
  - EBL 900 ml
- Pre-op Hb:125 g/l. Post op Hb 93 g/l. No transfusion

Histological findings

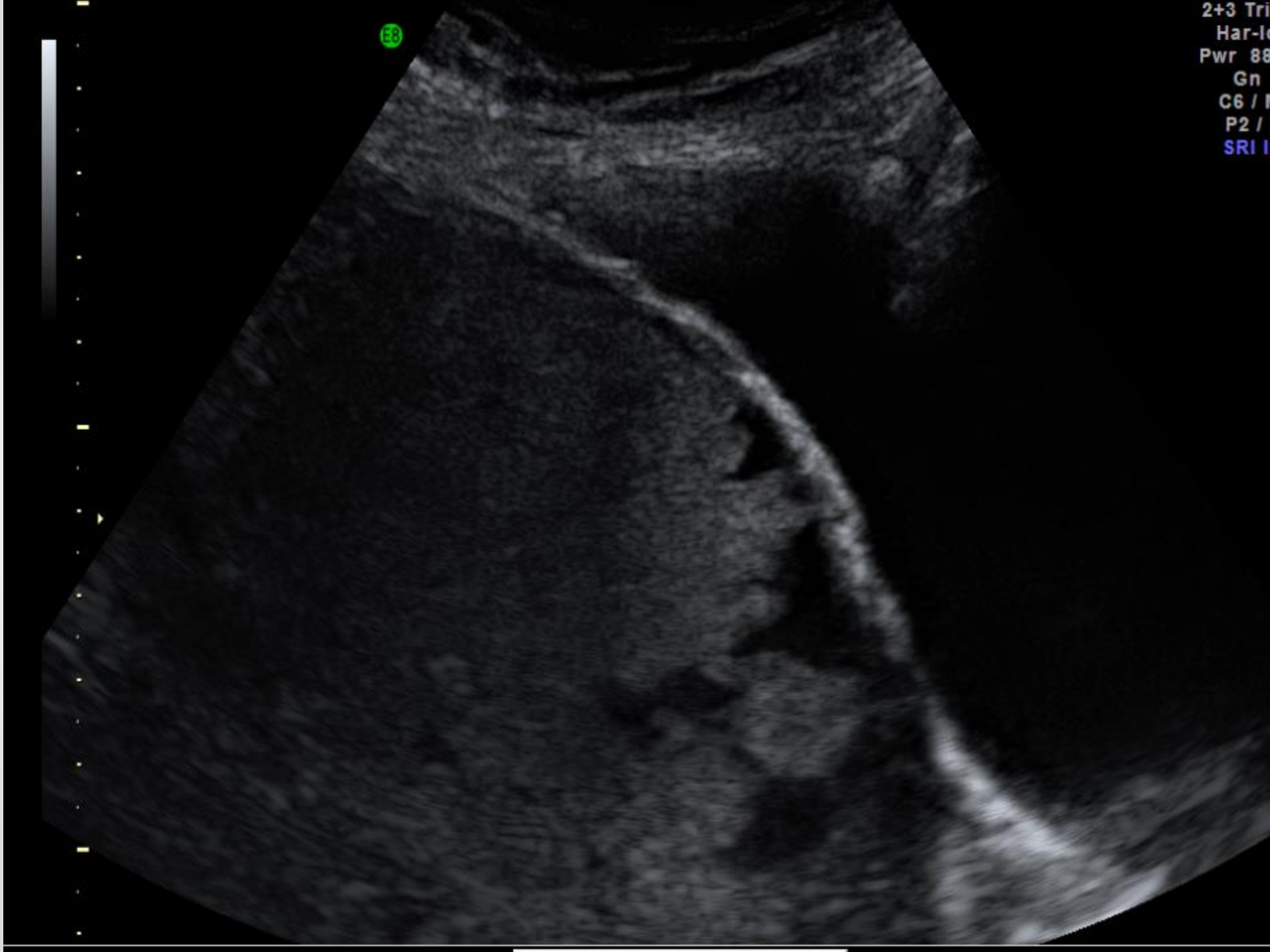
- Deep infiltration of chorionic villi and trophoblast into myometrium, coming close to the outer surface mainly at the lower uterine segment and upper part of the cervix (area consistent with previous caesarean section site)
- Appearances consistent with placenta accreta

Case 2: MB

- 38 year old
- BMI 27 kg/m^2
- Para 6
  - 34/40 NVD: 1830 g. Neonatal death at 1 hour (Meckel Gruber: posterior encephalocele and polycystic kidneys, polydactyly)
  - 40/40 intrapartum SB: known multiple anomalies (encephalocele, anhydramnios, renal agenesis). Assisted vaginal breech delivery with cephalocentesis to deliver head: 2600 g
  - 34/40 Emergency LSCS- failed IOL for pre-eclampsia: 1880 g
  - 36/40 LSCS. Pre-eclampsia: 2260 g
  - 39/40 Elective LSCS: 3450 g
  - 26/40 IUFD. Pre-eclampsia and IUGR (reversed EDF): 600 g

USS findings (FMM)

- Initial placental scan at 29 weeks gestation
- Anterior major placenta praevia
- Abnormal appearance with large vascular lacunae
- Placental-uterine border indistinct over bladder, particularly centrally
- Strong suspicion of morbidly adherent placenta
- One area suspicious of invasion into bladder on Doppler USS (no history of vaginal bleeding or haematuria)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2+3 Tri
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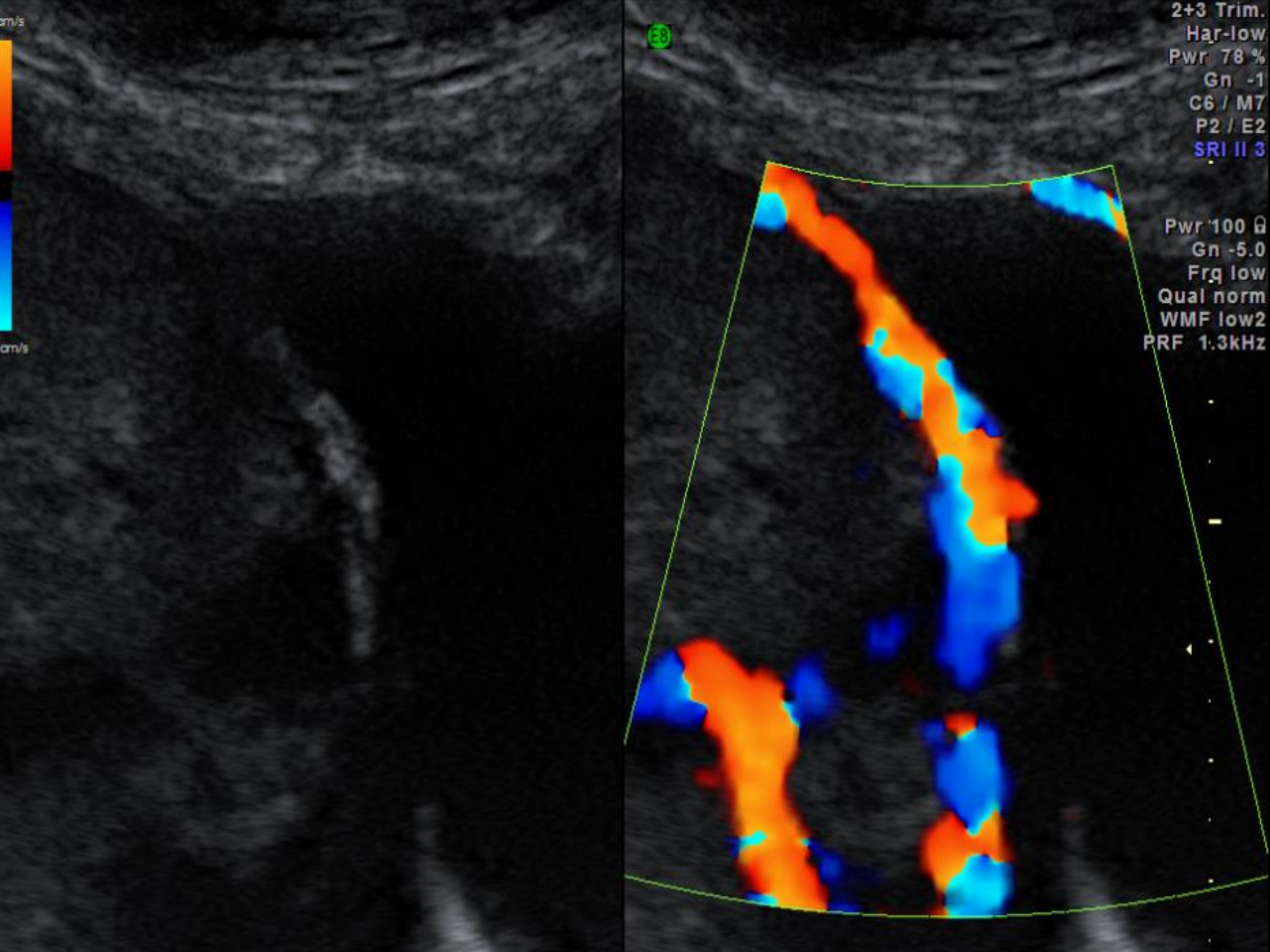
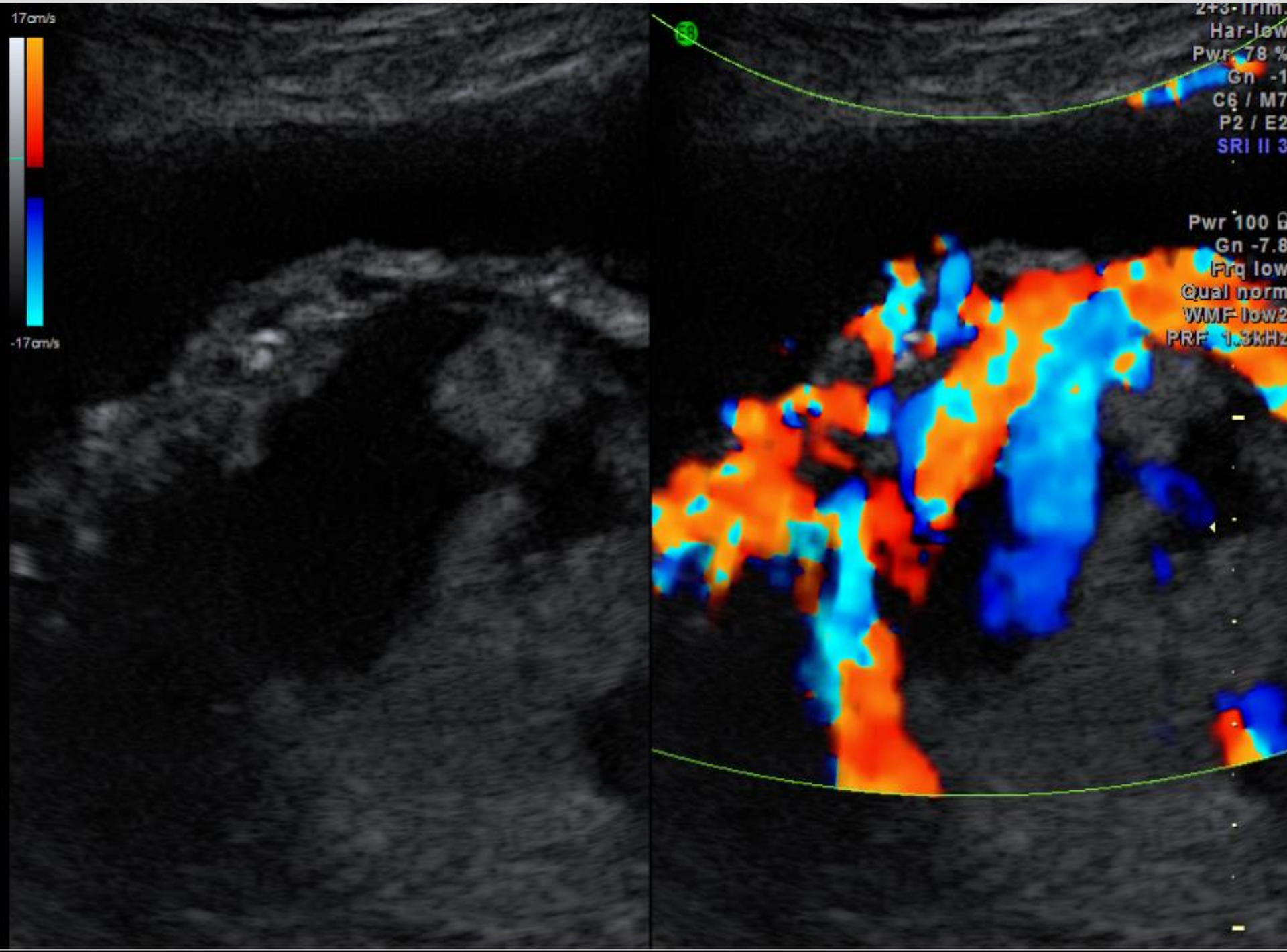
Pwr 88
Gn
C6 /
P2 /
SRI


cm/s
cm/s
E8
2+3 Trim.
Har-low
Pwr 78 %
Gn -1
C6 / M7
P2 / E2
SRI II 3
Pwr 100
Gn -5.0
Frq low
Qual norm
WMF low2
PRF 1.3kHz


17cm/s
-17cm/s
Pwr 100
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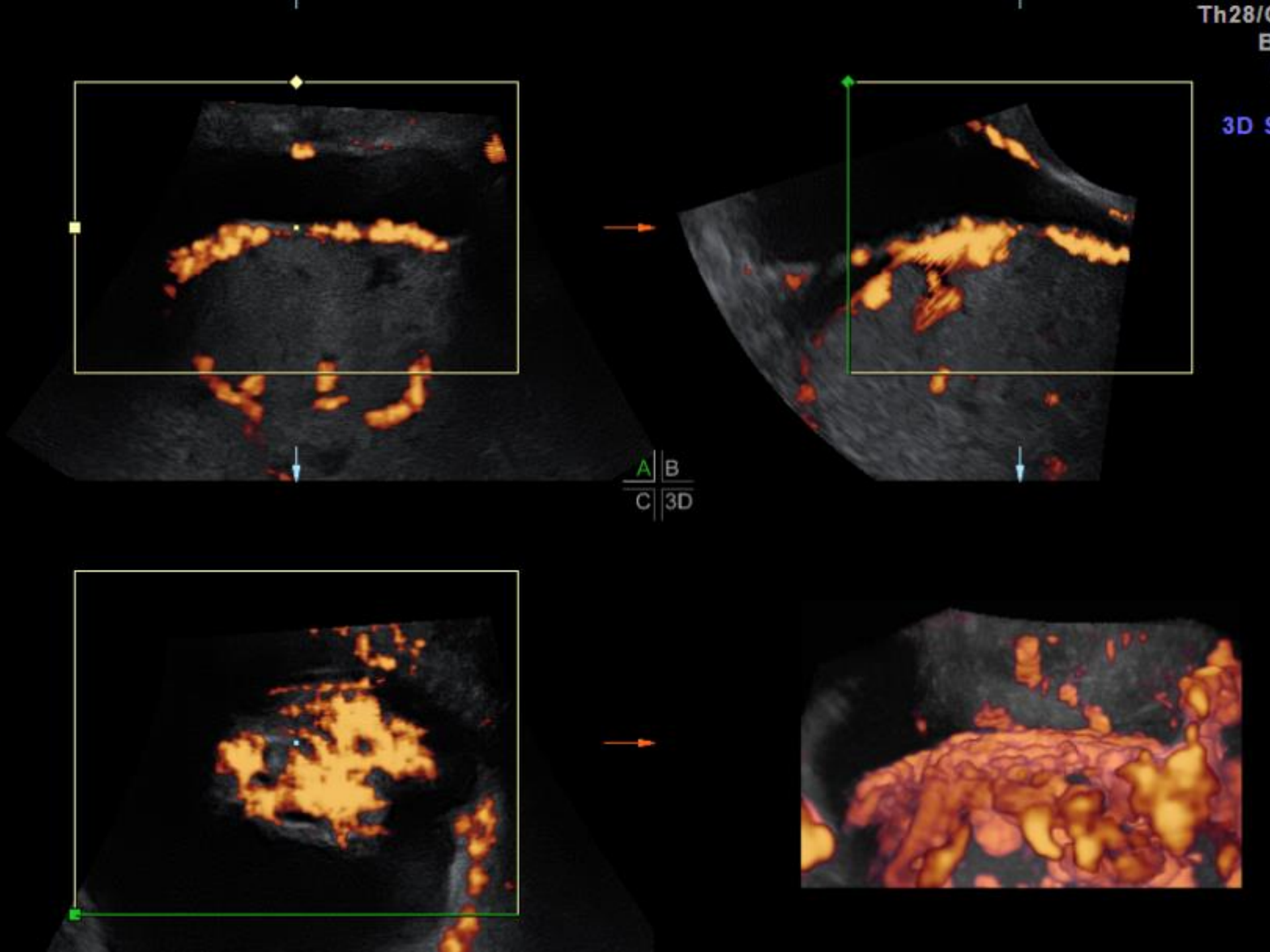
Frq low
Qual norm
WMF low2
PRF 1.3kHz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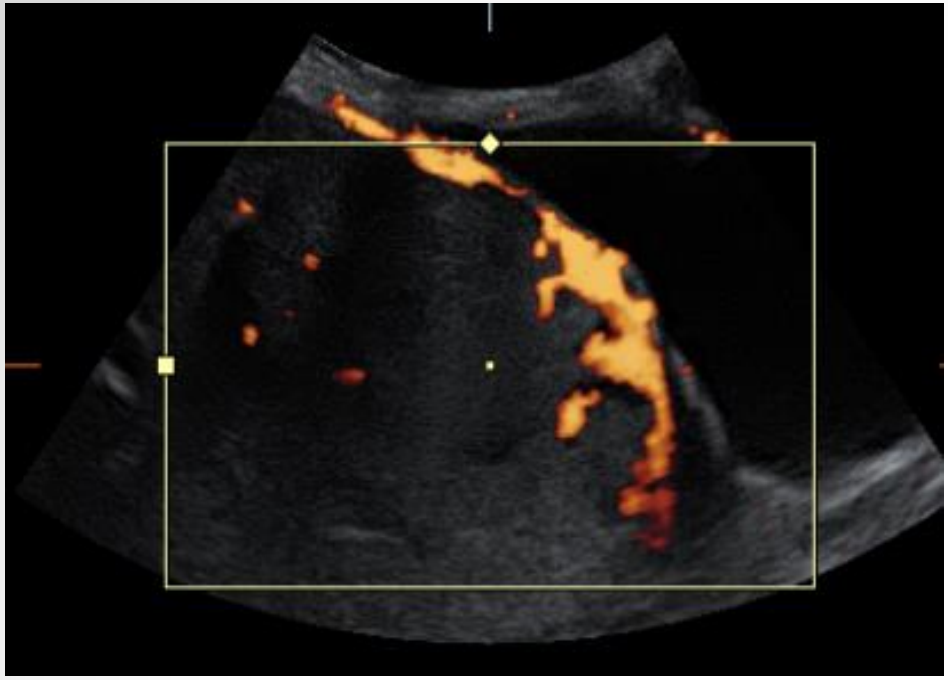
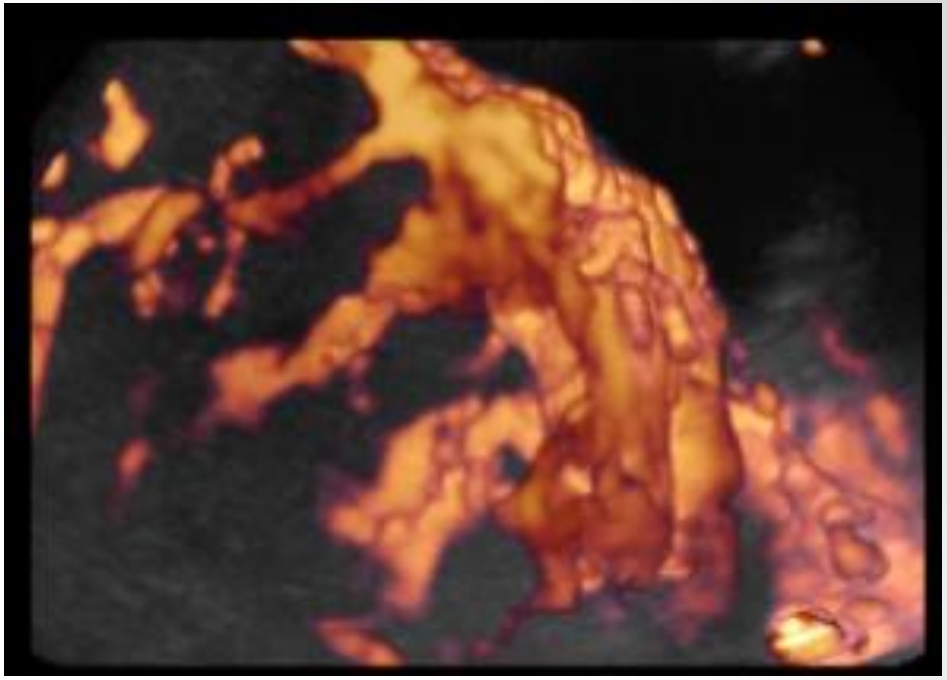
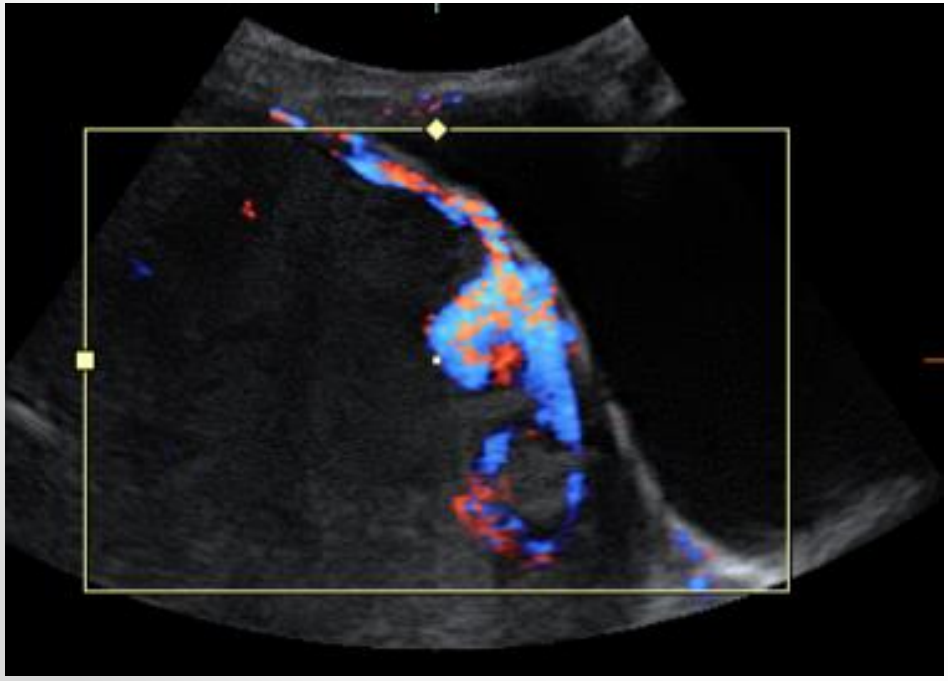
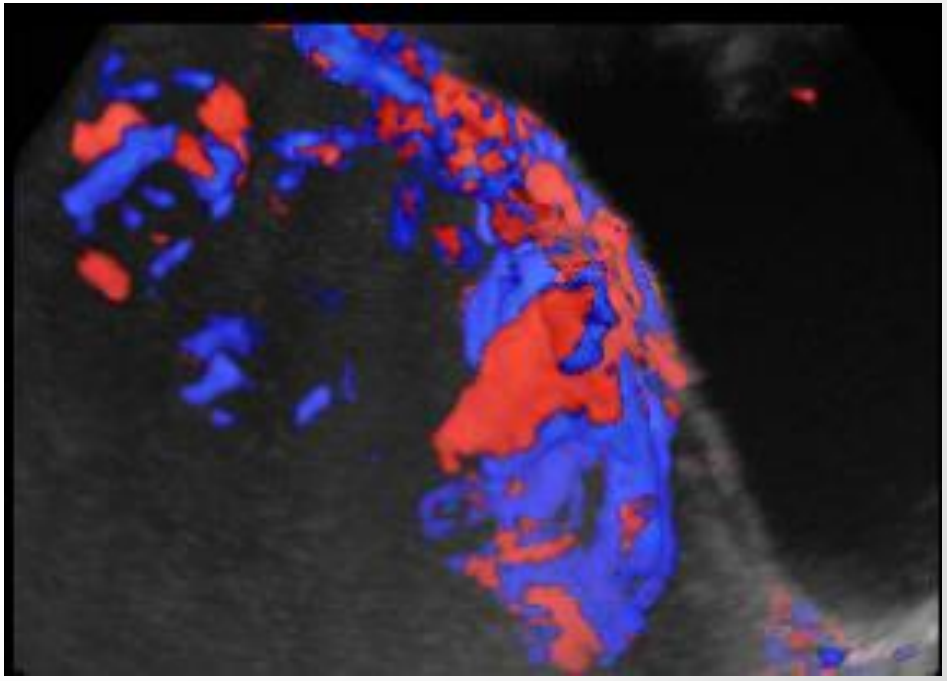
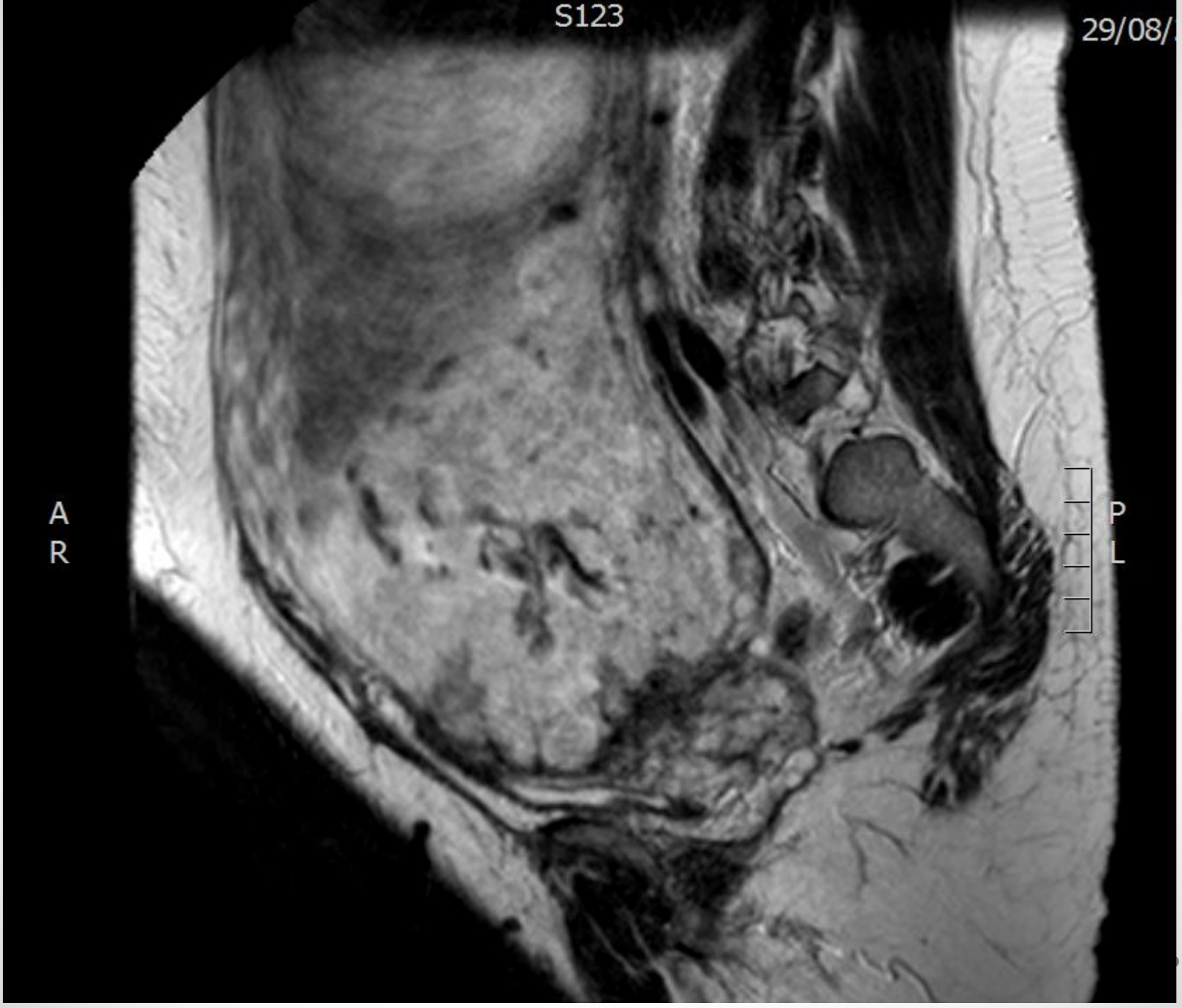





MRI findings

- At the antero-inferior margin of the uterus there are large placental lacunae
- Myometrium indistinct here
- Appearances suspicious for placenta accreta
- The suspicious area lies just above the bladder but the bladder wall does not appear to be involved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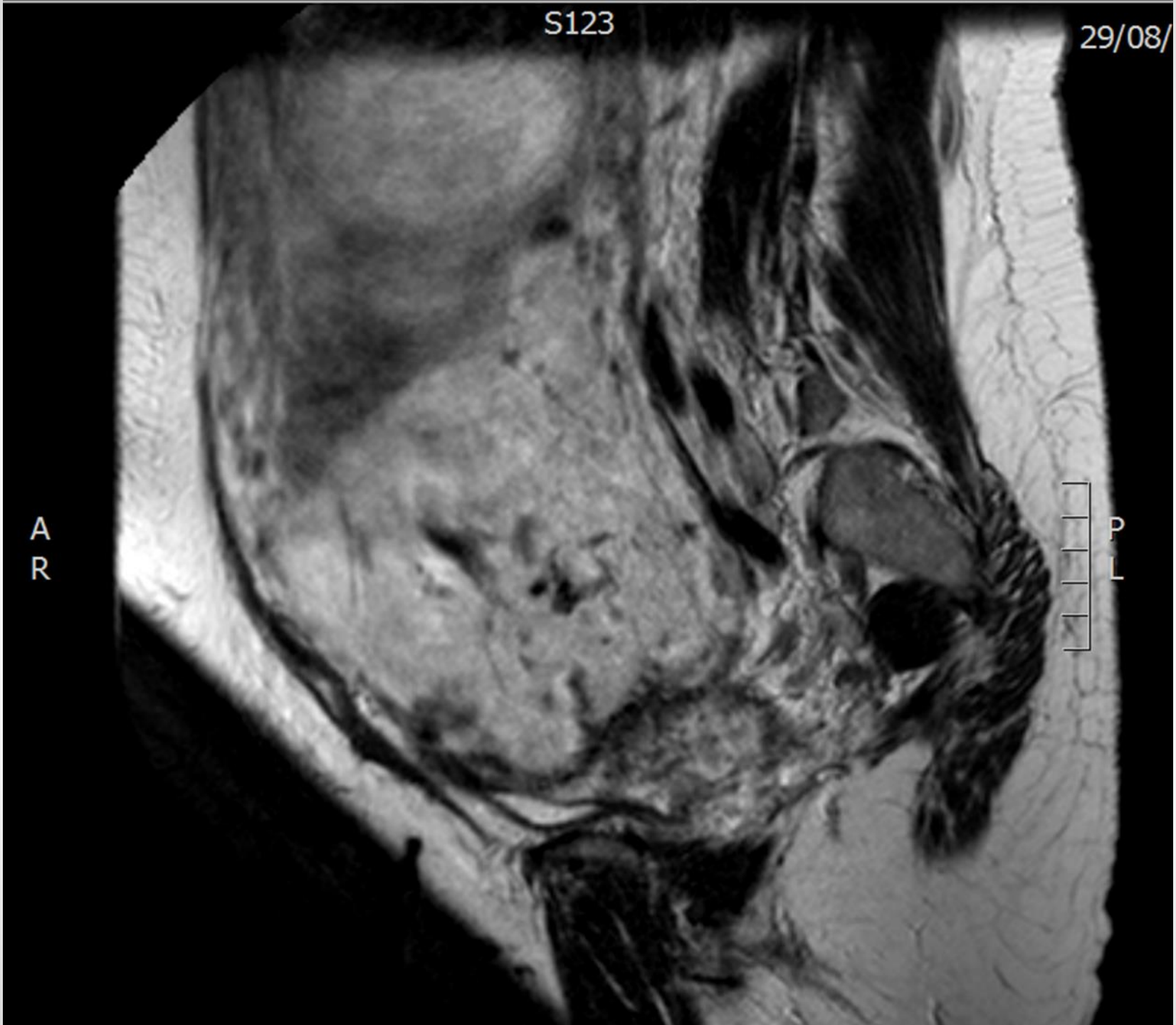
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Management plan

- No bleeding in pregnancy
- Plan for Caesarean section at 36 weeks gestation following corticosteroids
- In view of concern regarding bladder involvement for urology presence and cystoscopy prior to LSCS

Operative findings

- Pre-operative interventional radiology for internal iliac artery catheterisation
- Pre-operative cystoscopy and ureteric stent: no involvement of bladder dome with aberrant vasculature
- Transverse fetal lie
- Classical uterine incision; live female 2670 g; Apgar 4, 7, 10
- Placenta did not separate
- Uterus closed and proceeded to hysterectomy (total)
- Placenta adherent to posterior bladder- dissected away without bladder injury
- EBL 1700 ml
- Pre-op Hb: 136 g/l. Post op Hb 122 g/l. No homologous blood transfusion; autologous transfusion 700 ml (cell salvage)

Histological findings

- Uterus contains placental tissue extending into the myometrial wall reaching the serosal surface consistent with a placenta percreta
- Ectocervical epithelium not included (=sub-total hysterectomy)

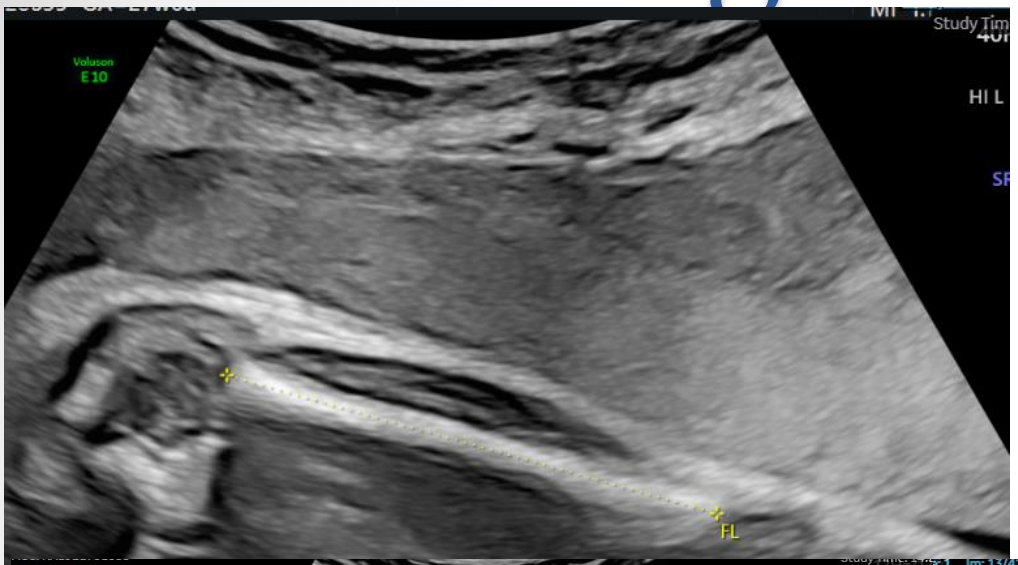
Case 3: MS

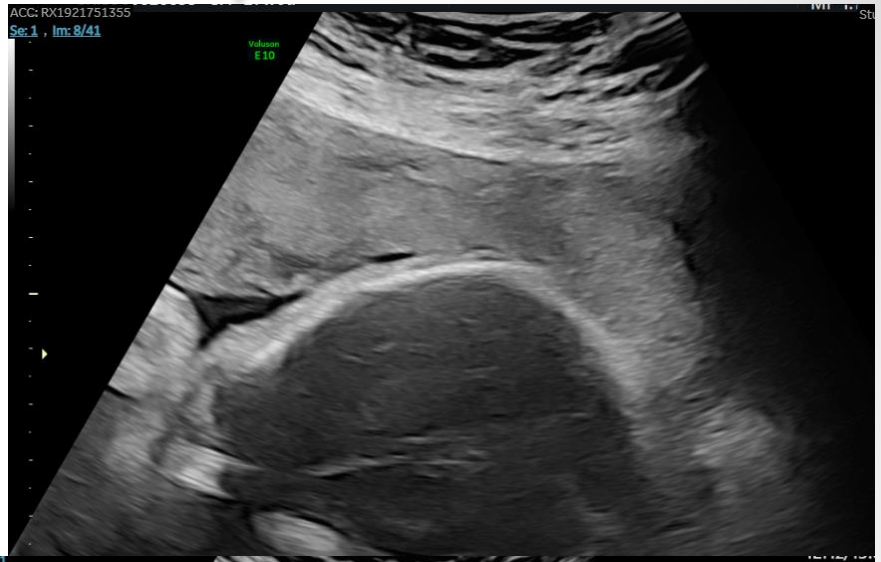
- 34 year old
- BMI 31 kg/m^2
- Non-smoker
- Para 1:
  - 39/40 Emergency LSCS(2021)
- 20 week scan: major anterior placenta praevia. Refer AiP service
- No bleeding

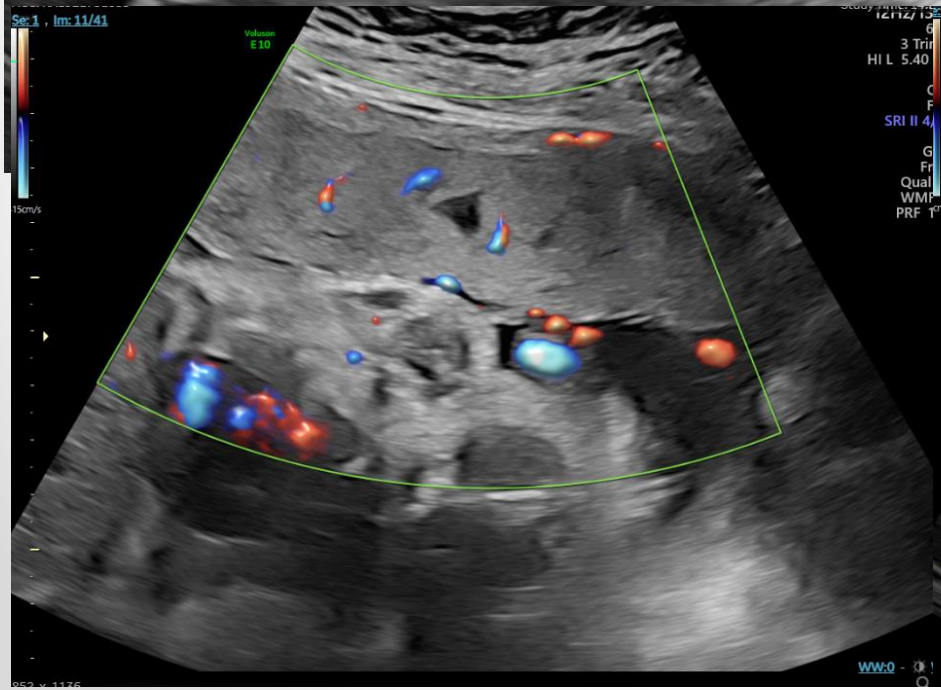
AIP scan

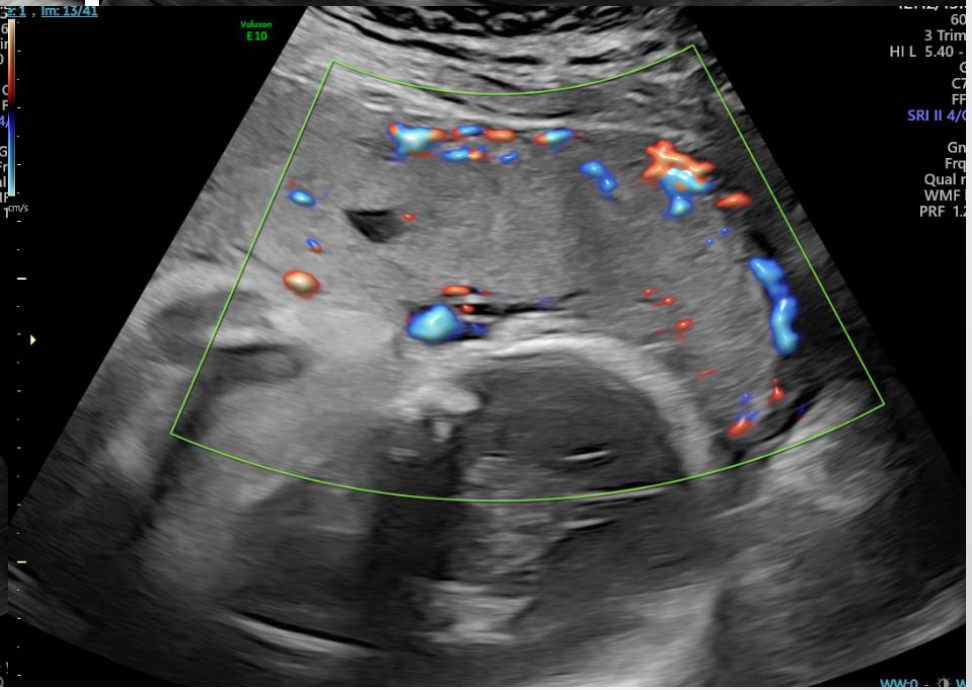
- Anterior low lying placenta 16 mm from os
- Two areas suspicious of localised accreta
  - Left side of lower uterus
  - Left side further up
- Plan: rescan 32 weeks and plan timing of delivery after this. Possibly 36 weeks if no bleeding

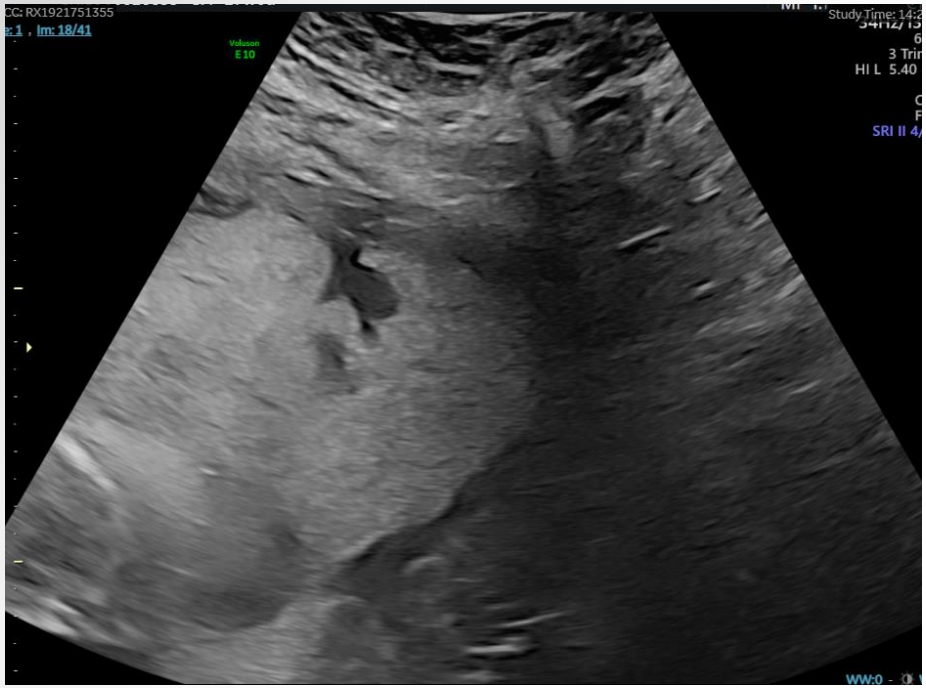
Images at 27/40







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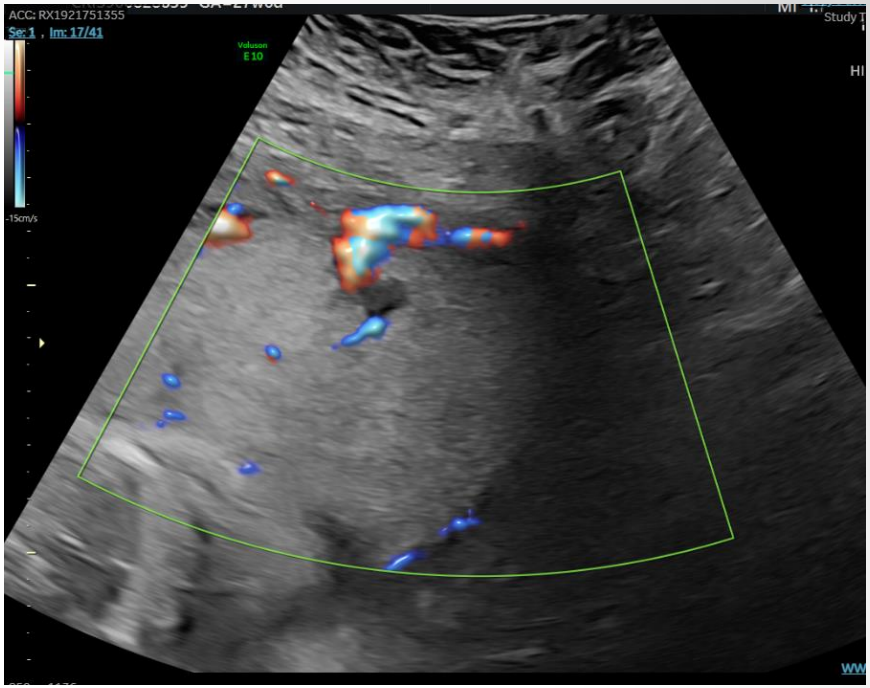
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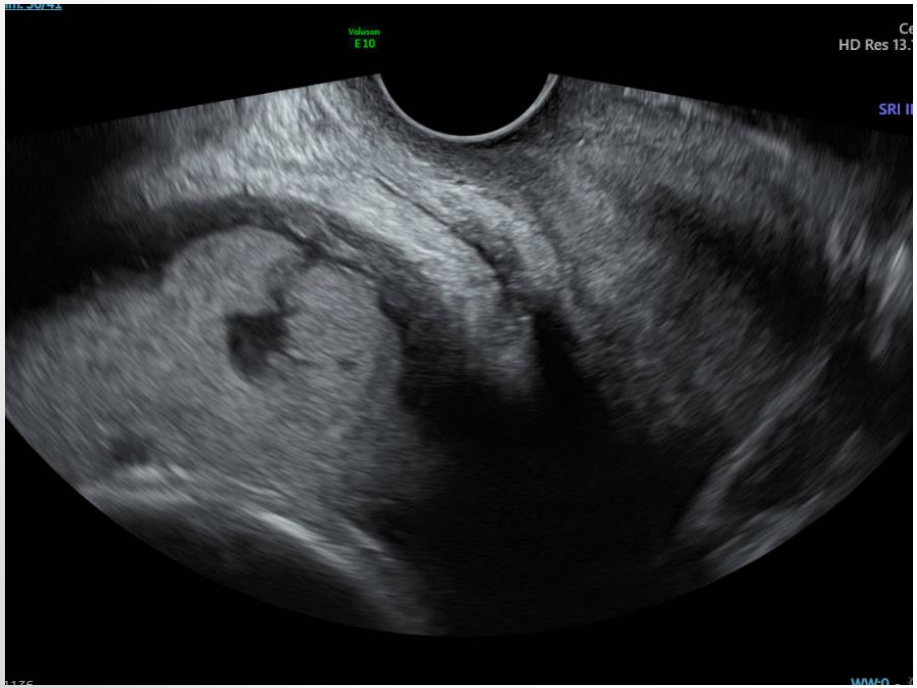
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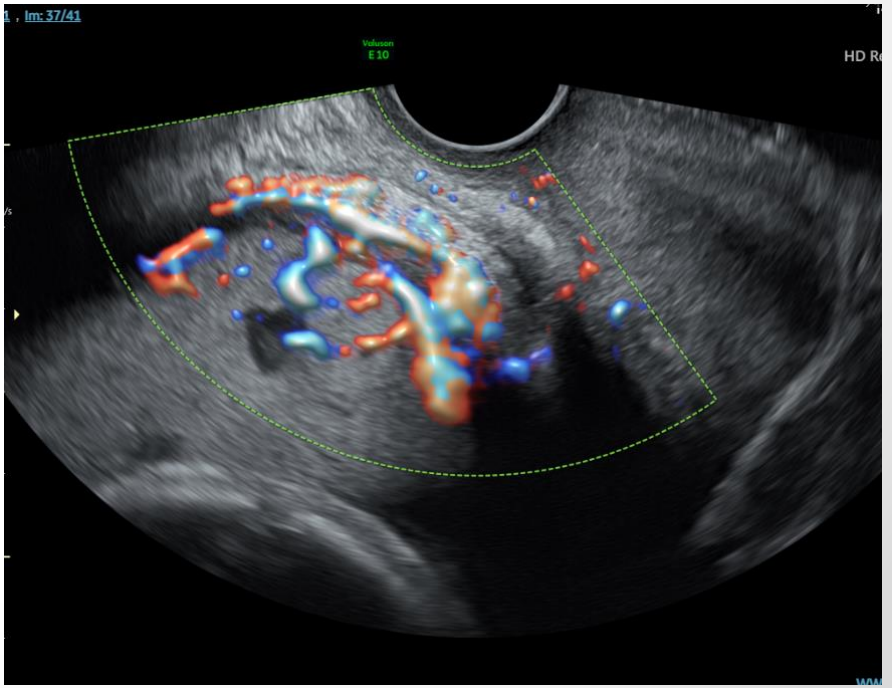
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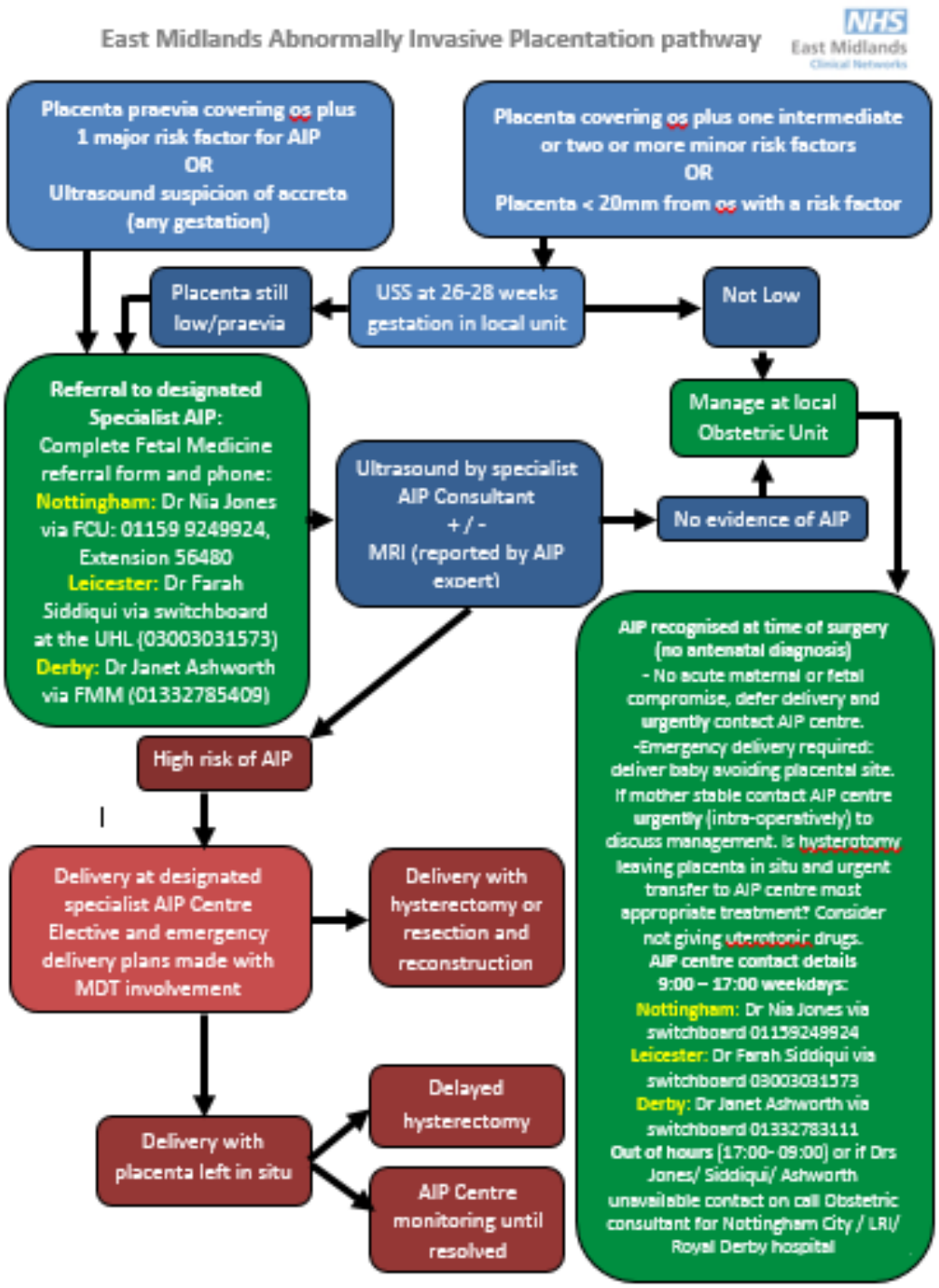
Delivery

- Admitted 31+6 with significant bleeding (300ml gradually over 12 hours)
- Betamethasone
- Magnesium sulphate
- Delivery following day

- Classical LSCS
- Localised accreta confirmed
- Placenta removed. Defect not full thickness of myometrium therefore not opened
- EBL 900 ml
- Pre-op Hb 117; post-op Hb 93
- Declined sterilisation. Counselled against further pregnancies

Key messages

1. Ask woman with a placenta praevia if they have undergone previous LSCS
2. Risk is highest if placenta covers the cervical os in those with previous LSCS
3. Risk is based on number of previous LSCS in presence of placenta praevia
4. Not looking for previous LSCS scar but for evidence of disordered architecture in placenta
5. Diagnosis is difficult. Use all imaging features on USS for diagnosis
6. Utilise regional specialist service and use MDT to increase diagnostic accuracy



Thank you

EM: AIP risk factors and pathway

Major Risk Factors	• Previous AIP • Caesarean section • Previous trachelectomy (removal of cervix) • Suspected scar ectopic in this pregnancy
Intermediate Risk Factors	• ≥ 2 episodes of endometrial curettage (ERPC/ STOP) • Uterine surgery involving the endometrium (e.g. myomectomy which breached the cavity or resection of uterine septum) • Endometrial ablation • MROP with significant PPH requiring blood transfusion • Asherman's syndrome
Minor Risk Factors	• 1 episode of endometrial curettage (ERPC / STOP) • IVF • MROP not requiring blood transfusion • Previous postnatal endometritis or septic miscarriage

PLACENTA COVERING OS *PLUS* ONE MAJOR RISK FACTOR	**PLACENTA COVERING OS *PLUS* ONE INTERMEDIATE OR TWO OR MORE MINOR RISK FACTORS PLACENTA < 20mm FROM OS WITH A RISK FACTOR**
⬇	⬇
FOLLOWING COMPLETED DETAILED SCAN REFER TO REGIONAL AIP CENTRE FOR IMAGING	**RESCAN 26-28 WEEKS LOCALLY. IF PLACENTA <20MM FROM OS REFER TO REGIONAL AIP CENTRE**