RSNA 2017
MSCU41C

Obstetric Ultrasound: Urgent & Emergent

phyllisglanc.com (WEBSITE WITH HANDOUT)

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when it matters MOST

Objectives

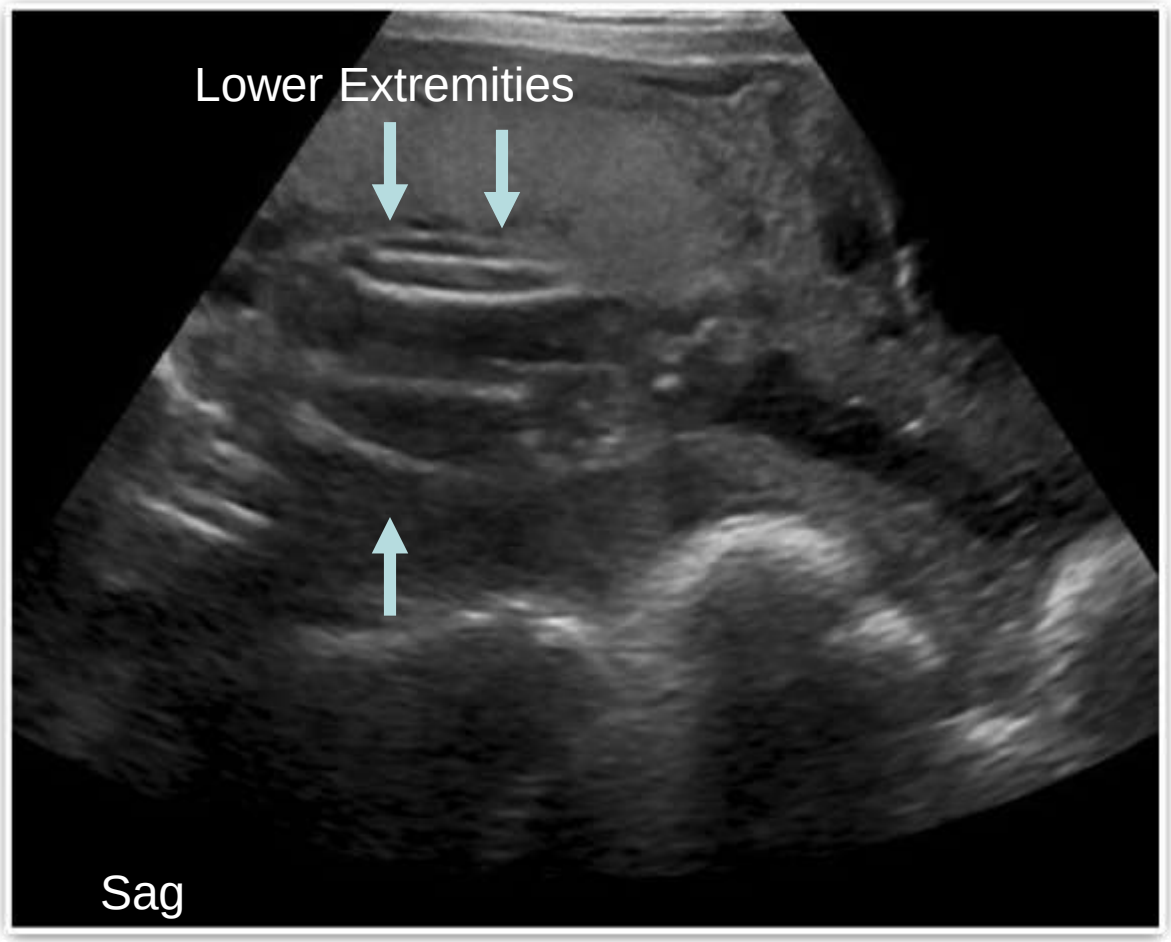
- Case presentation series
- 17 minutes ……focus and challenges

Case 1:

- Routine BPP
- Prolonged PROM, oligohydramnios
- Transferred at viability 23W5D

Breech presentation

?



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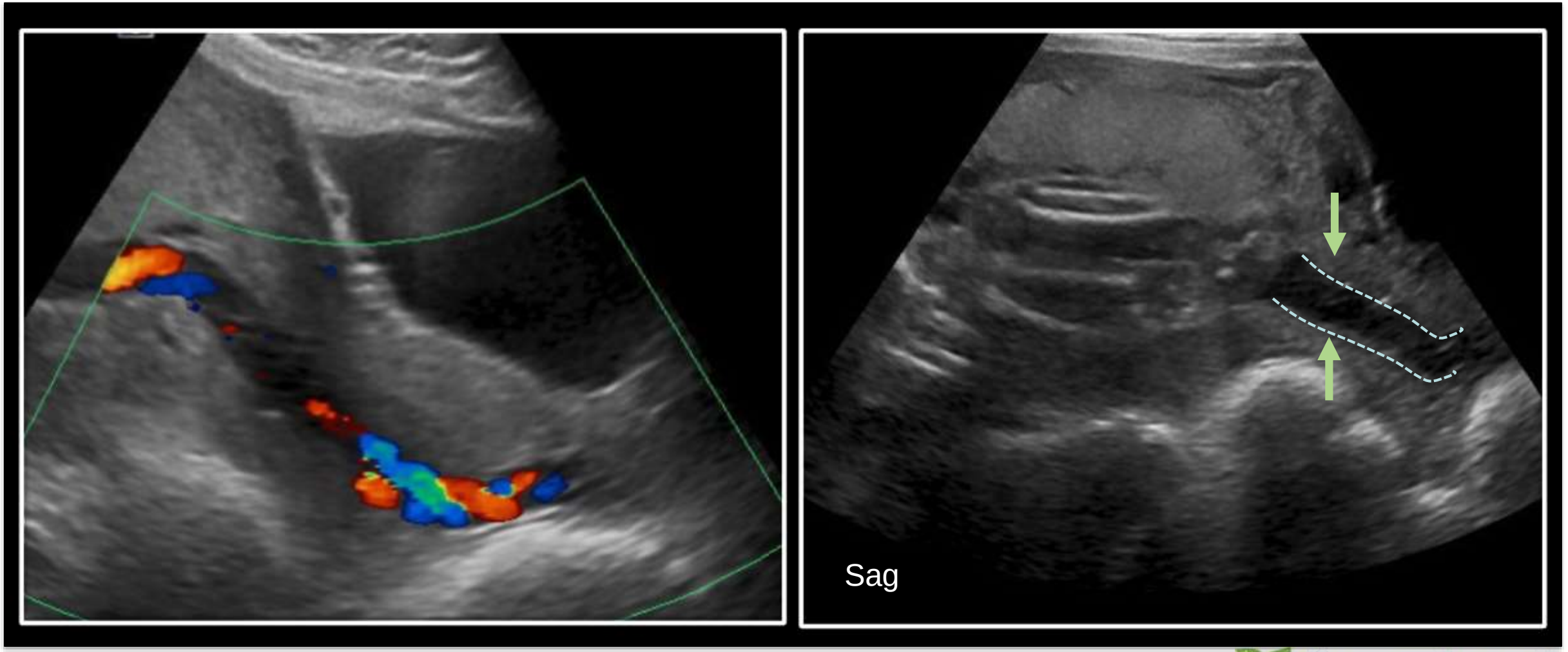
Case 1:

Open cervix with umbilical cord prolapse



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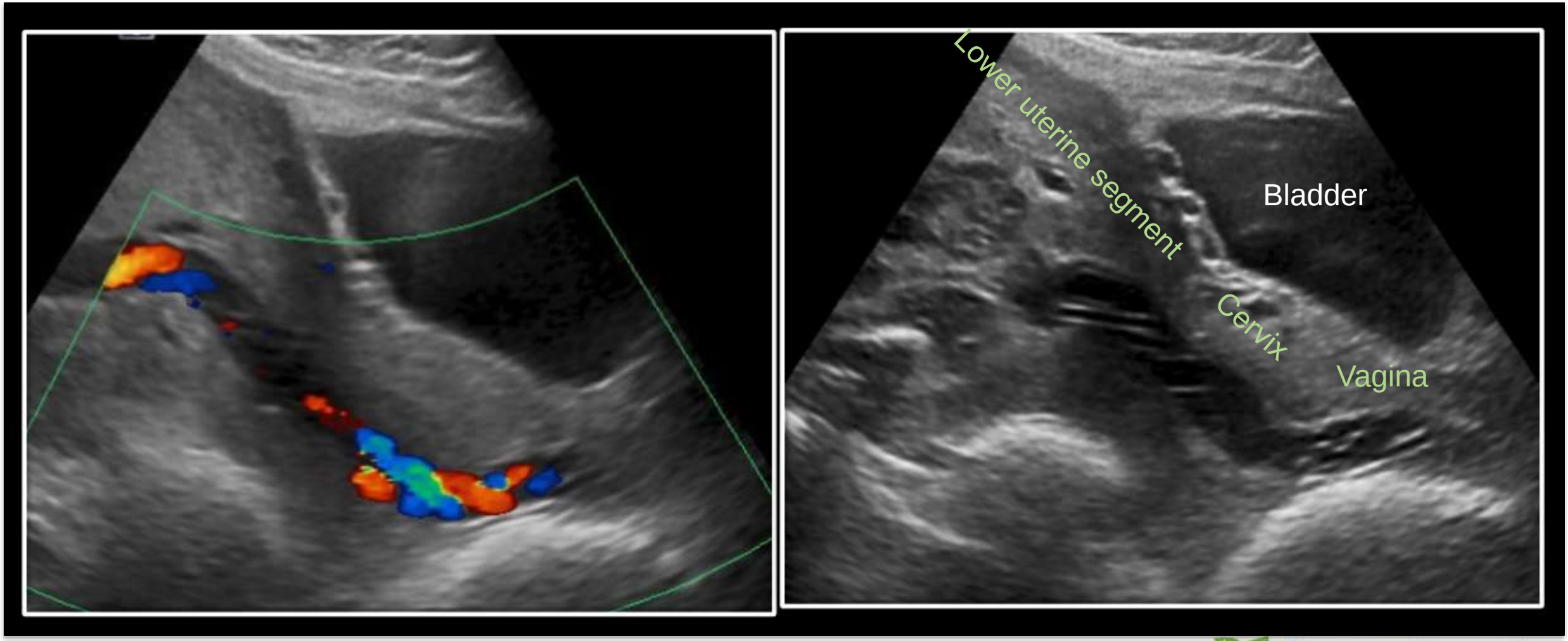
Case 1: Transabdominal

Open cervix with umbilical cord prolapse



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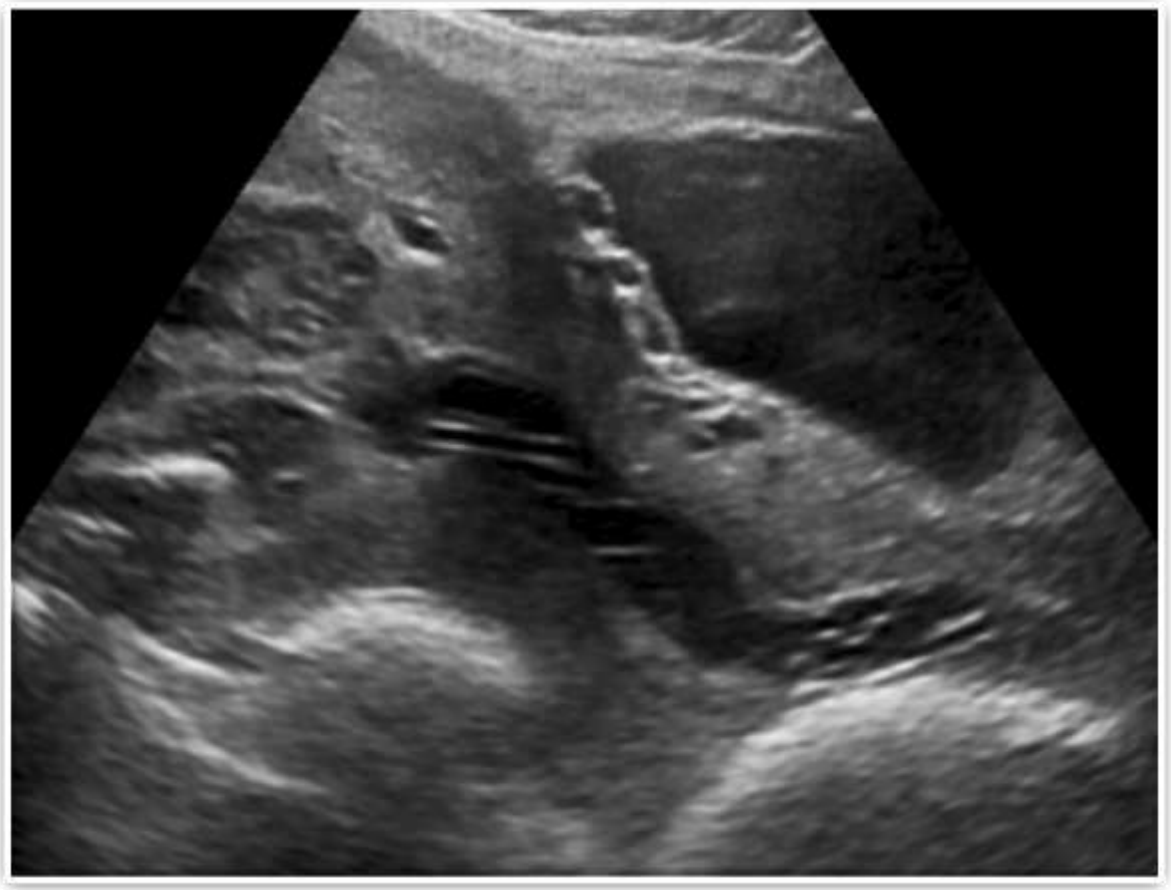
Case #1: Umbilical Cord Prolapse

- Transferred to OR with patient in Trendelenberg and hand in vagina

- Live infant, 670 gm.



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Obstetric Emergency: Umbilical Cord Prolapse

- Occult - cord pass through cervix with fetal parts
- Overt - cord pass through cervix in advance fetal presenting part
  - Risk PPROM > grand multiparity, multips, nonvertex, preterm labor

- Suspect: Abnormal FHR tracing, severe decelerations, prolonged bradycardia
- Confirm: “soft pulsatile mass” on vaginal exam

RCOG Guideline #50, *Gibbons et al. *BJOG* 2014;DOI: 10.1111/1471-0528.12890

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Obstetric Emergency: Umbilical Cord Prolapse

- Incidence decreased from 6.4/1000 (1940's) to 1.7/1000 last decade
  - Incidence as high as 1% in breech

- Factors which to contribute to decreased incidence
  - Avoid artificial ROM (TOL) until presenting part well-engaged
  - Admit non-cephalic presentation with PPROM

RCOG Guideline #50, *Gibbons et al. *BJOG* 2014;DOI: 10.1111/1471-0528.12890

Obstetric Emergency: Umbilical Cord Prolapse

Improved perinatal survival 46 % to as much as 94%*

Prompt delivery associated with favorable outcome

- Rapid C-section (30 min)
- Improved neonatal resuscitation
- Routine use fetal monitoring (may diagnose earlier)

RCOG Green Top Guideline # 50 *Gibbons et al. *BJOG* 2014;DOI: 10.1111/1471-0528.12890 (Dublin)

Obstetric Emergency: Umbilical Cord Prolapse

- Decrease risk of pressure on UC
  - Manual elevation fetal presenting part
    - Hand in vagina to push head up
  - Trendelenberg (marked)
- Other Options:
  - Left lateral position with hip elevated
  - Knee-Chest with face down (community)
  - Fill bladder 500-750cc
  - Consider tocolytic agents
  - After push part up, move hand on abdomen keep it up

Training multidisciplinary with team rehearsals

RCOG Green Top Guideline # 50 *Gibbons et al. *BJOG* 2014;DOI: 10.1111/1471-0528.12890

Umbilical cord prolapse is associated with fetal demise in what % of cases?

1. < 10%
2. 10-50%
3. 50-75%
4. > 75%

https://goo.gl/gpECTG

Gibbons et al. *BJOG* 2014;DOI: 10.1111/1471-0528.12890

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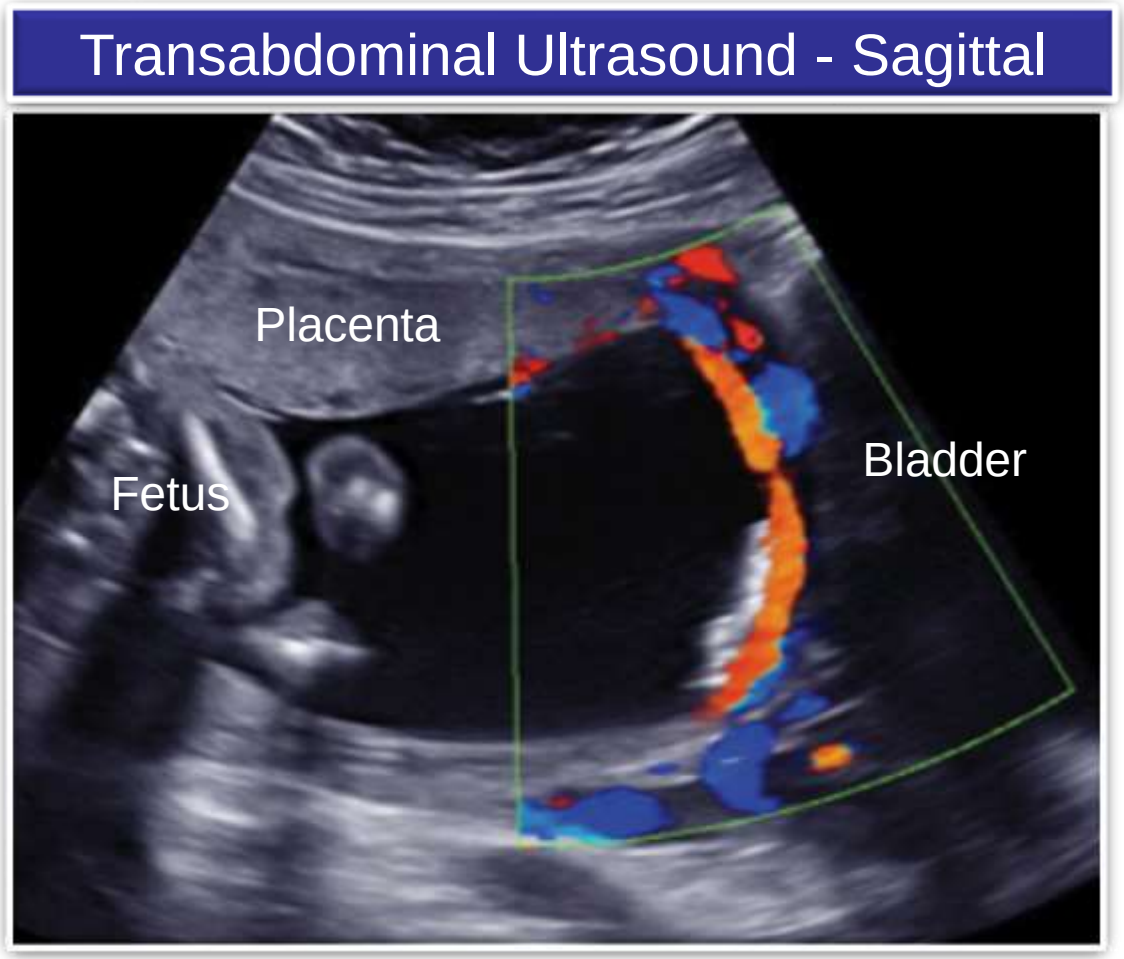
Case # 2: What is your Diagnosis?



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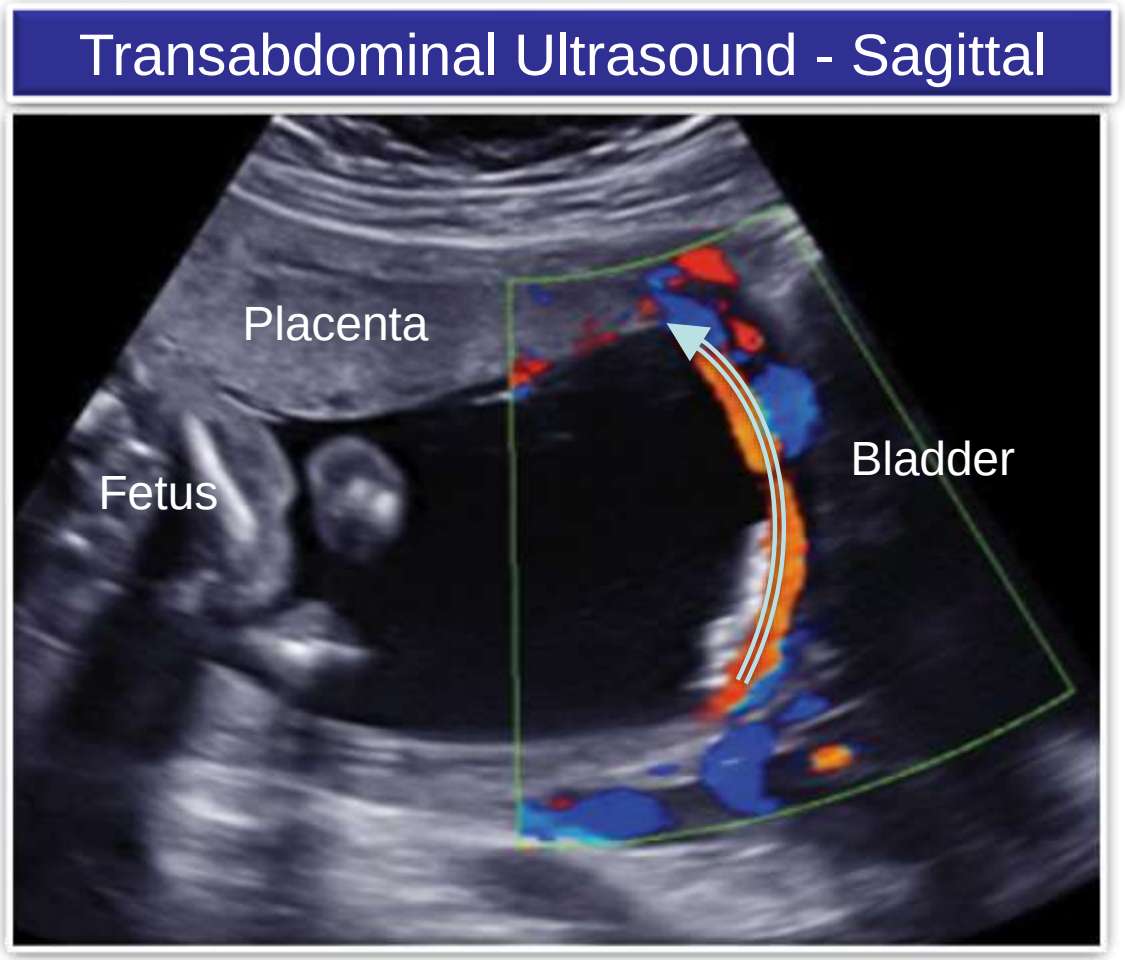
Case # 2: Vasa Previa



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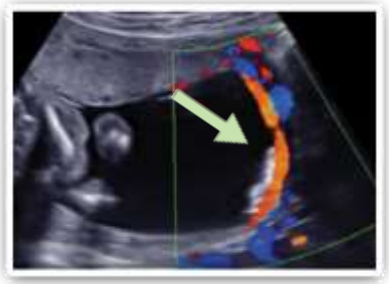
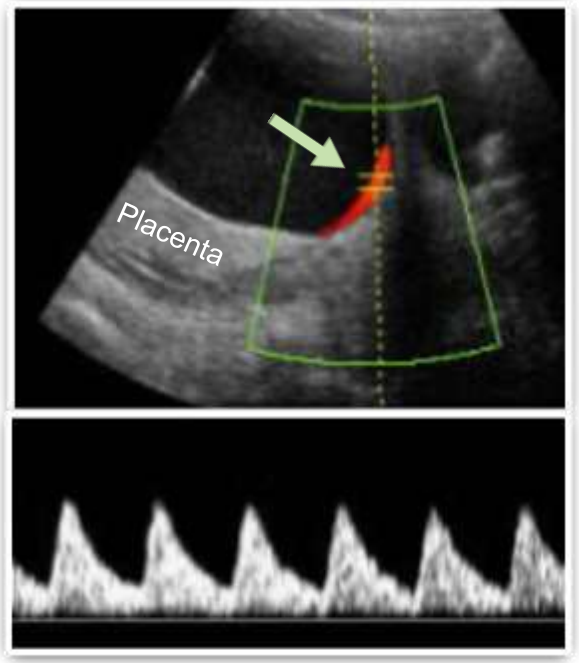
Case #2: Vasa Previa



- **Umbilical cord BV insert on membranes crossing internal cervical os**
  - Include BV within 2 cm internal cervical os
  - ↑risk previa, succenturiate or bilobe placenta, multips
- Fetal death from exsanguination - mortality 60-80%
- Critical diagnosis
  - Permits planned C-section - associated 90% survival
- Confirm diagnosis via Doppler of arteries determine fetal HR
  - Consider maternal retroplacental,cervicouterine
  - ? Funic cord presentation rather than insertion



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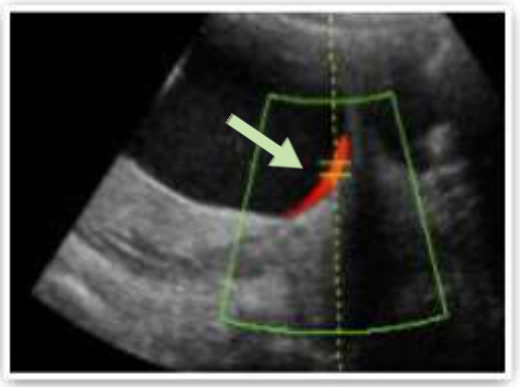
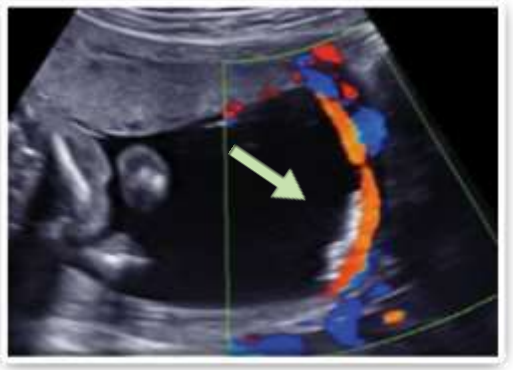
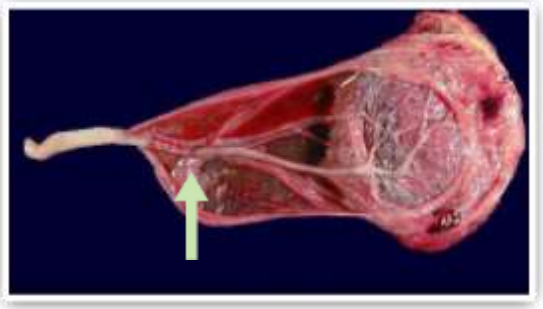
Velamentous UCI







- **Cord inserts into membranes**, not the placenta.
  - May associated placenta previa or vasa previa
  - 1% singletons ……..as much as 15% in MC twins
    - **Consider document UCI sites in MC twins**

- Cord vessels lack placental support and no surrounding Wharton's jelly thus increased risk:
    - Rupture, kink or compression or thrombosis BV
    - Risk PTD up to 37.5%*
    - IUGR

*Placental implantation abnormalities and risk of PTD: systematic review and metaanalysis. Vintzileos A AJOG 2015

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Management

- No high quality data on management
  - **Vasa Previa** : Conservative suggest betamethasone course 28-32 wks then consider admit 30-34 wks
  - **Velamentous** insertion consider close monitoring 35 weeks onward with delivery by 40 weeks.
  - Rapid delivery if labor, PROM, variable de-accels, vaginal bleeding with fetal tachycardia

Placental implantation abnormalities and risk of PTD: systematic review and metaanalysis Vahanian SA, Lavery JA, Ananth CV, Vintzileos A AJOG 2015

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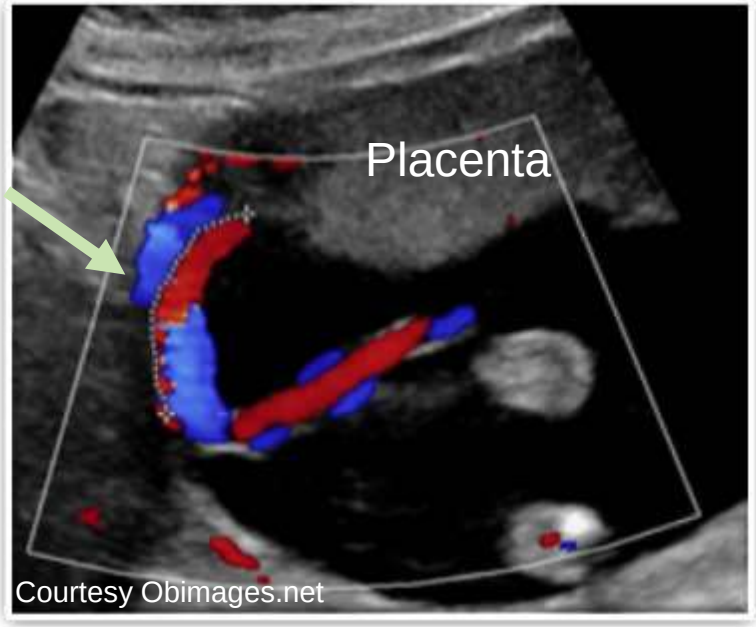
Vasa Previa & Velamentous Cord Insertions

Vasa Previa and aberrant velamentous

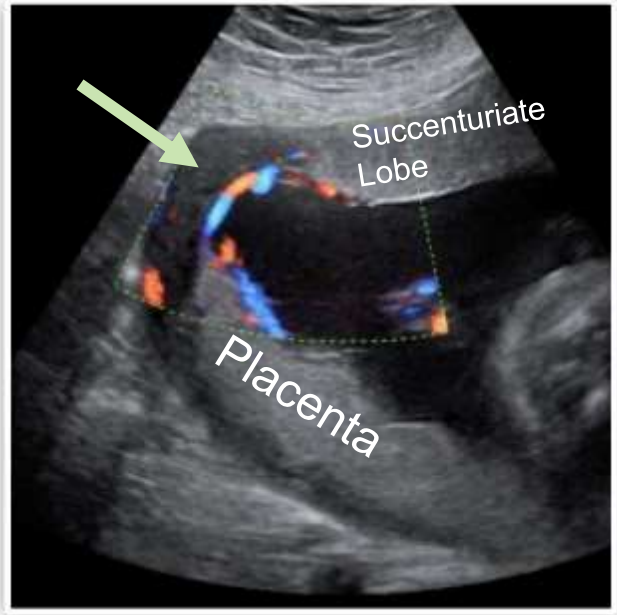
Courtesy MFM at Valley Hospital, Ridgewood NJ

Velamentous



Courtesy Obimages.net

Velamentous Succenturiate



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Vasa Previa is defined as “Insertion of the umbilical cord” on which of the following?

1. On the placenta.
2. On the margin of the placenta.
3. On the membranes near the placental margin.
4. On the membranes covering the internal cervical os.

https://goo.gl/T7WZ2Z

*Placental implantation abnormalities and risk of PTD: systematic review and metaanalysis Vahanian SA, Lavery JA, Ananth CV, Vintzileos A AJOG 2015

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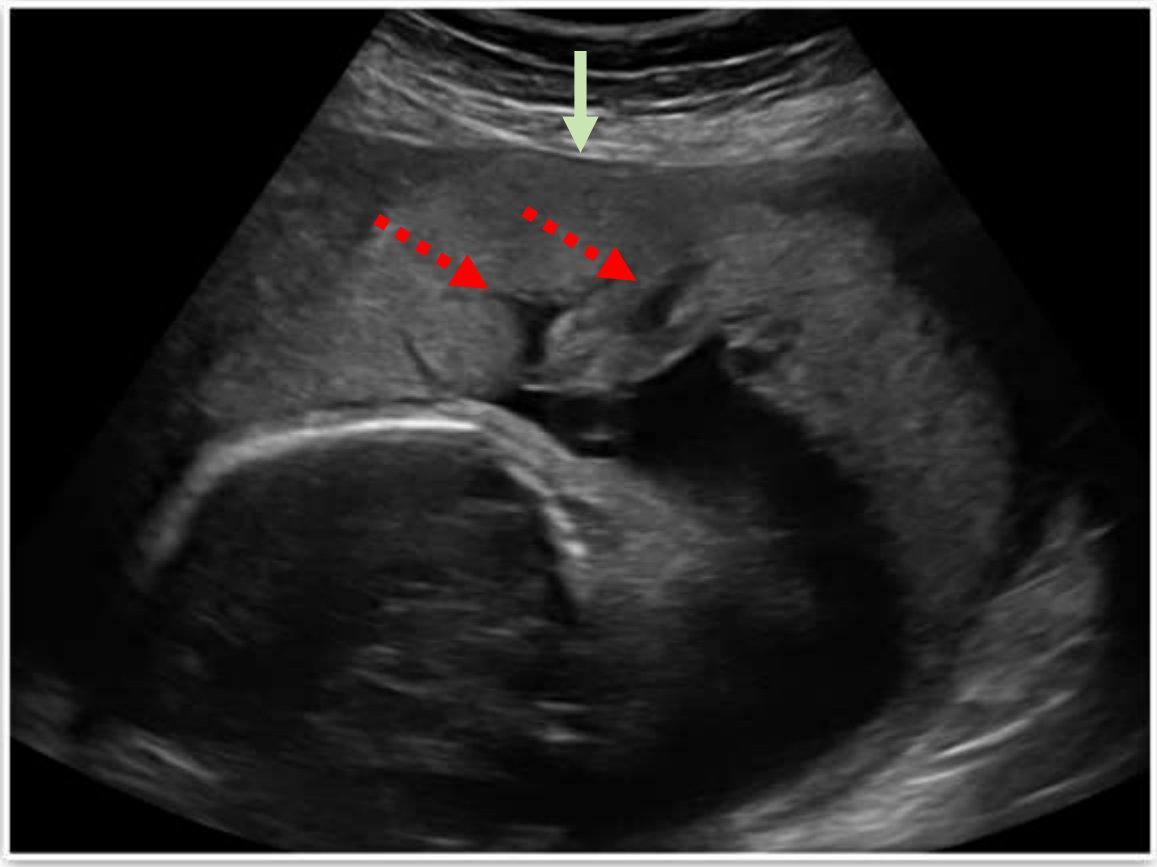
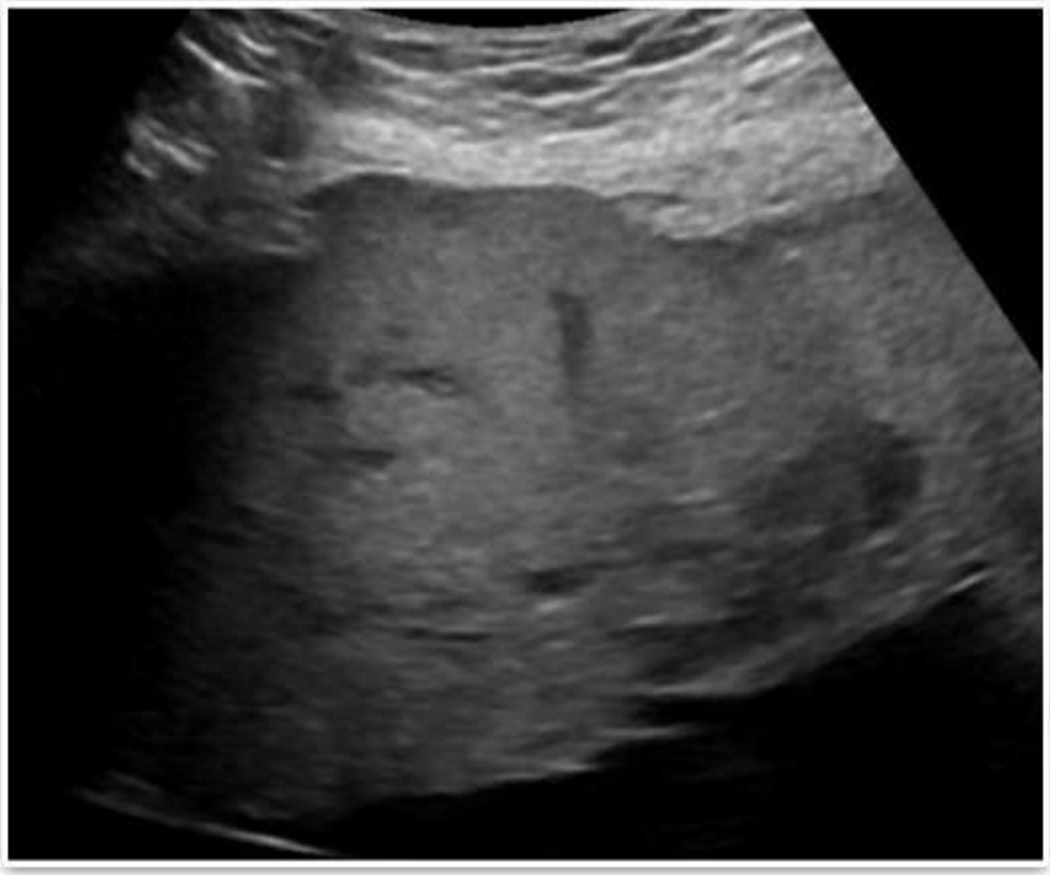
Case # 3

- **Pregnancy 4: Current for routine BPP at 31W3D**
  - Normal preceding studies (NT, anatomy, BPPs)

    –*Gravida 4, Para1*
    - *Normal, EPL, then classical vertical Csection but neonatal demise*

Case # 3: 31W3D, routine BPP





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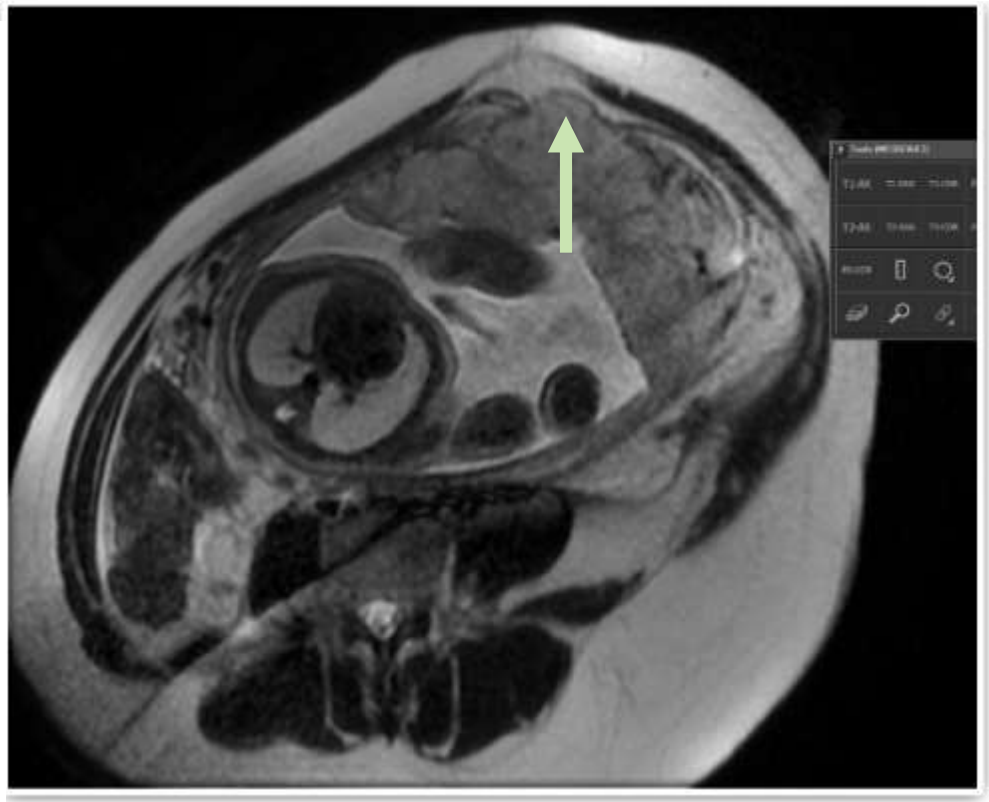
MRI 32 weeks

- Focal area placental bulge with mymometrial thinning just left midline inferior to umbilicus
  - 2.8 x 0.8 x 2.6 cm
  - Bulge deep left medial rectus abdominus with no definite invasion

SSFE heavily T2W



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Organized for C-section with hysterectomy

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Morbidly Adherent Placenta (MAP)
Abnormally Invasive Placenta (AIP)
Placenta percreta, acreta, increta

- Abnormal placentation related to disruption normal endometrial-myometrial junction with defect or abnormal decidual layer which is thinned or absent
  - Permits abnormal adherence & penetration chorionic villi into uterine wall
  - 80% associated with prior C-section, D&C, myomectomy
    - Partial or complete dehiscence scar permitting extravillous trophoblasts direct access to deeper myometrium or serosa

Big 2: Prior C-section and Placenta previa

Risk MAP if placenta previa **and** prior C-section		Risk MAP if **only prior C-section no** previa
1st	3%	0.03%
2nd	11%	0.2%
3rd	40%	0.1%
4th or 5th	61%	0.8%
6th or 7th	67%	4.7%

Maternal morbidity associated with multiple repeat cesarean deliveries. Silver et al. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network Obstet Gynecol. 2006;107(6):1226.

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Invasive Placentation

- ~ 1/300 pregnancies
- Rise in incidence
  - Related to increased C-sections (10X increase last decade)
  - Increased risk also if prior uterine instrumentation (D&C), myomectomy

- Complications range from severe hemorrhage and coagulopathy to maternal-fetal demise

Wu et al, Silver et al, Mogos et al

Ultrasound versus MR
Abnormal Invasive Placentation

- Sensitivity & Specificity US, MR based on 1010 patient meta-analysis: 23 studies of prenatal sonographic identification of invasive placentation,
  - US sensitivity 91% and specificity 97%
  - MR sensitivity 94.4% and specificity 84%
- Comparable diagnostic accuracy

- MR advantage in posterior placentation, assessing degree extrauterine invasion

* Prenatal identification of invasive placentation using ultrasound: systematic review and meta-analysis. D'Antonio F, Iacovella C, Bhide A UOG 2013 Nov;42(5):509-17.

Pro Forma for ultrasound reporting in suspected abnormally invasive placenta (AIP): an international consensus UOG: Volume 47, Issue 3, March 2016, Pages: 276-278

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 ☐

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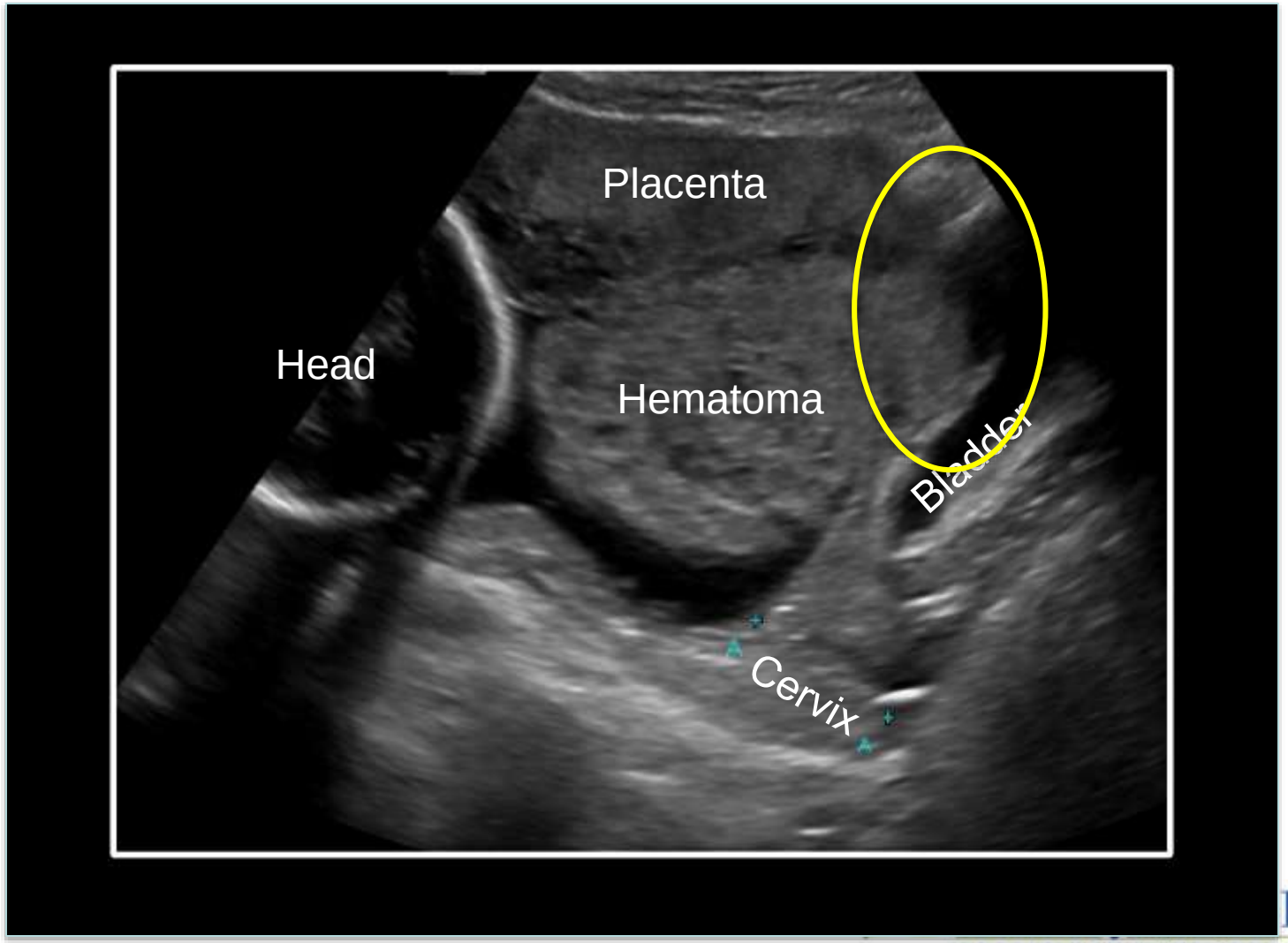
Gray Scale US Findings	US or MR Findings
Loss retroplacental clear zone	Irregular or no longer visible
Myometrial thinning	< 1mm
Abnormal placental lacunae	May be large, irregular, turbulent flow
Placental bulge	Deviation uterine serosa from expected plane into neighbouring organs, typically the bladder, thus serosa appears intact but outline distorted
Bladder wall interruption	Loss or interruption bladder wall hyperechoic serosal line
Focal exophytic mass	Placental tissue breaks through uterine serosa and extends beyond it
Color Doppler Findings	
Uterovaginal hypervascularity	Striking amount CD signal between myometrium & posterior wall bladder, numerous closely packed BV with multidirectional flow, may high velocity
Subplacental hypervascularity	Striking amount CD signal in placental bed, numerous closely packed BV with multidirectional flow, may high velocity
Bridging vessels	Vessels bridge placenta across myometrium beyond serosa (bladder) may run perpendicular rather than parallel to myometrium
Parametrial Involvement	Invasion into parametrium

Plus MR: Intraplacental dark T2 bands, extent spread

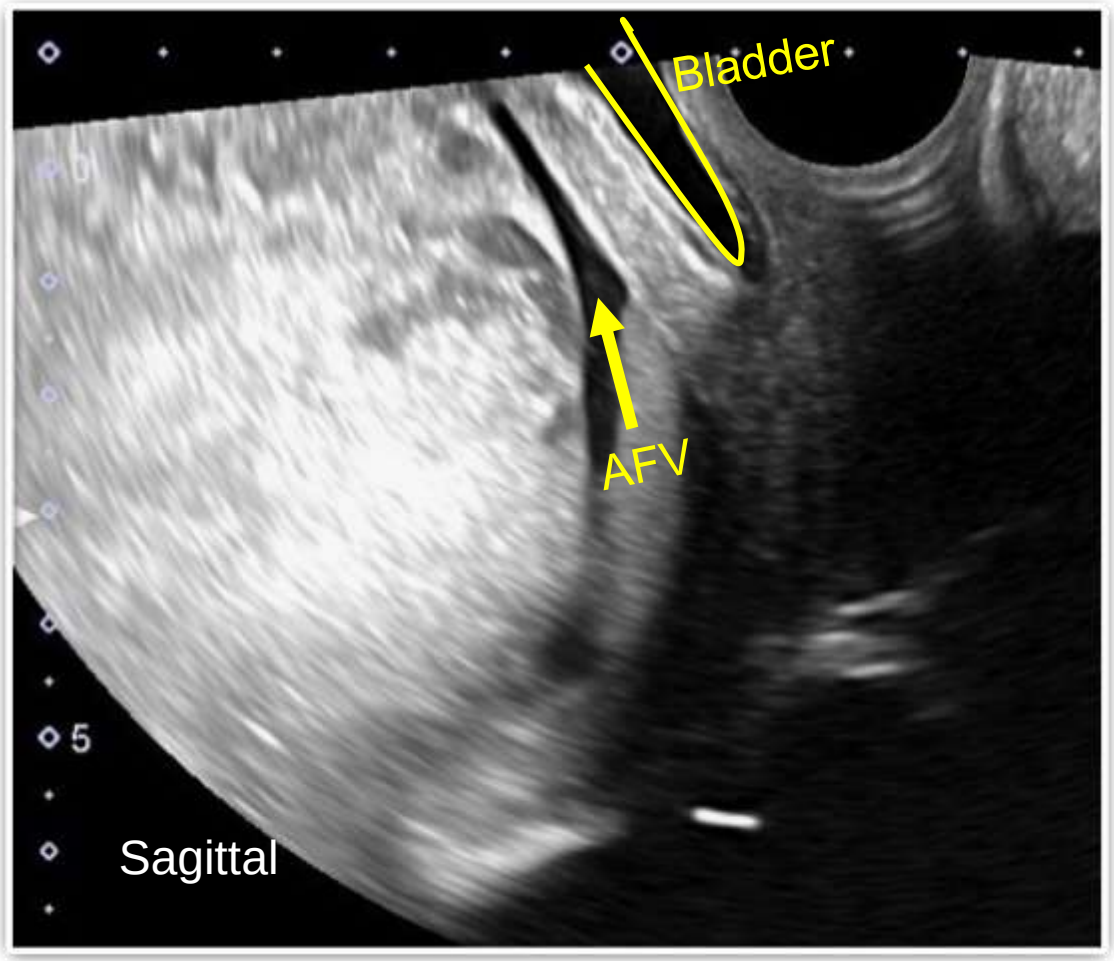
Case Example 2: AIP

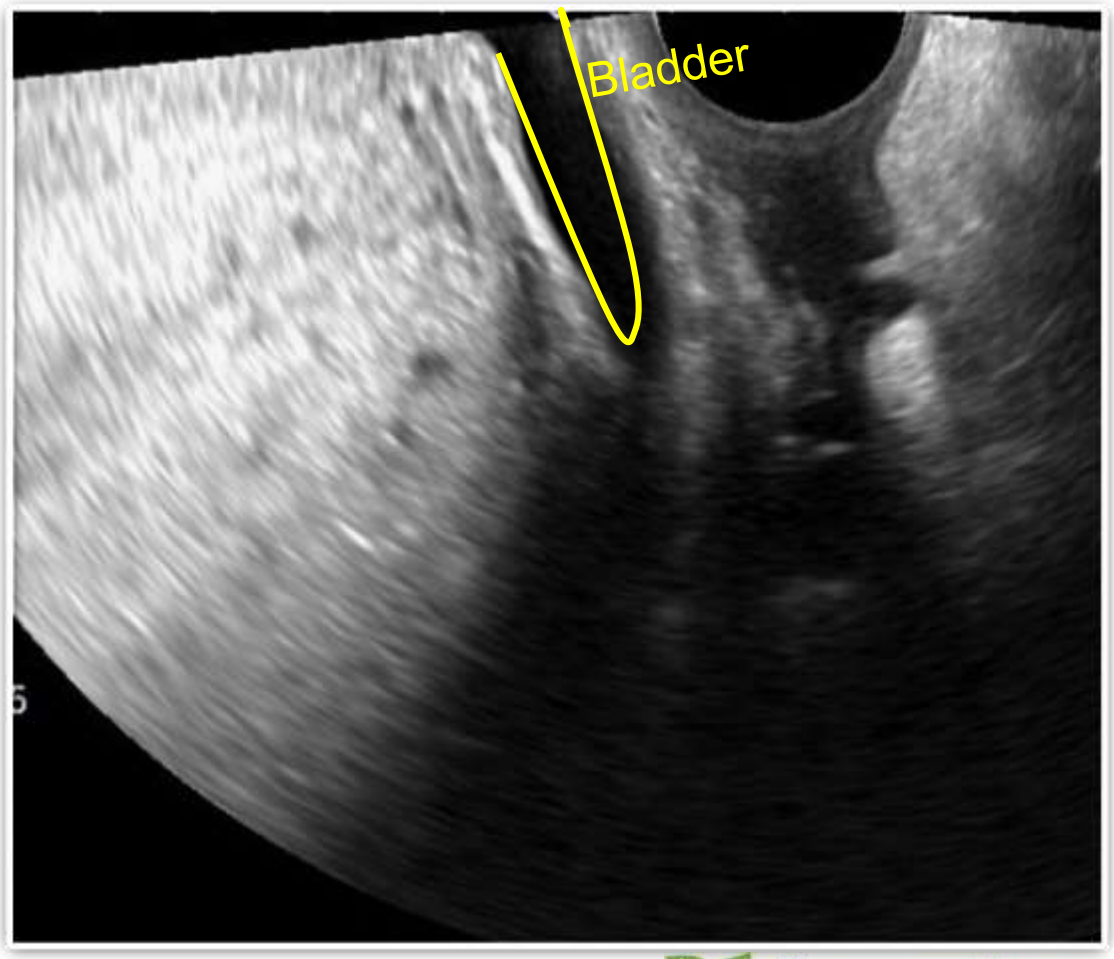
- 2 prior C-sections & previa

25 weeks & 2 days, G6P4, Antepartum hemorrhage



TVS for Previa





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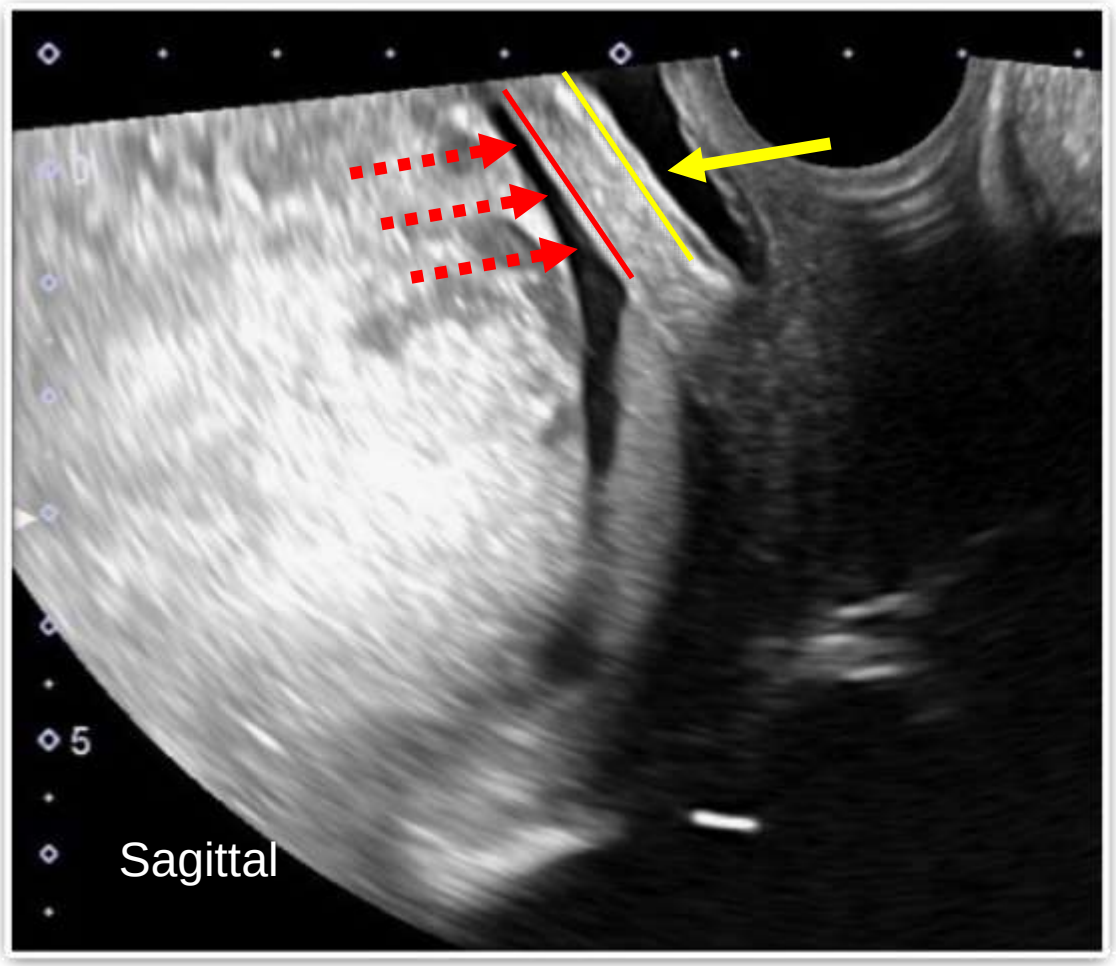
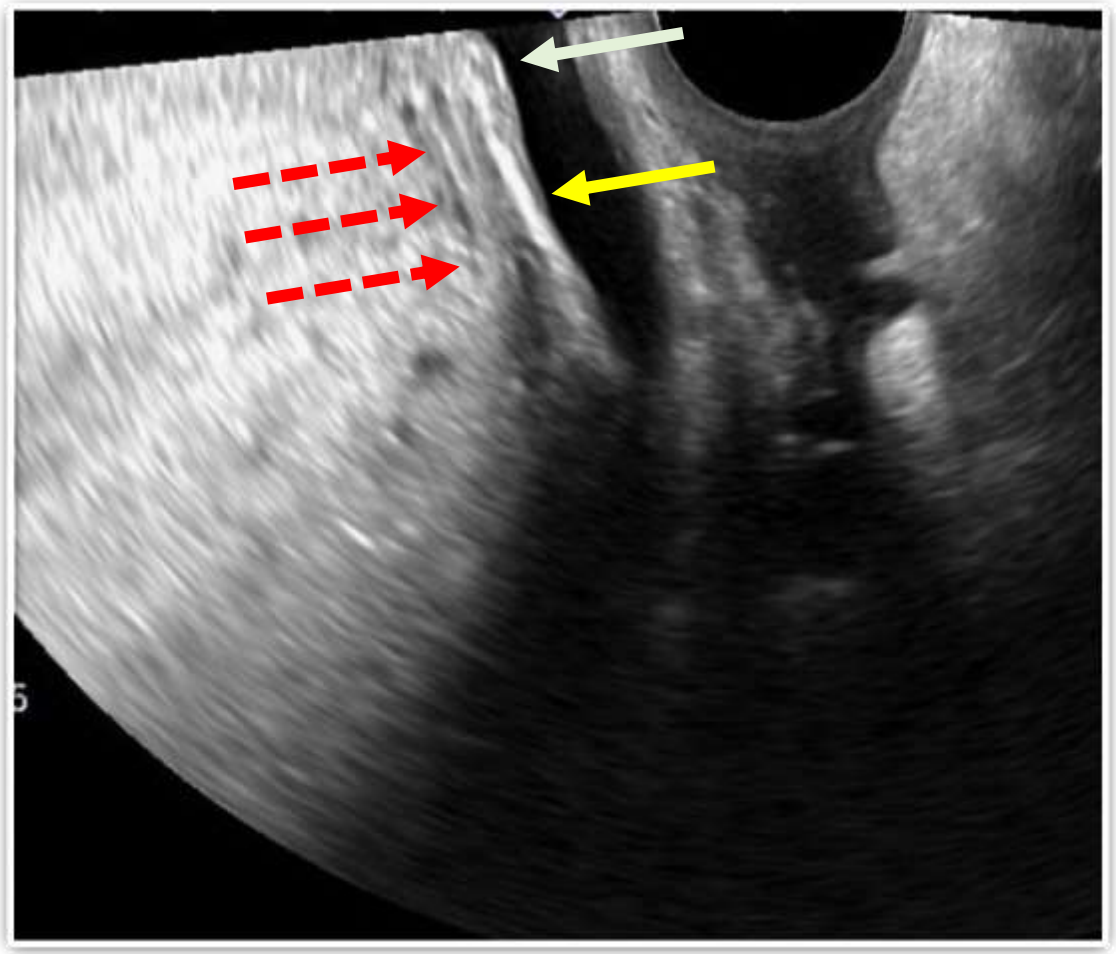
TVS for Previa





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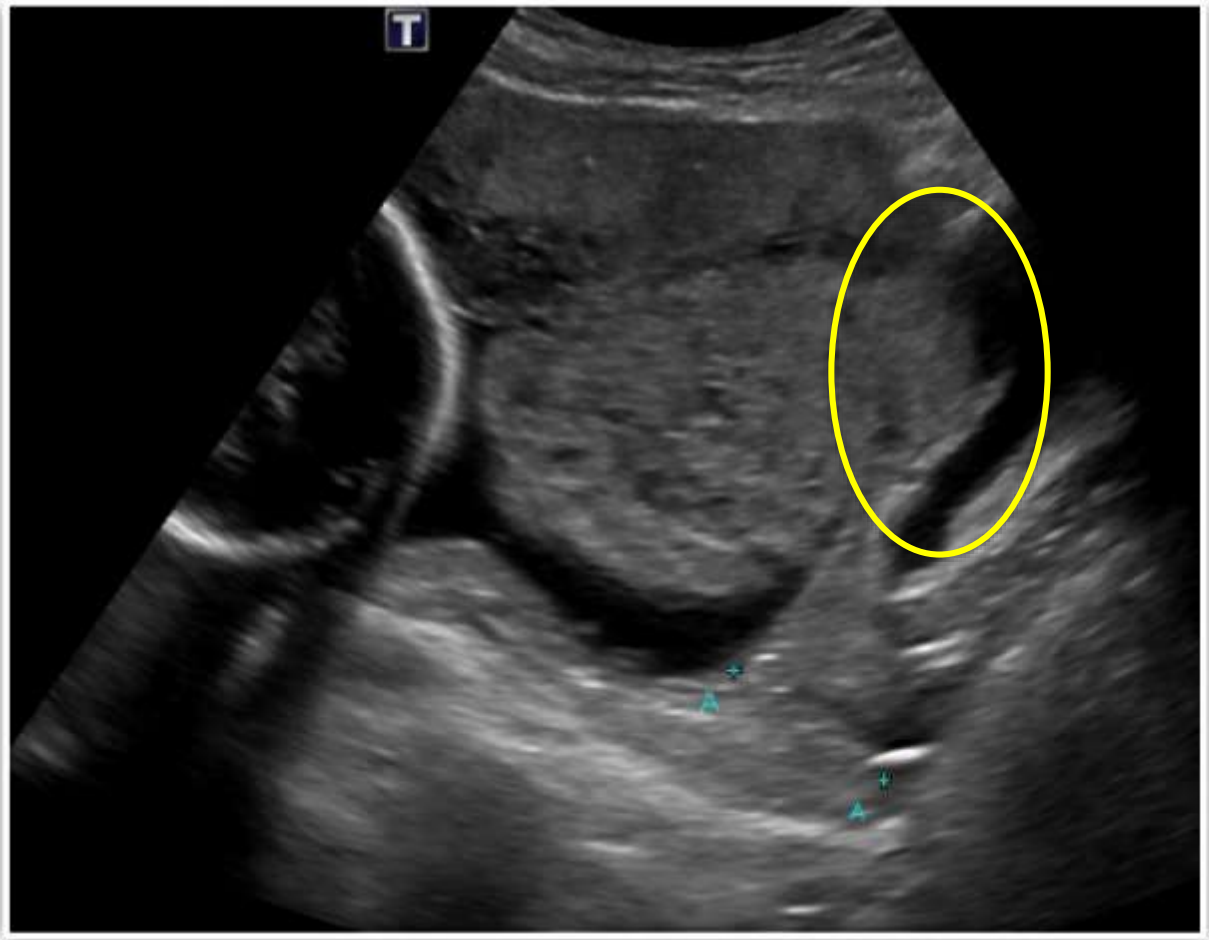
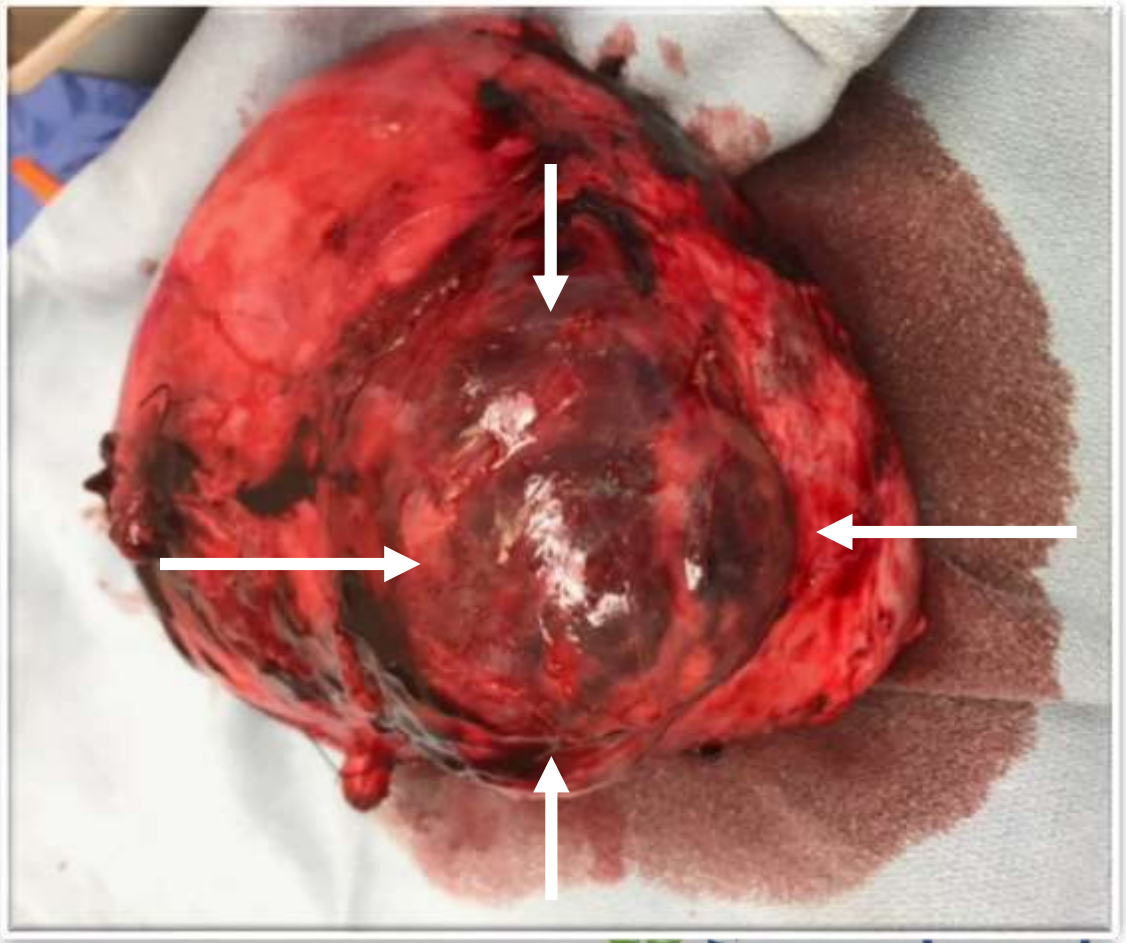
Placenta invaded through uterine wall but not yet through bladder
G6P4, 2 prior C-sections, previa





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Management

- Referral tertiary unit with multidisciplinary team
  - *Interventional radiology for pre operative UAE/balloon occlusion or post operative if bleeding*
  - Uterine arteries will be clamped during hysterectomy
  - Consider methotrexate if leave some placenta behind in conservative management
    - Limited evidence to support this route

The correct term(s) for placenta accreta is

1. Morbidly adherent placenta (MAP)
2. Abnormally invasive placenta (AIP)
3. Placenta increta, percreta, acreta.
4. All of the above.

https://goo.gl/QcCLpb

Pro Forma for ultrasound reporting in suspected abnormally invasive placenta (AIP): an international consensus UOG: Volume 47, Issue 3, March 2016, Pages: 276-278

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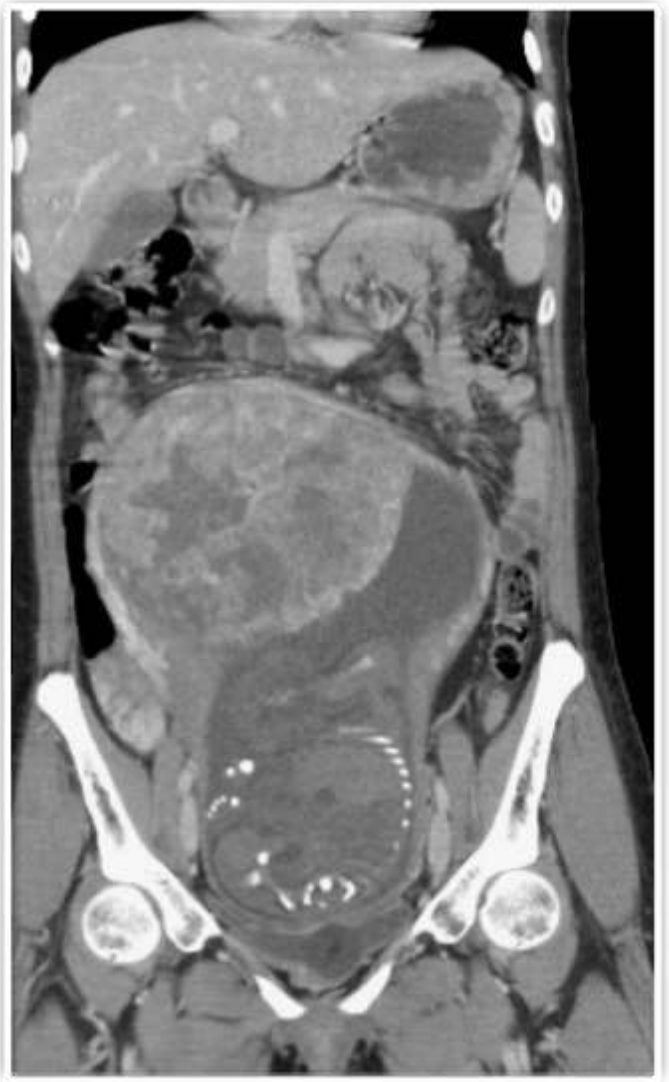
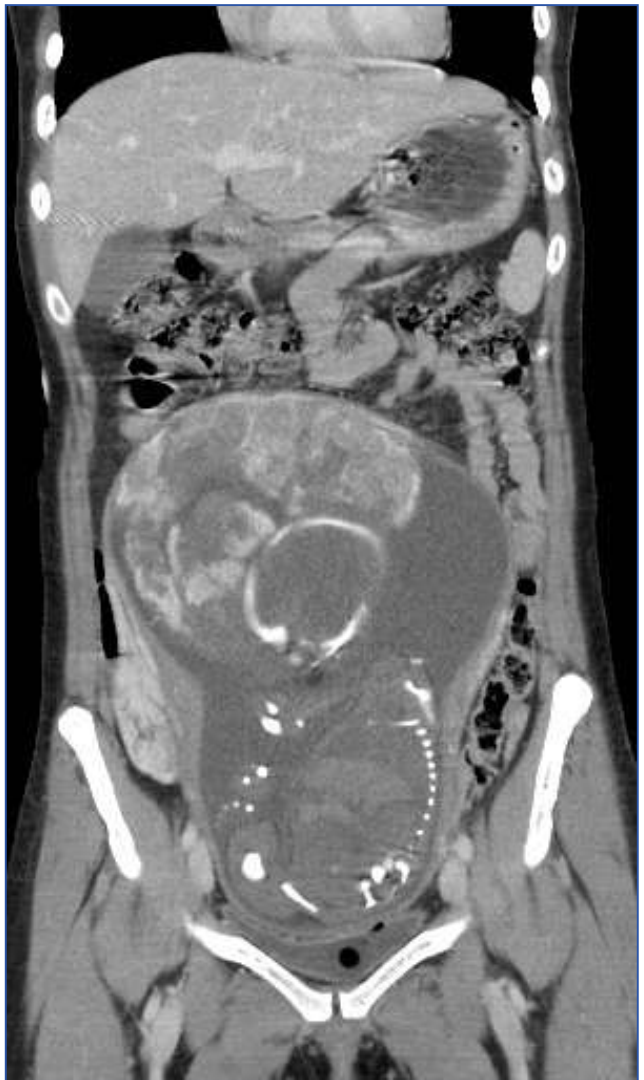
Case # 4 : Pregnant 29 weeks - MVA

- 25yo hit by car, landed on abdomen/head
  - Head CT revealed small subdural hematoma
  - Combative, agitated, requiring sedation
  - NST abnormal with minimal variability, FHR 145 bpm, worsen
  - HB 10 & platelets 82,000 ? Consumptive coagulopathy possibly hidden abruption
  - Abnormal FHR tracing - Primary Stat Low C-section

MVA – Pedestrian – 29 weeks pregnant

Case # 4: What's Your Diagnosis?





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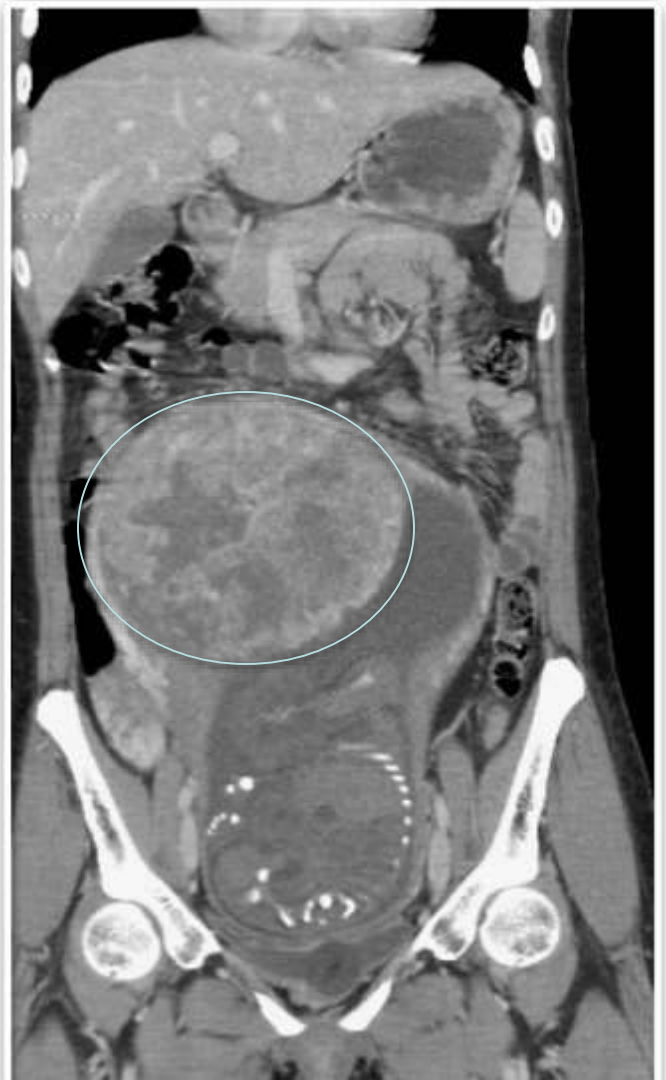
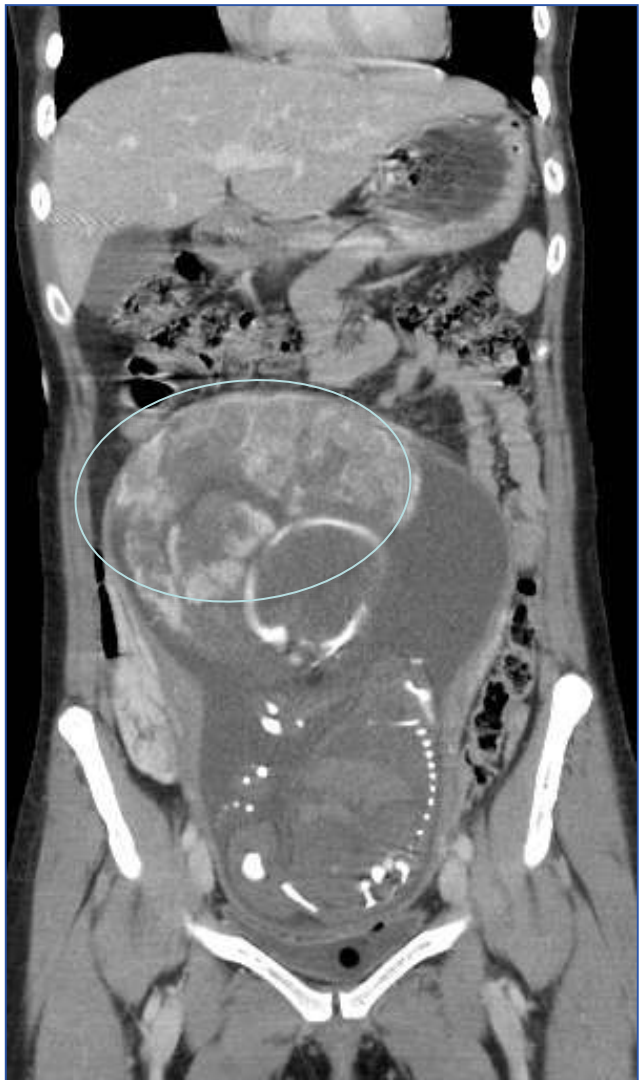
Case #4: Placental abruption

Blunt trauma with shear injury, large areas devascularized placenta, “white” at OR





Symptoms 80% bleed, 70% pain

Ultrasound: Limited sensitivity 15-20%

Poor prognosis if large/recurrent

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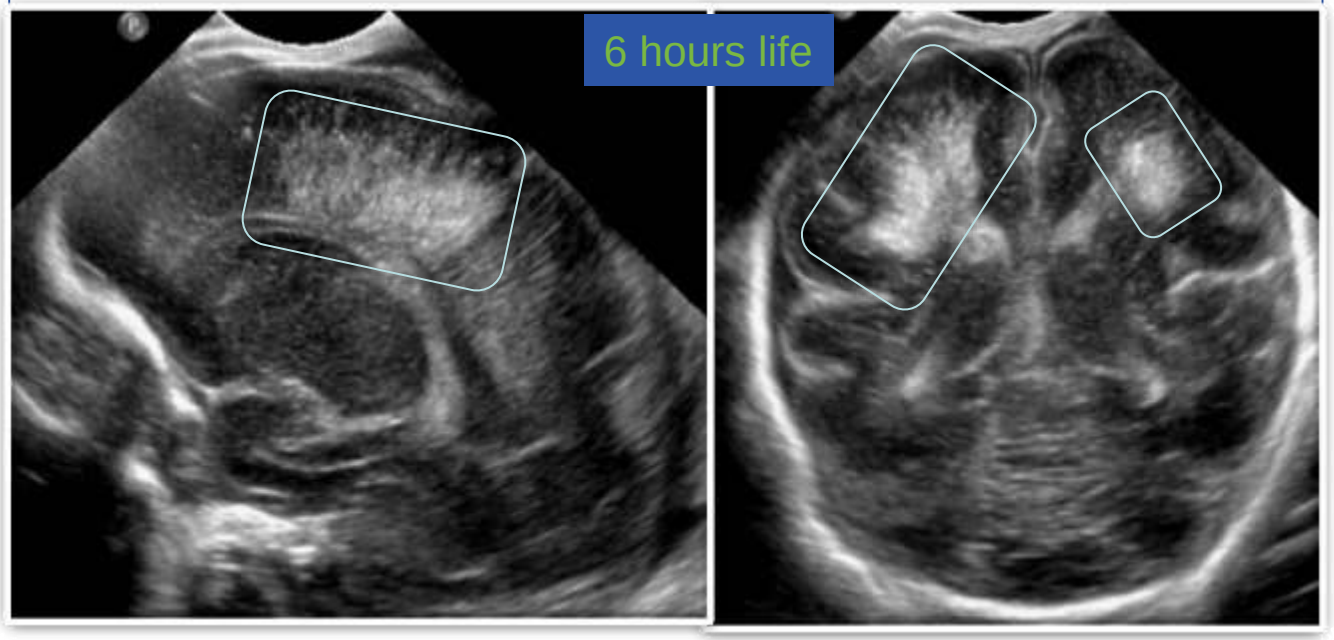
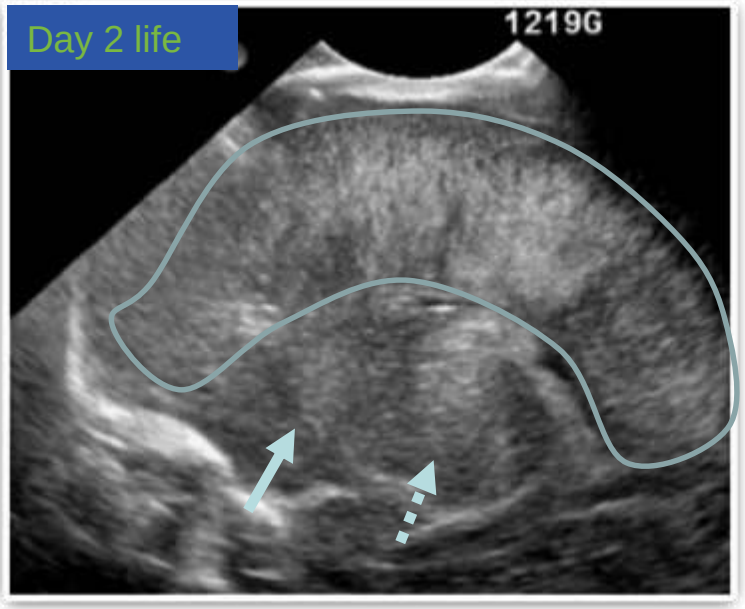
Infant – 29 wks

- Flaccid with no HR
- Resuscitation, unstable, low hemoglobin
- Bulging fontanelle



- Remained flaccid
- Progression US findings
- Withdrew support



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Maternal Abdominal Trauma Principles

- No fetal survival without maternal survival
  - Exception is T3 when immediate C-section may save fetus
  - Do not delay with ionizing radiation such as CT

- Minor maternal trauma may cause fetal death
  - Blunt trauma result in shear injury - placental abruption
    - Incidence ~ 40% severe vs 3% mild blunt trauma

- Amend trauma protocol:
  - Include observation period in L&D for fetal monitoring and potential delivery

The most common cause of fetal demise in maternal trauma is

1. Penetrating trauma with direct fetal injury.

2. Penetrating trauma with indirect fetal injury on basis of hypovolemia and hypoxia.

3. Blunt trauma with shear injury to placenta.

https://goo.gl/X6HhDX

Richards JR, et all. . Blunt abdominal injury in the pregnant patient: detection with US. Radiology2004;**233**(2):463–470;

Goodwin H, Abdominal ultrasound examination in pregnant blunt trauma patients. J Trauma 2001;**50**(4):689–693

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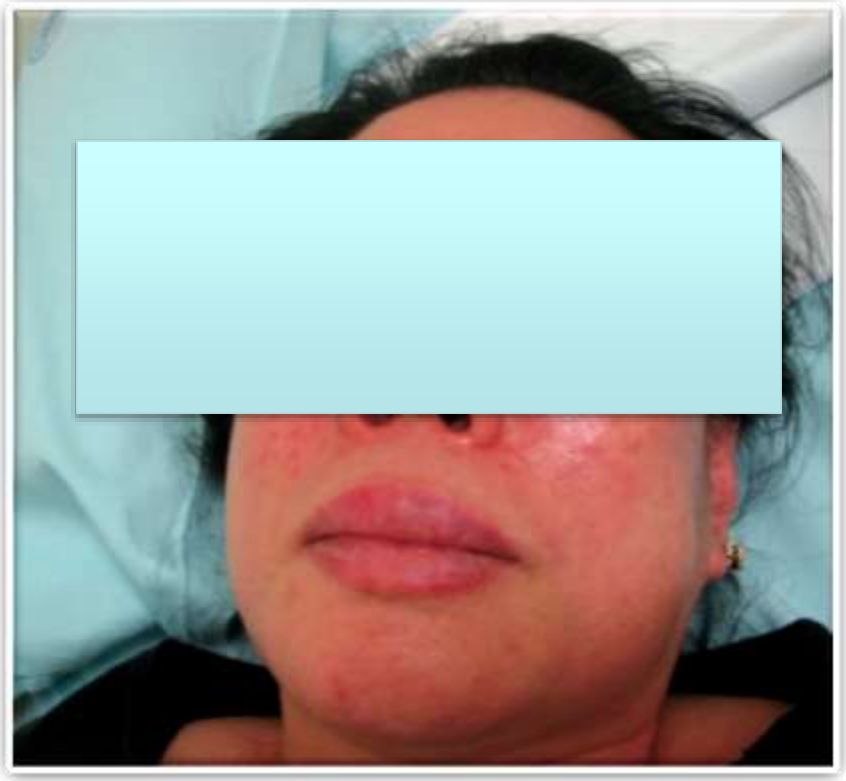
Case # bonus: What is Happening?

- During your transvaginal exam your patient complains of throat tingling, you look up at her…..



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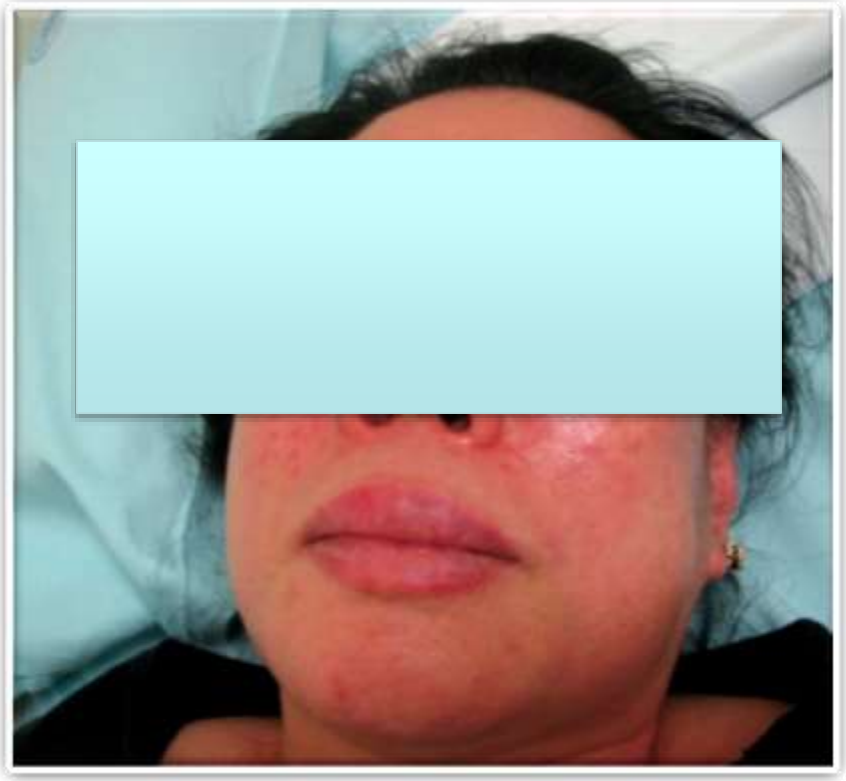
Case: Severe Latex Allergy

- **A**irway: Raspy voice
- **B**reathing: RR 30
- **C**irculation: HR 115

- Call for help
- Oxygen if available
- Epinephrine 0.3mg i.m.



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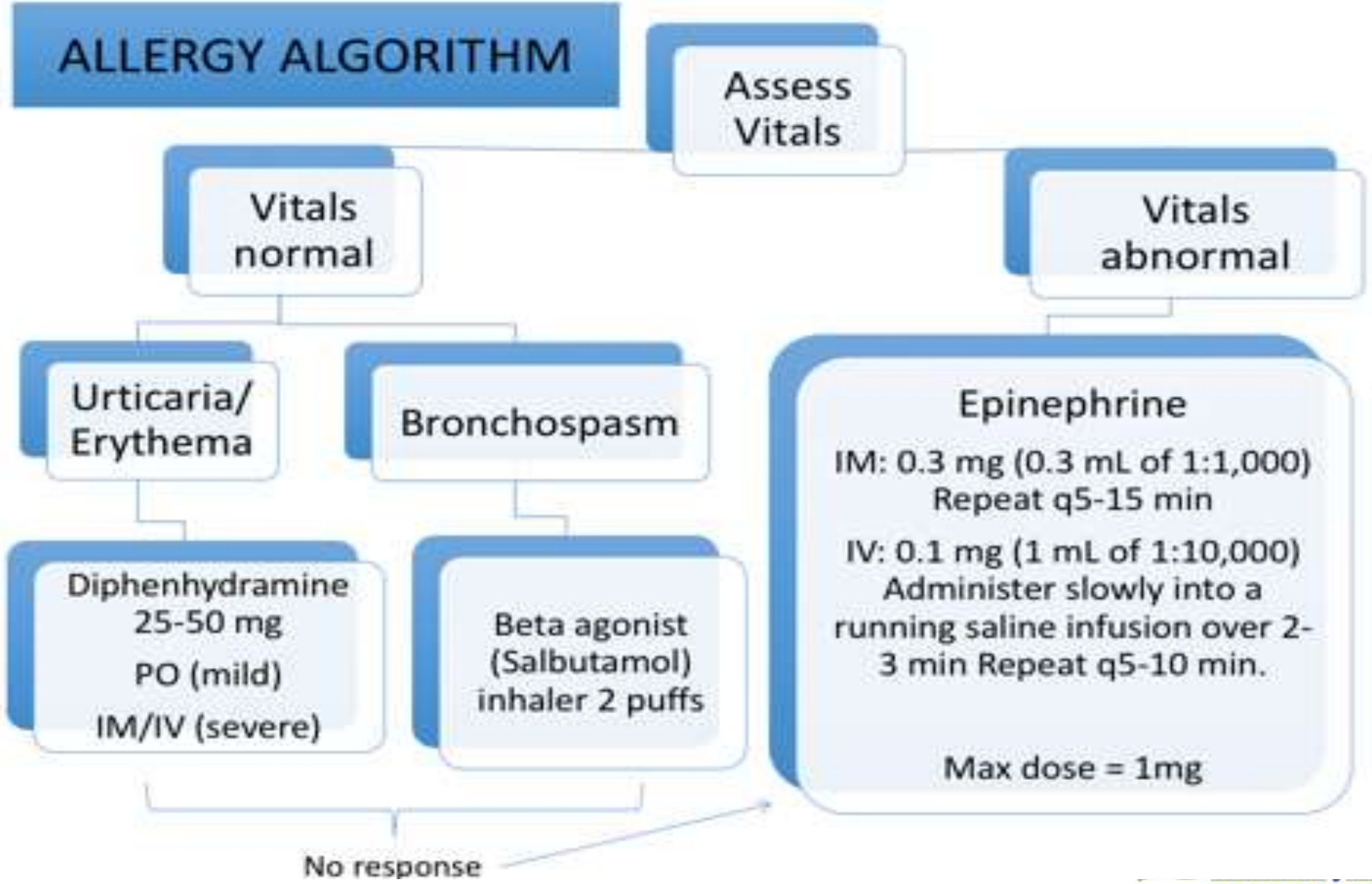
ALLERGY ALGORITHM
Assess Vitals
Vitals normal
Vitals abnormal
Urticaria/ Erythema
Bronchospasm
Epinephrine
IM: 0.3 mg (0.3 mL of 1:1,000) Repeat q5-15 min
IV: 0.1 mg (1 mL of 1:10,000) Administer slowly into a running saline infusion over 2-3 min Repeat q5-10 min.
Max dose = 1mg
Diphenhydramine 25-50 mg
PO (mild)
IM/IV (severe)
Beta agonist (Salbutamol) inhaler 2 puffs
No response

Latex Allergy

- Latex allergy emerged 1980s
  - Peak 3-10% HCWs sensitized
  - Increased exposures due to:
    - Universal Precautions: 1987 protection (Hepatitis C, HIV)
    - Standard Precautions: Latex gloves in health care, food industries….
    - Patients multiple admission, atopic, workers in NRL industries

45 Kelly KJ, Sussman G. Latex allergy: Where are we now and how did we get there?. The Journal of Allergy & Clinical Immunology: In Practice. 2017 Oct 31;5(5):1212-6.

Latex Allergy

- Adaptions over past 15 years
  - Reduction NRL (natural rubber latex) allergen content
  - Removal cornstarch powder (carrier for latex allergens)
    - FDA ban Jan 2017
  - Movement to non-latex gloves
    - Nitrile gloves- polyacrylate coated from inner side to facilitate easy and smooth donning, thus eliminate powder which is proven carrier of latex allergens

Kelly KJ, Sussman G. Latex allergy: Where are we now and how did we get there?. The Journal of Allergy & Clinical Immunology: In Practice. 2017 Oct 31;5(5):1212-6. Bansal P. Nitrile Gloves Over Latex Gloves: Need of the Hour!. International Journal of Nursing. 2015 Nov 25;1(2).

Summary: Tips

- Umbilical cord prolapse : Consider diagnosis & Team rehearsals
- Vasa Previa : Consider documentation routine umbilical cord insertion, especially in MC twins
- Invasive Placentation: Risk factors previa, C-section
- Maternal Trauma: Mild blunt trauma may be life threatening to fetus
- Latex Allergy - Protect staff with low allergen (NPL) non-powder gloves
  - Consider non-latex gloves, condoms…if affected HCWs or patients.

Real Canadian Medical Health Care System aka Sunnybrook Style!

phyllisglanc.com (WEBSITE WITH HANDOUT)

Thank you for your time and attention
Thank you to RSNA for invitation

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THANK YOU FOR YOUR TIME AND ATTENTION
THANK YOU TO THE RSNA & ORGANIZERS

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