AMNIOTIC FLUID VOLUME

FLAME LECTURE: 59

STELLER 9.7.23

LEARNING OBJECTIVES

- To understand rationale behind using amniotic fluid volume for fetal assessment
- To describe approaches for assessment of fetal well being
- Prerequisites:
  - NONE
- See also – for closely related topics
  - FLAME LECTURE 54: Outpatient Antenatal Testing
  - FLAME LECTURE 54B: The Nonstress Test (NST) and Contraction Stress Test (CST)
  - FLAME LECTURE 56: The Biophysical profile
  - FLAME LECTURE 57: Assessment of Fetal Movements

RATIONALE OF AMNIOTIC FLUID VOLUME FOR FETAL ASSESSMENT

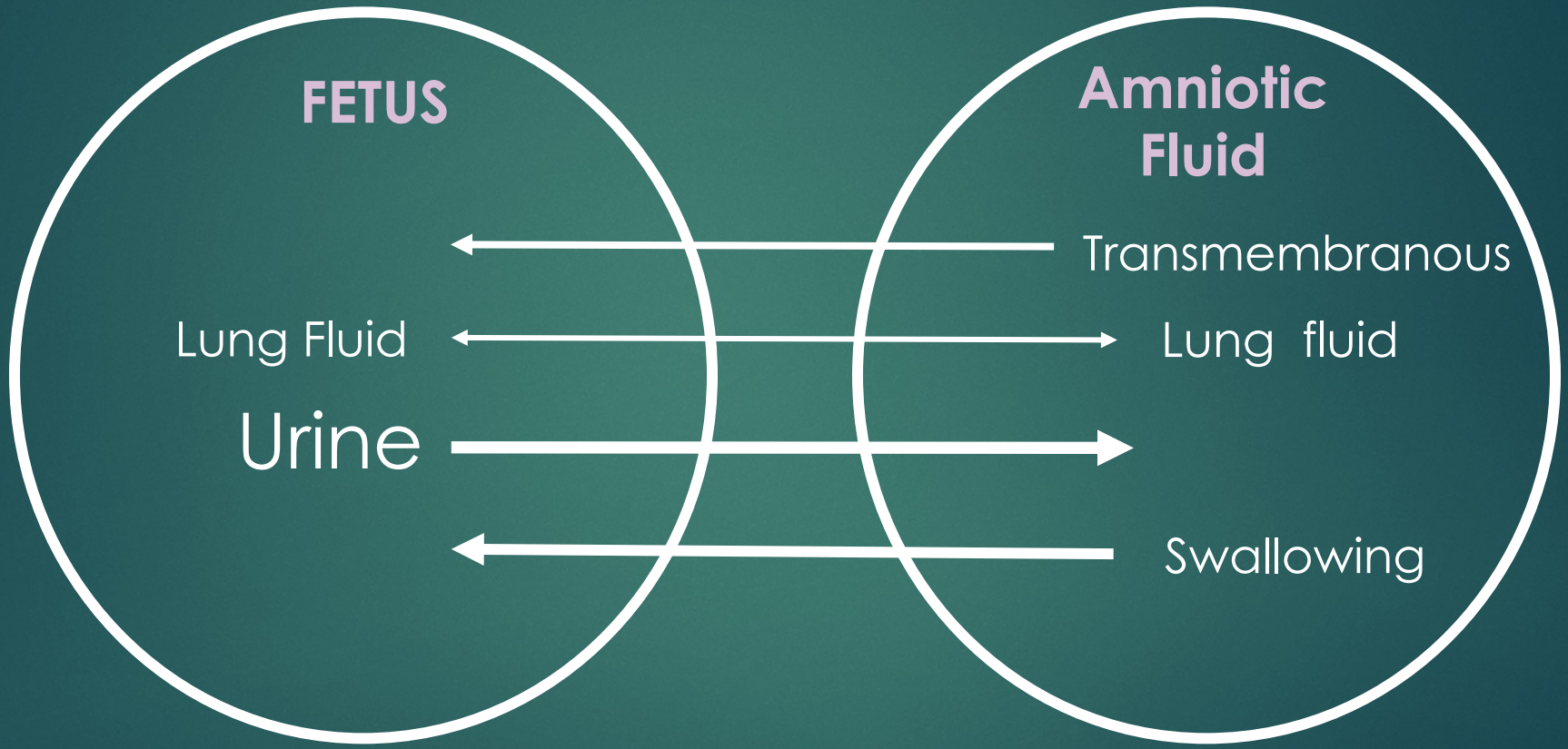
- Goals
  - Detect oligohydramnios as a risk factor for uteroplacental insufficiency to provide an opportunity for intervention before an adverse event occurs
  - Prevent stillbirth
  - Avoid unnecessary iatrogenic preterm delivery
- Physiologic basis
  - The fetal brain is incredibly sensitive to changes in O_2 and pH, and under stress
    - Blood flow is directed TO the brain, heart, and adrenals and AWAY from the kidneys → a decrease in renal perfusion → a decrease in fetal urine production → thus, low amniotic fluid volume (oligohydramnios)

AMNIOTIC FLUID VOLUME

- When low, it is a **CHRONIC** indicator of uteroplacental insufficiency
  - It takes ~15 days for a fetus to progress from normal to reduced AFV, and ~23 days to develop severe oligohydramnios[1]
  - However, based on gestational age and severity of insulting disease process, this time interval can be dramatically less

1. Magann EF. Obstet Gynecol. 2000

AMNIOTIC FLUID VOLUME: Balance



METHODS OF ASSESSMENT

- ALL ultrasounds should include eval of the AFV
  - Subjective assessment in 1st tri → objective in late 2nd to early 3rd trimester til delivery
- Variety of AFV quantitative measures:
  - Single Deepest Vertical Pocket (DVP): calculated in centimeters
  - Amniotic Fluid Index (AFI): sum of the maximum DVP in each of the four quadrants

RULES FOR MEASURING BY U/S

- Patient should lie flat on the bed (supine)
- Hold ultrasound probe perpendicular to maternal spine (aka perpendicular to the bed the patient is lying on when patient supine)
  - Even though the gravid abdomen is round
- Each pocket of amniotic fluid must be at least 1 cm wide x 1cm deep to count
- Exclude umbilical cord or fetal parts
  - Can use color flow mode to confirm this
- The calipers used when measuring on the US machine should be directly vertical and not at a diagonal

HOW TO PERFORM AN AFI

- Divide the uterus into 4 quadrants using the umbilicus as the center point
- Measure the deepest, clear, cord-free pocket in the vertical plane for all 4 quadrants

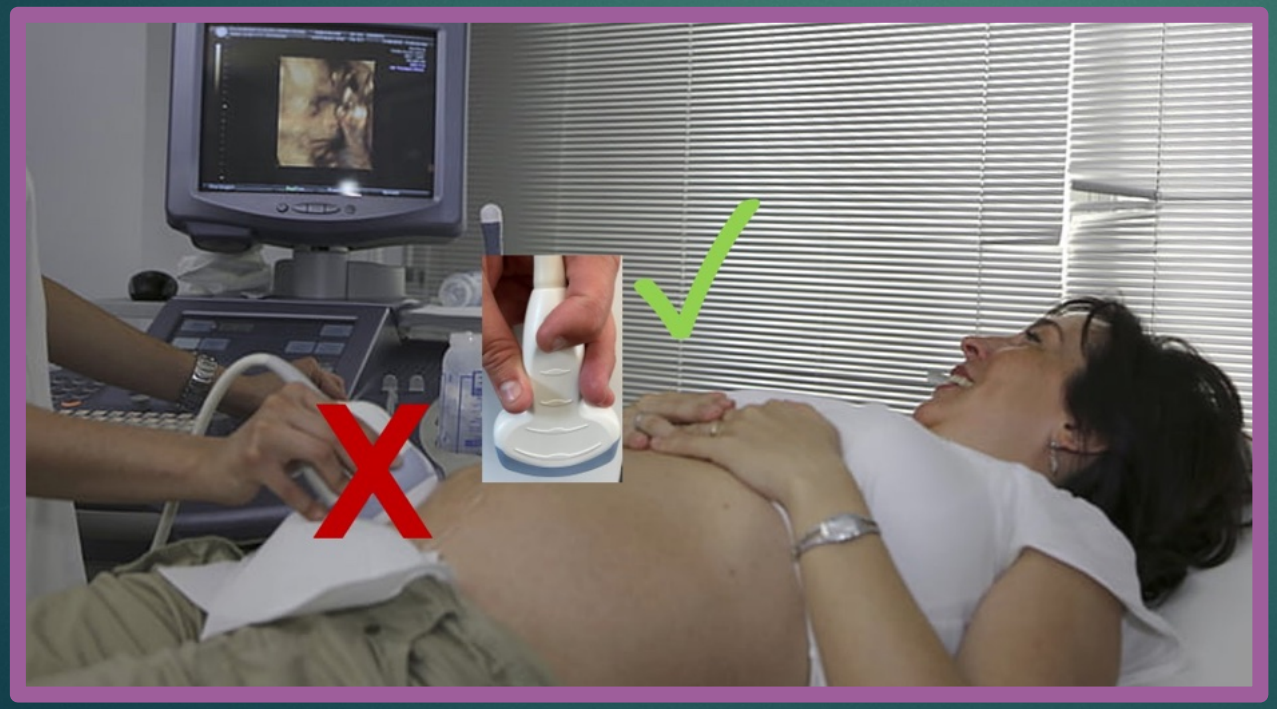
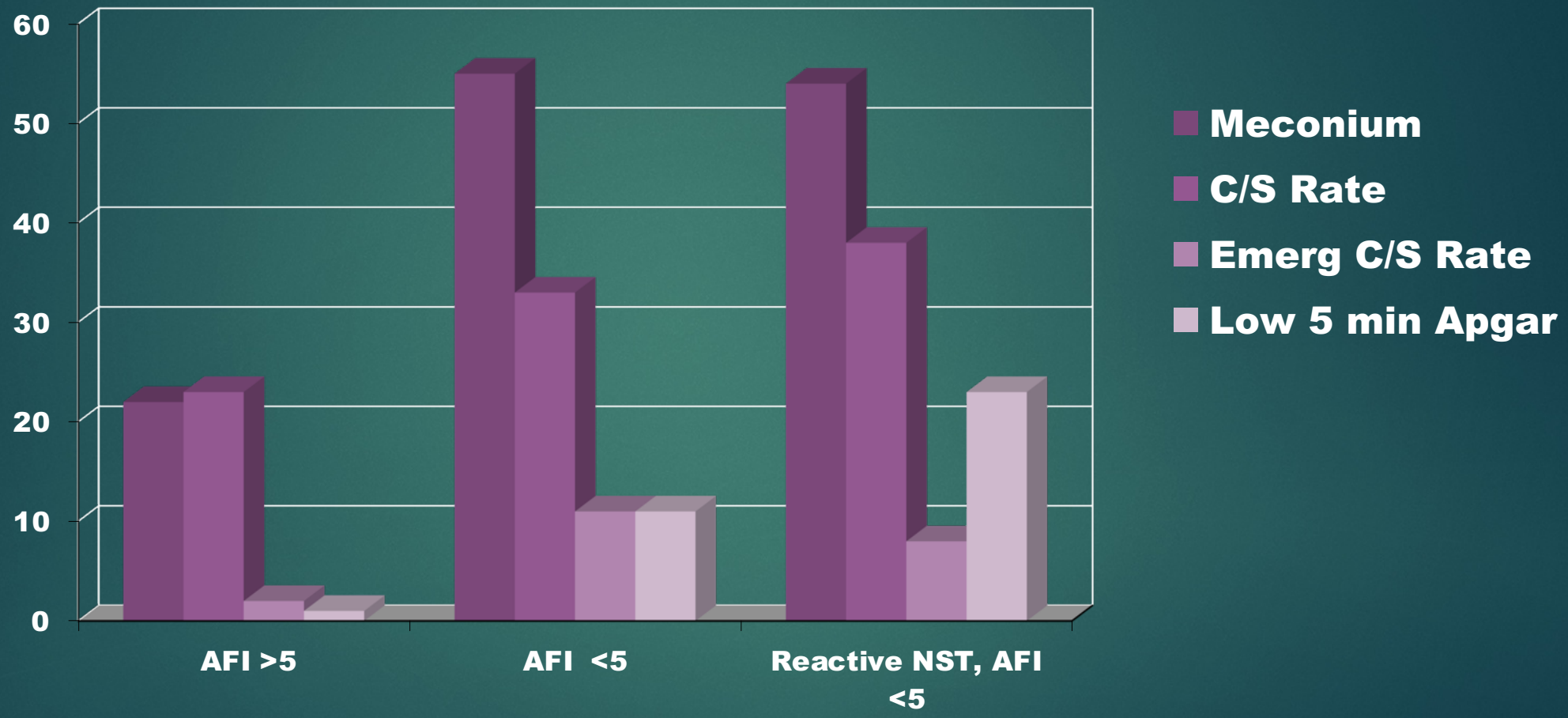


Image adapted from hippox

ABNORMAL AFV DIAGNOSES

- Polyhydramnios: AFI > 24cm or DVP > 8cm
- Oligohydramnios: AFI < 5cm or DVP < 2cm
- ACOG & SMFM recommend use of DVP > AFI
  - Good evidence that using DVP reduces unnecessary interventions without increasing adverse perinatal outcomes
  - However, in practice, many providers still use AFI

OLIGOHYDRAMNIOS



Even w/ a reactive NST, meconium staining, C/S rates, and low 5-minute APGARs are increased with oligohydramnios

2. Rutherford SE. Obstet gynecol. 1987

MANAGEMENT CONSIDERATIONS

OLIGOHYDRAMNIOS

- Determining when to intervene depends on gestational age, maternal condition, and fetal clinical condition as determined by other indices of fetal well-being
- First, rule out ruptured membranes
- For uncomplicated, isolated, and persistent oligohydramnios (DVP < 2), ACOG recommends delivery at 36-37 6/7 weeks
- Pre-delivery, the decision for expectant mgmt should be individualized, and f/u NSTs, AFIs, and growth assessments are indicated from diagnosis until delivery

MANAGEMENT CONSIDERATIONS

POLYHYDRAMNIOS

- Polyhydramnios is associated with congenital anomalies (~30%), maternal DM or GDM (~25%), and is idiopathic in 40% of cases
  - If the AFI is >30 cm, there is a 10% incidence of a tracheoesophageal fistula or other GI tract anomaly
  - Look for signs of hydrops fetalis (fetal ascites, pleural effusion, pericardial effusion, skin edema)
  - Recommend review of or repeat screening for GDM if no other explanation
- If DVP 8-10 or AFI 25-30, recommend twice weekly NSTs, weekly AFI, and serial growth scans starting at 32 weeks
- If DVP >10 or AFI >30, recommend these interventions starting at 28 weeks
- ACOG recommends delivery between 39-40 weeks

IMPORTANT LINKS & REFERENCES

- ACOG Committee Opinion 828. Indications for Outpatient Antenatal Fetal Surveillance. 2021.
- ACOG Committee Opinion 831. Medically Indicated Late-Preterm and Early-Term Deliveries. 2021.
- JOINT EXECUTIVE SUMMARY – Fetal Imaging
- Magann EF et al. Obstet Gynecol. 2000.
- Rutherford SE et al. Obstet Gynecol. 1987.
- Spong CY et al. Obstet Gynecol. 2011.