First Trimester US

The Basics

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Objectives

By the end of this lecture, you will be able to

- Identify anatomic landmarks on pelvic ultrasound
- Discuss the 4 basic dimensions of a first trimester ultrasound
- Identify signs of normal first trimester pregnancy on ultrasound
- Discuss signs of abnormal early pregnancy on ultrasound cases

True or false:

Definitive intrauterine pregnancy is a yolk sac within a gestational sac within the cavity of the uterus

Orienting to Pelvic US

Pelvic ultrasound

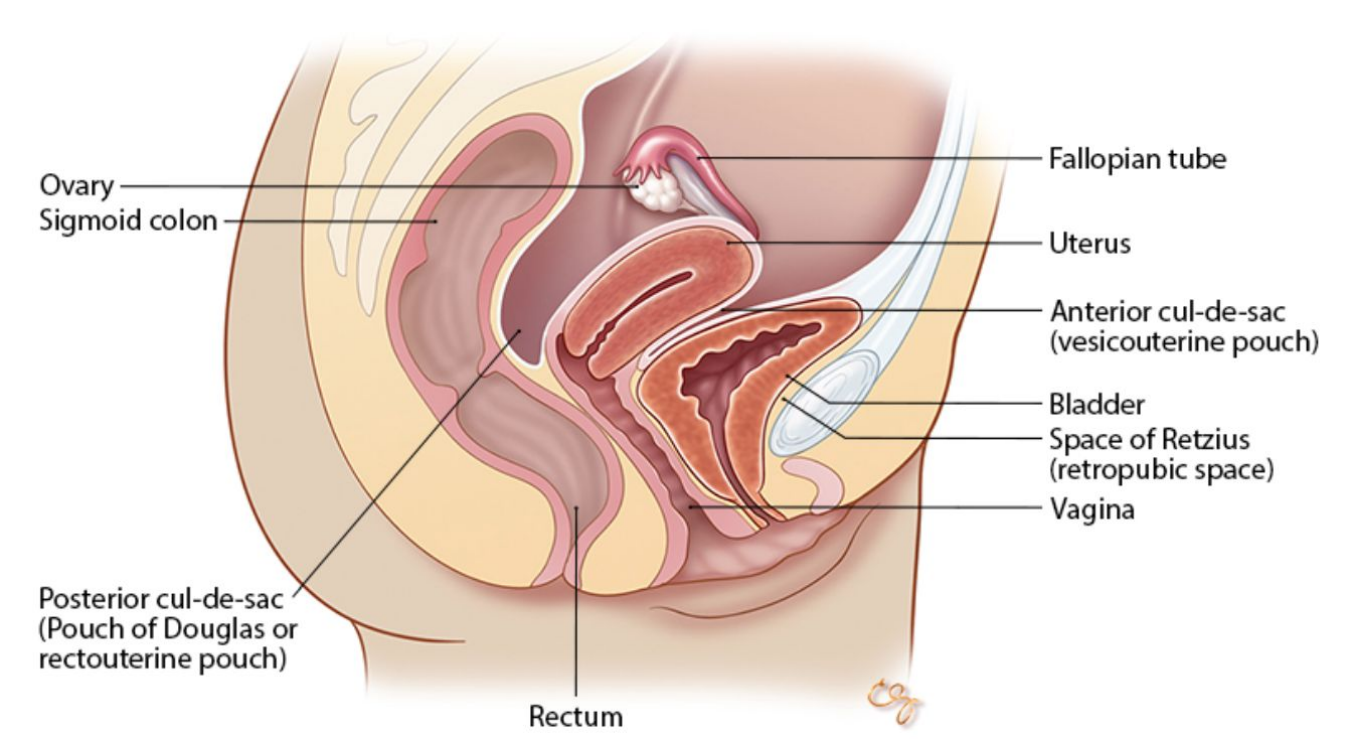
Transabdominal ultrasound

- Non-invasive
- Lower frequency probe
  - Can see deeper but lower quality image
- Requires a full bladder

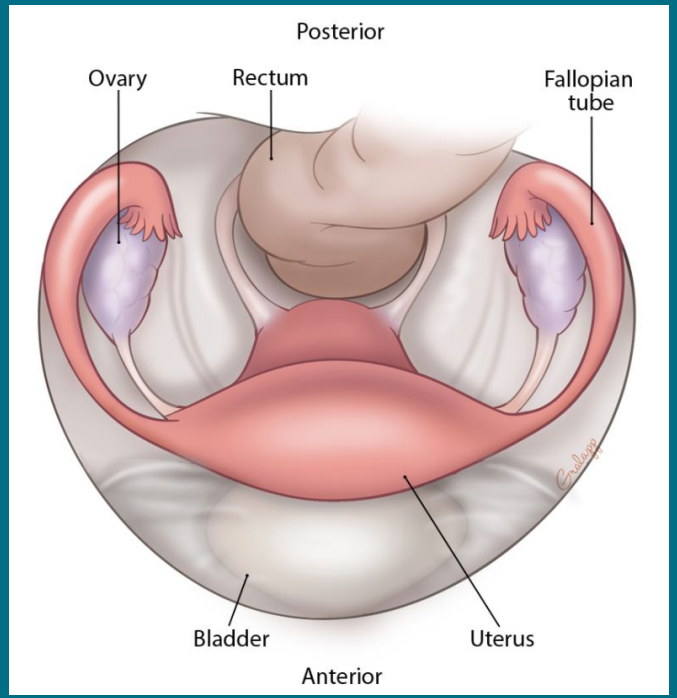
Transvaginal ultrasound

- Invasive exam
- Higher frequency probe
  - Higher quality images
- Better quality with empty bladder
- Generally quality is not affected by body habitus

Ultrasound anatomy



Ultrasound anatomy

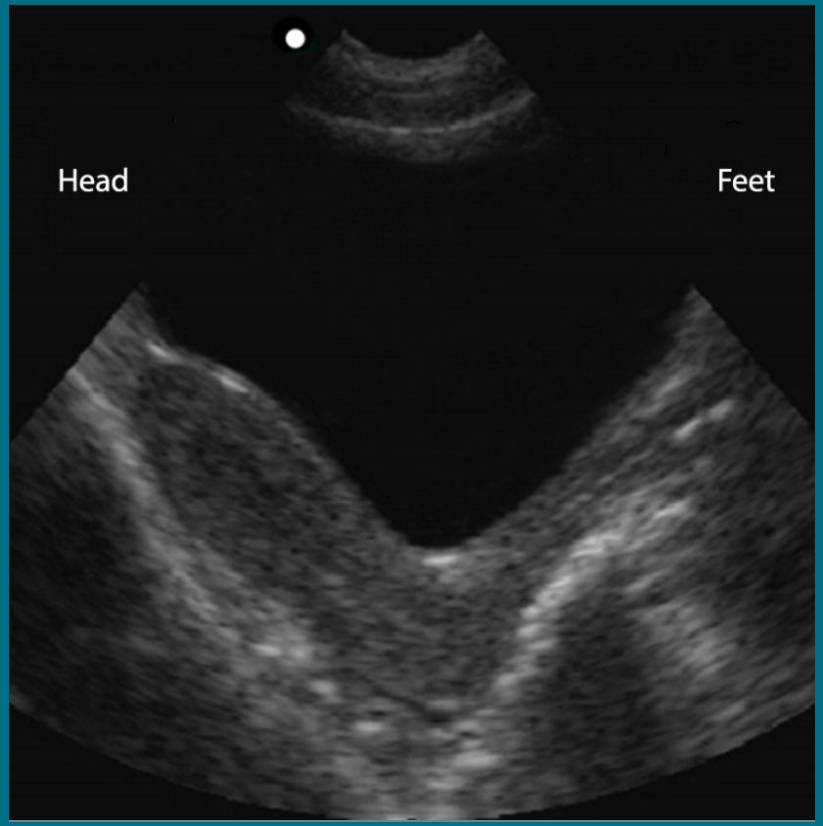


*Reminder that ovaries are posterior to the uterus

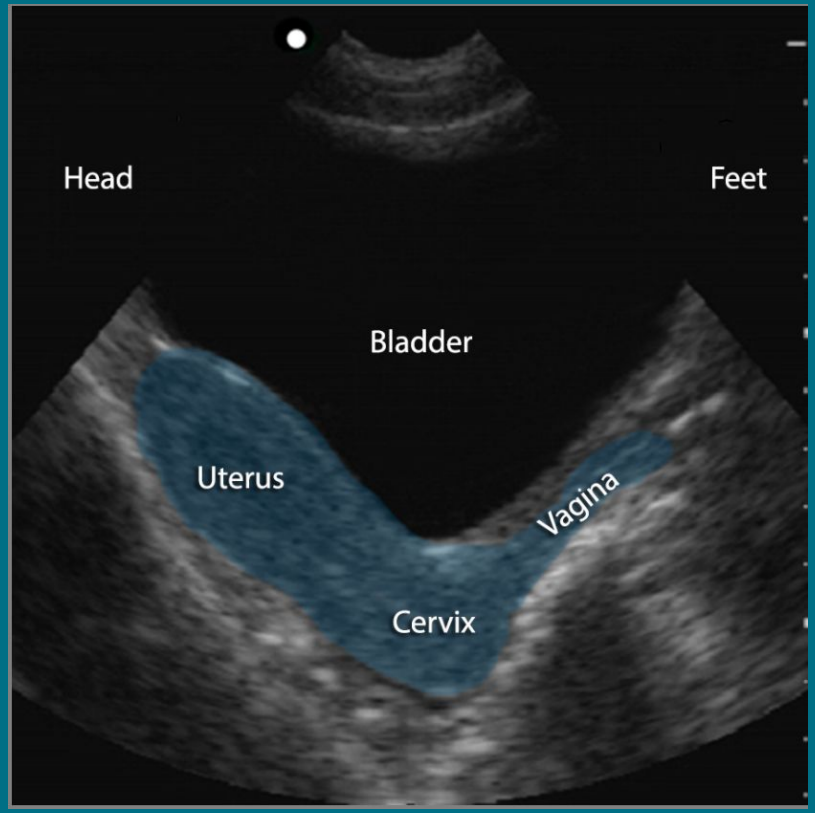
Sagittal View

Transverse View

Transabdominal in sagittal view



Transabdominal in sagittal view



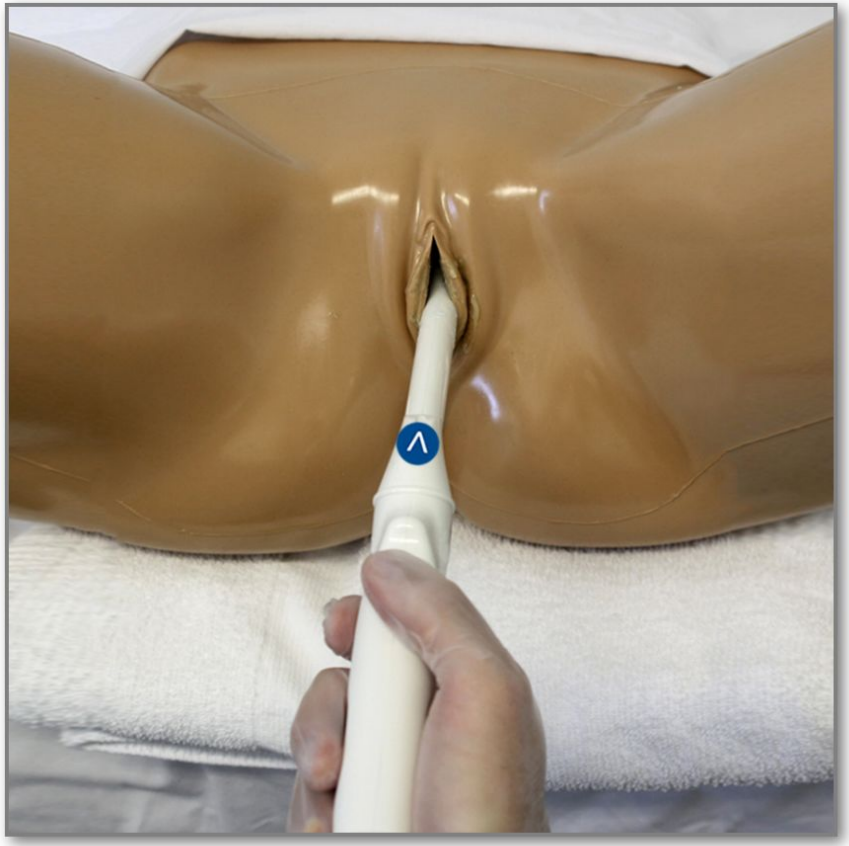
Trauma-informed providers:

- Recognize the widespread impact of trauma
- Integrate patient choice and empowerment to promote healing
- Actively resist re-traumatization

TIC tips

- Establish a rapport with patients prior to the exam
- Invite patients to suggest measures that will promote comfort
- Assure patients of their control; if they wish to stop, the examiner will stop
- Keep the patient's body covered, exposing only areas that are examined
- Invite the patient to place the probe themselves
- Offer frog-leg positioning instead of foot rests
- Be mindful of touching areas that are not being examined
- Encourage abdominal breathing as appropriate

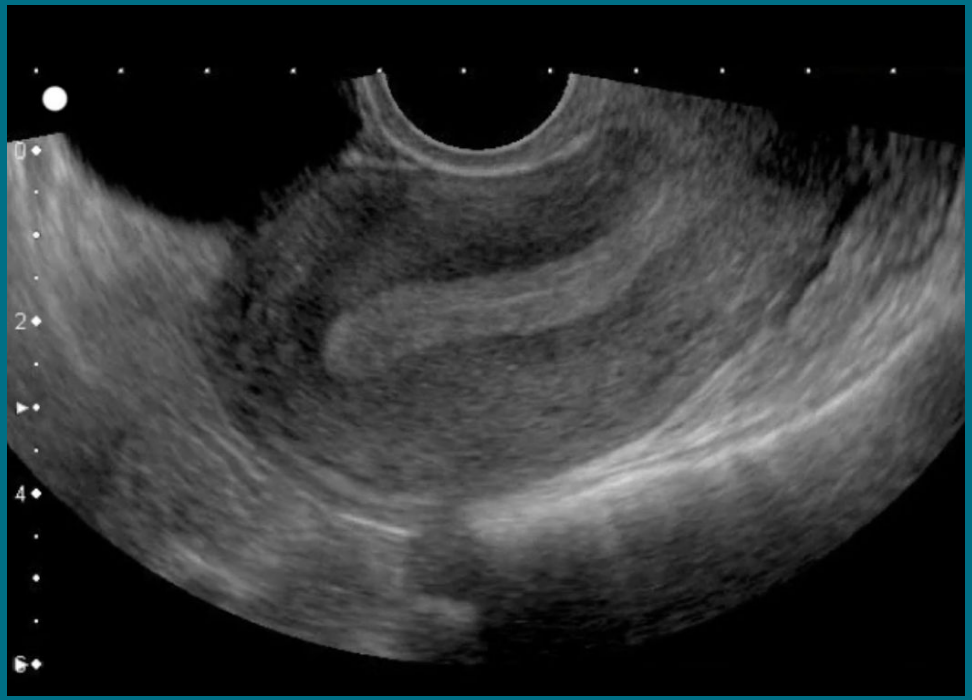
Adapted from RHAP



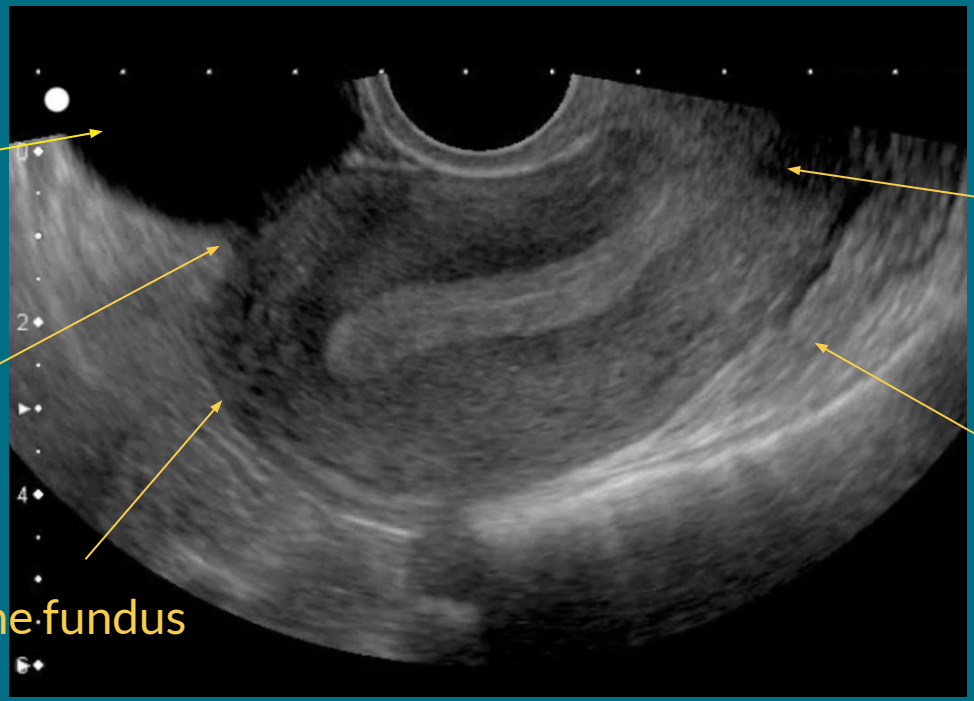
Sagittal View

Coronal View

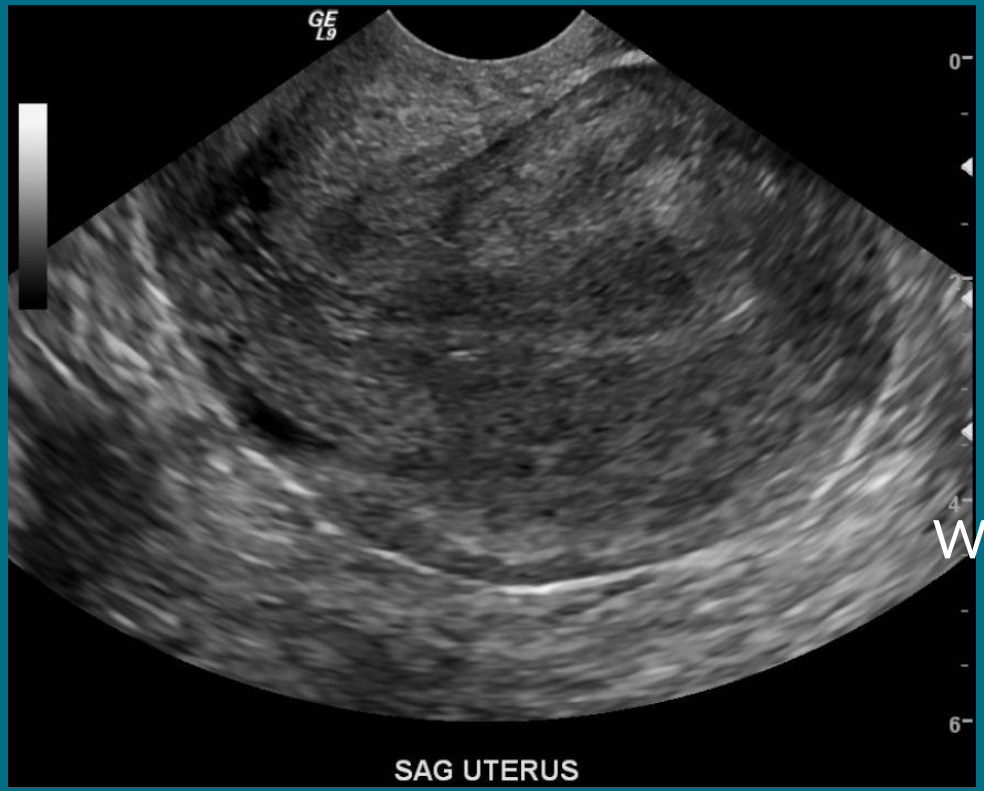
TV in sagittal view



TV in sagittal view



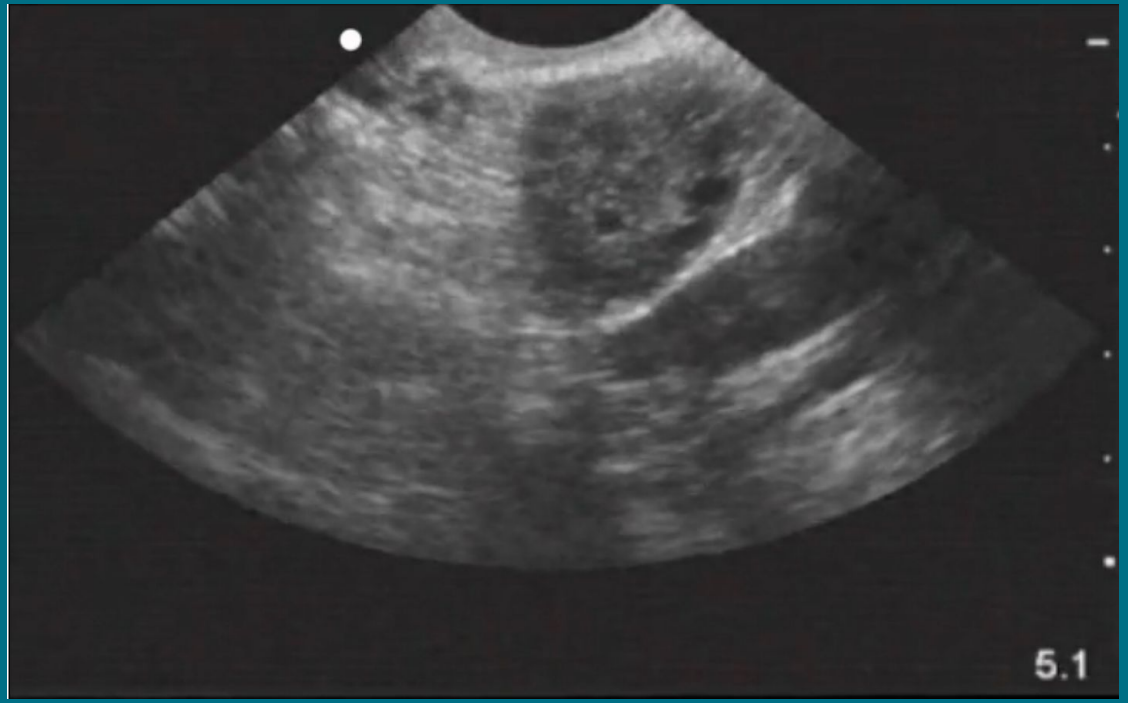
TV in sagittal view



Why is the fundus on the right?

Radiopaedia

Choco chip ovaries



Sonasim

*TV technique

1. Place probe endovaginally with indicator to the ceiling; advance to the cervix
2. Drop your US hand to the floor so the probe is showing anterior structures - identify the bladder
3. Slowly pull your US hand up towards the ceiling to scan anterior to posterior
4. Center the uterus and slowly scan from anatomic right to left, keeping your US hand the same distance from the floor; **scan all the way through the uterus**
5. Identify left and right ovaries
6. Identify gestation sac; take measurements and assess for cardiac activity

First trimester US

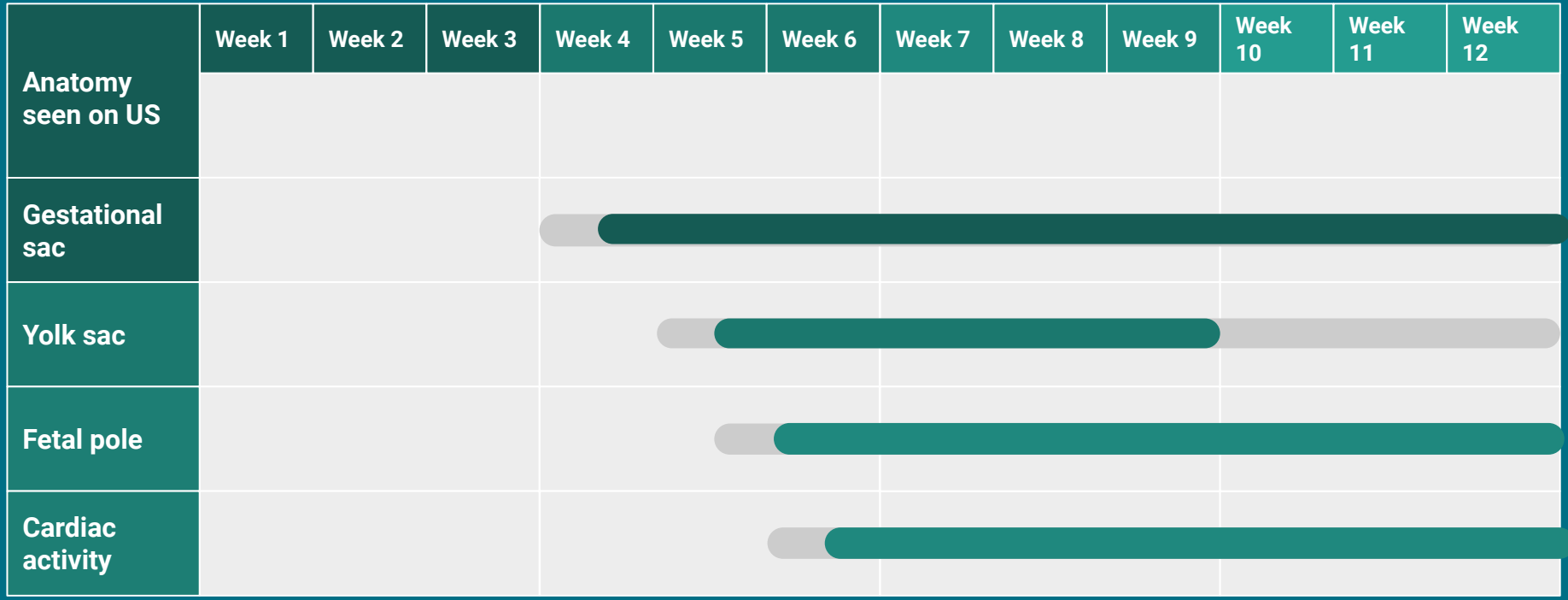
Indications for first tri US

- To confirm intrauterine pregnancy
- To evaluate presence of multiple gestations
- To evaluate viability
- To evaluate vaginal bleeding or pelvic pain
- To estimate gestational age

4 basic dimensions of first tri US

- Number of gestations
- Cardiac activity
- Gestational age/dating
- Location of pregnancy (intrauterine vs. ectopic)

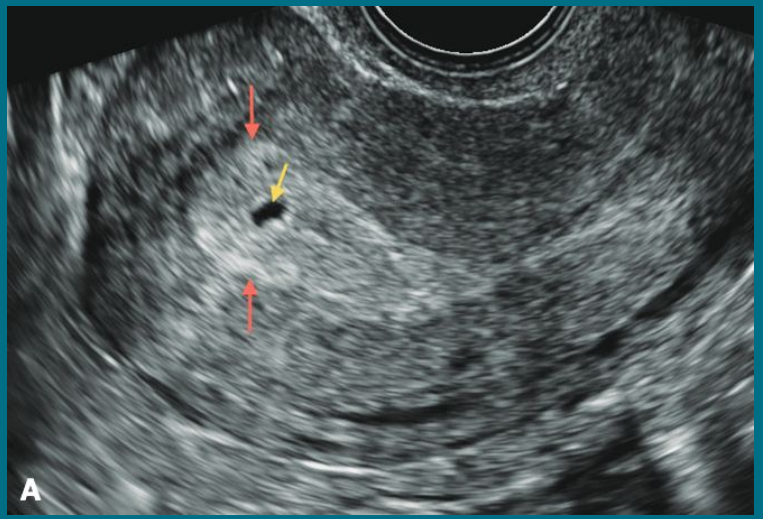
Normal early pregnancy



Gestational sac

- Can be seen around 4-4.5 weeks
- Eccentric in uterus
- Thick hyperechoic rim >2mm
- Measured from inner to inner border

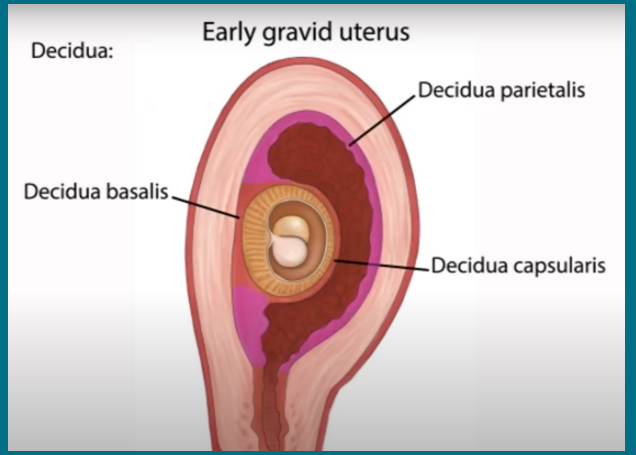
Don’t be fooled by a pseudosac!

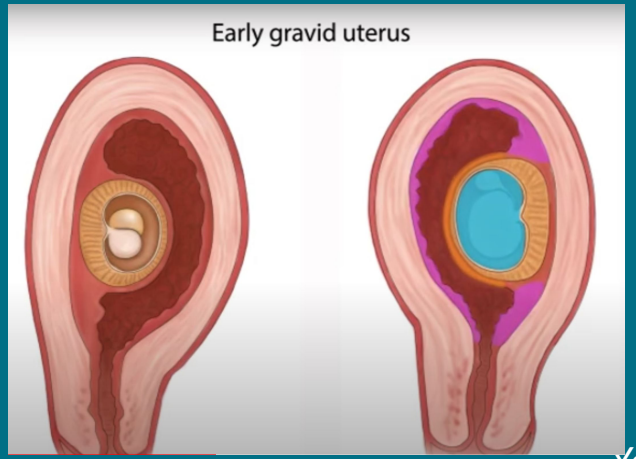


Cooke, 2015

DDSS

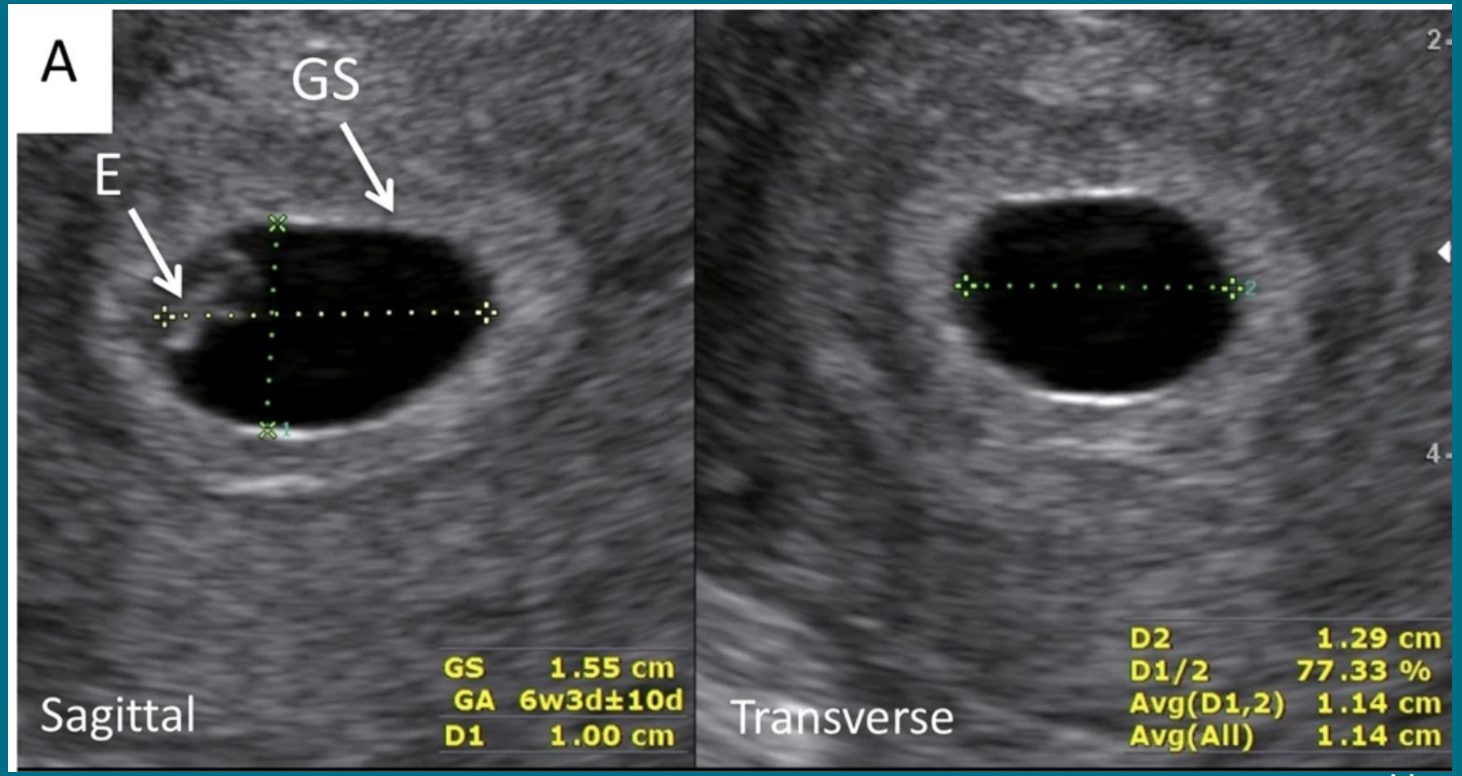
- Two layers of tissue often seen on early US
- Decidua capsularis + decidua parietalis
- Both hyperechoic, sometimes separated by thin hypoechoic rim
- Can be a reassuring sign of true sac





YouTube

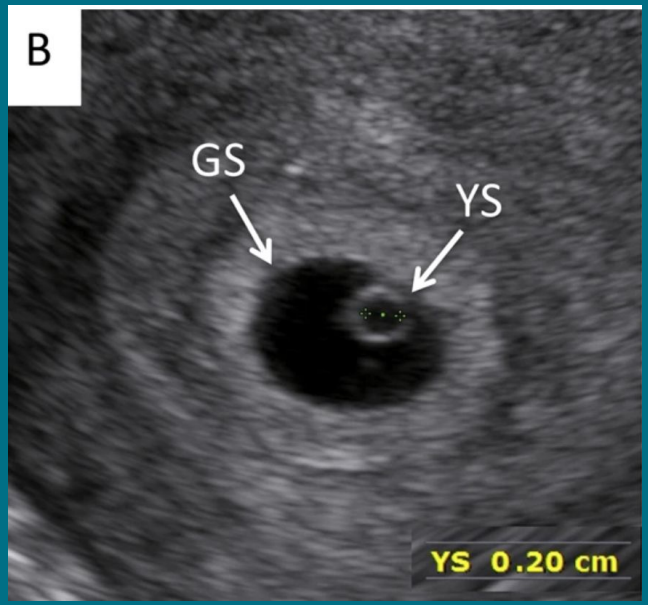
Gestational sac - mean sac diameter



Nature, 2020

Yolk sac

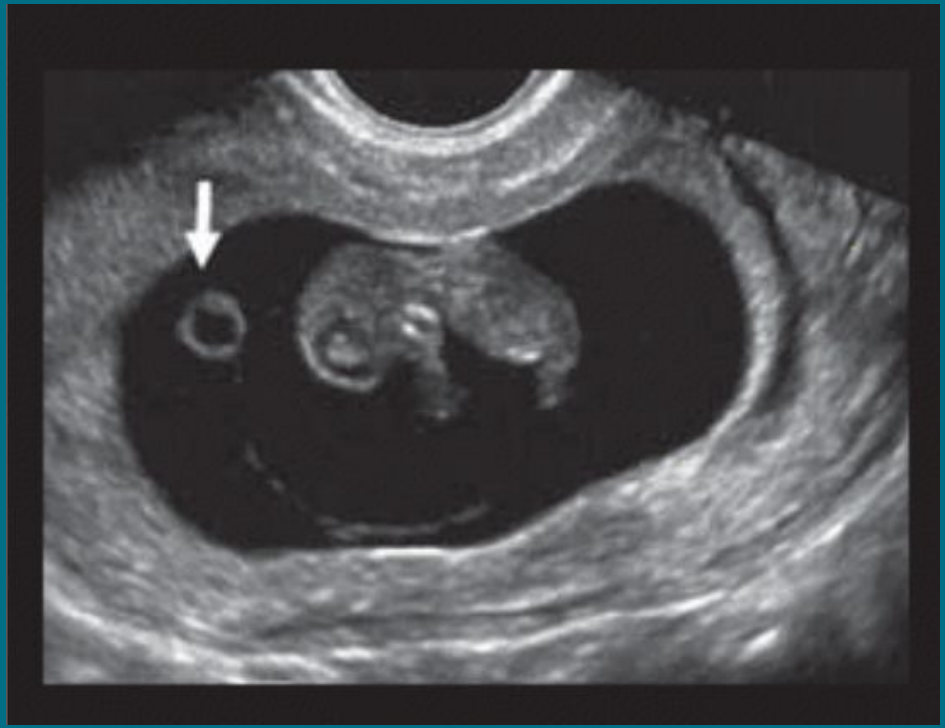
- Seen around 5 weeks until up to ~12 (until placenta takes over nutrition and gas exchange)
- Presence of a yolk sac defines true gestational sac
- Usually <6 mm
    - Measured from inner border to inner border



Nature, 2020

Fetal pole

- Can be seen around 6 weeks
- Cardiac activity seen around the same time as fetal pole
- Limb buds at 8 weeks
- Crown-rump-length measurement up until 14w0d is very accurate (within 5-7 days)
- Measured in longest sagittal plane



WHO

Definitions

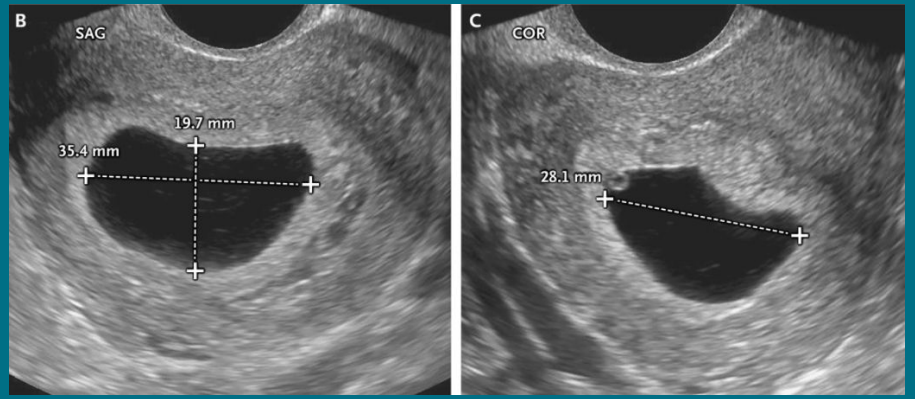
Definitive intrauterine pregnancy is a **yolk sac or a fetal pole** within a gestational sac within the cavity of the uterus

Viability is defined as **cardiac activity** within an IUP

Cooke, 2015

Definitions of pregnancy failure

- CRL ≥ 7 mm and no cardiac activity
- MSD > 25 mm without an embryo
- No embryo with cardiac activity ≥ 2 weeks after a scan with +GS and no YS



MSD = 27.7 mm

NEJM, 2013

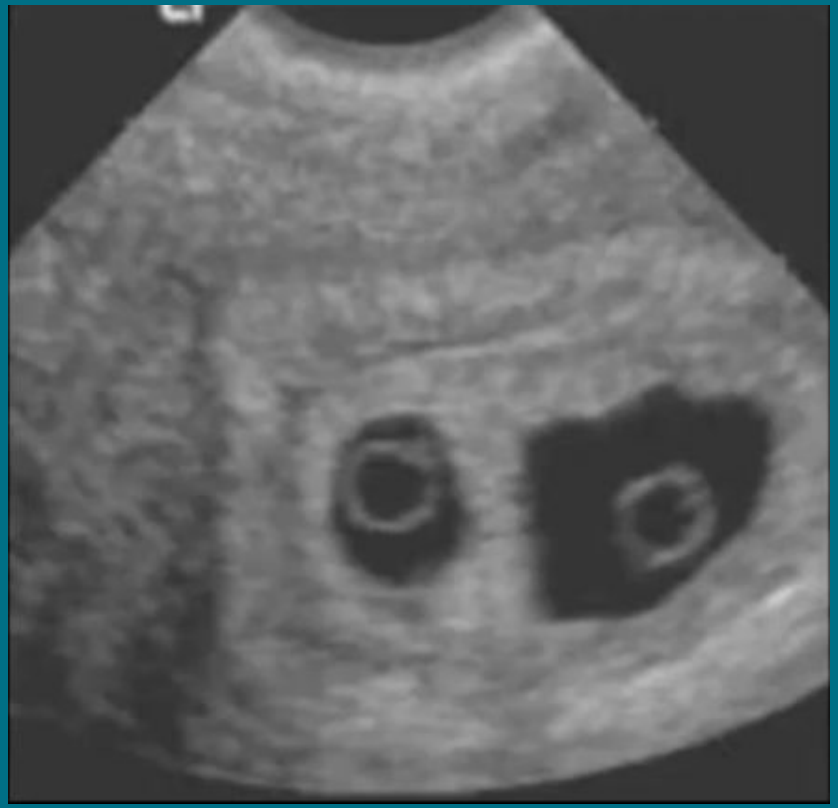
*Pregnancy failure on US

Table 2. Guidelines for Transvaginal Ultrasonographic Diagnosis of Pregnancy Failure in a Woman with an Intrauterine Pregnancy of Uncertain Viability.*

Findings Diagnostic of Pregnancy Failure	Findings Suspicious for, but Not Diagnostic of, Pregnancy Failure†
Crown–rump length of ≥7 mm and no heartbeat	Crown–rump length of <7 mm and no heartbeat
Mean sac diameter of ≥25 mm and no embryo	Mean sac diameter of 16–24 mm and no embryo
Absence of embryo with heartbeat ≥2 wk after a scan that showed a gestational sac without a yolk sac	Absence of embryo with heartbeat 7–13 days after a scan that showed a gestational sac without a yolk sac
Absence of embryo with heartbeat ≥11 days after a scan that showed a gestational sac with a yolk sac	Absence of embryo with heartbeat 7–10 days after a scan that showed a gestational sac with a yolk sac
	Absence of embryo ≥6 wk after last menstrual period
	Empty amnion (amnion seen adjacent to yolk sac, with no visible embryo)
	Enlarged yolk sac (>7 mm)
	Small gestational sac in relation to the size of the embryo (<5 mm difference between mean sac diameter and crown–rump length)

NEJM, 2013

Cases



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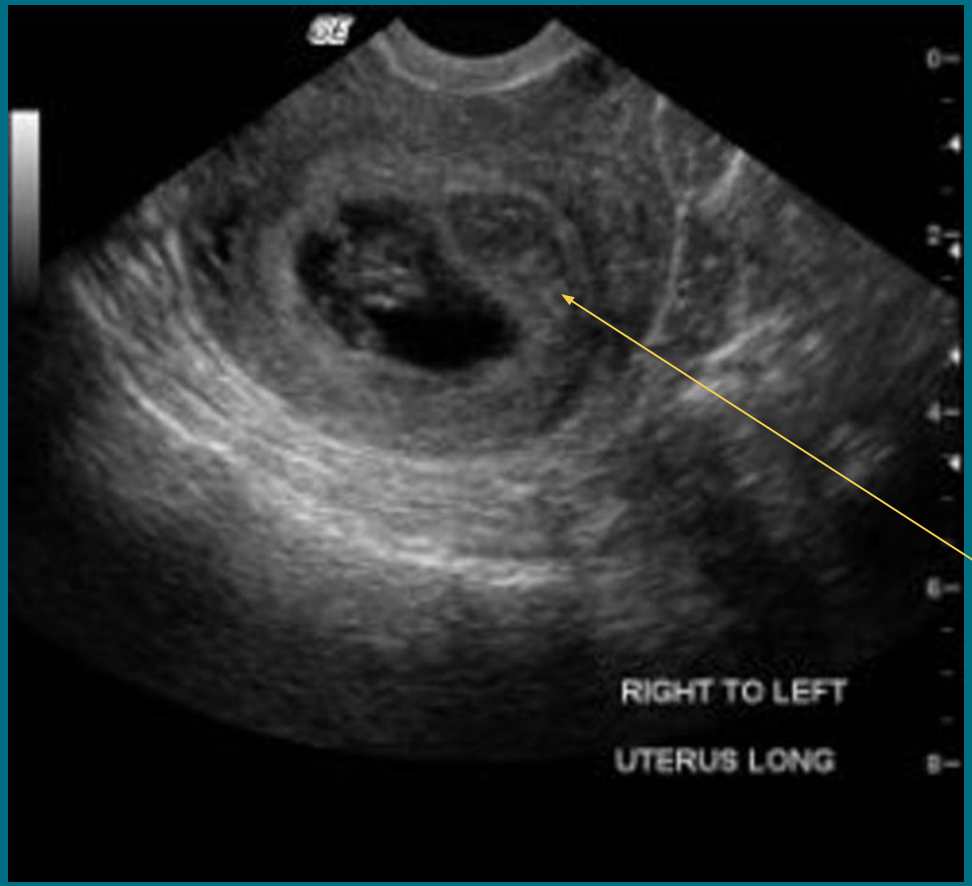
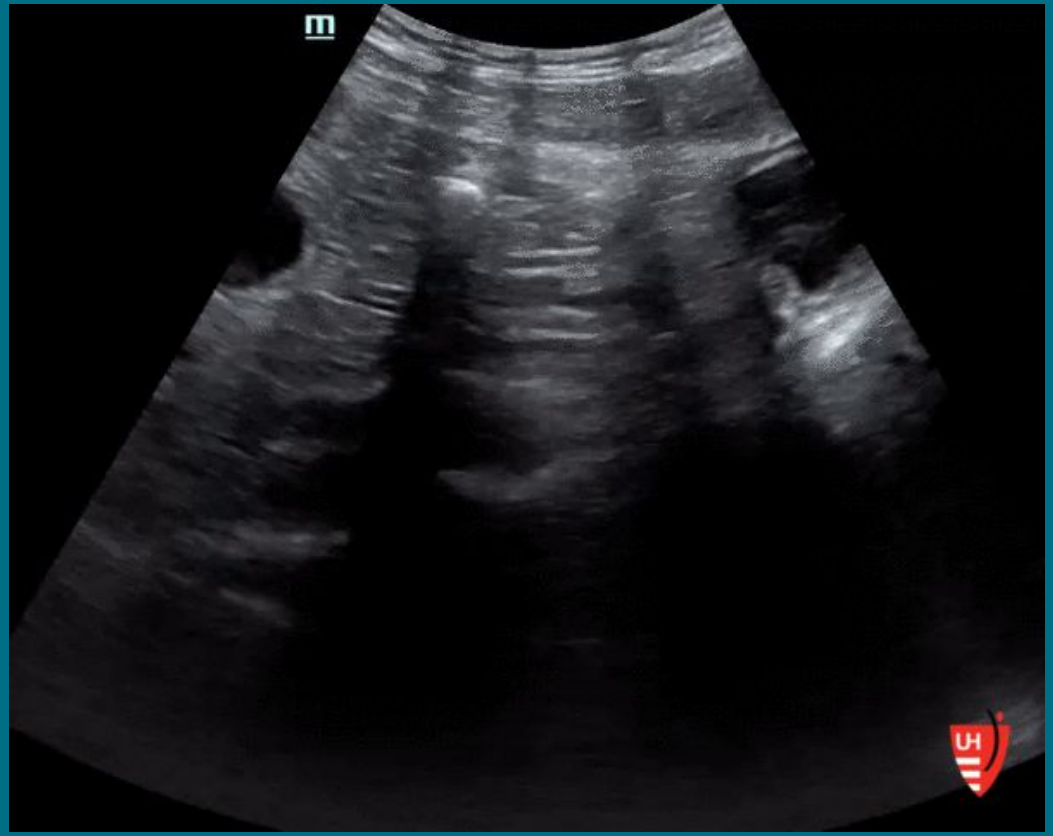
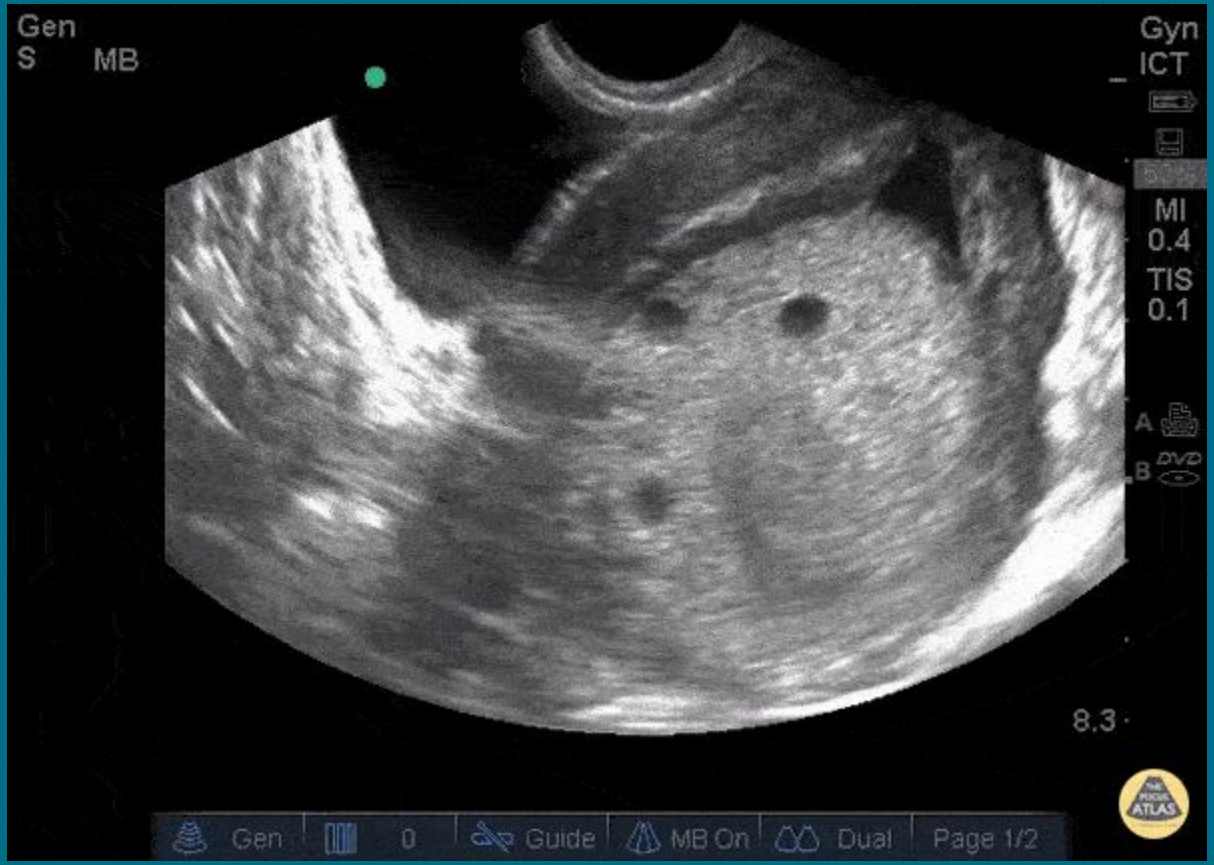


Radiopaedia



Cleveland Medical Center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Key Points

- Always scan completely through the uterus
- Always note number of gestation, location of pregnancy, presence of cardiac activity, and gestational age
- A gestational sac alone does not define an intrauterine pregnancy
- A true gestational sac is defined by a yolk sac or a fetal pole
- There are multiple definitions of failed pregnancy; remember CRL ≥ 7 mm and no cardiac activity and MSD > 25 mm without an embryo

References

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Images:

- Radiopaedia
- Sonasim
- Cleveland Medical Center
- Docnesia
- Emory University
- YouTube