OB/GYN Ultrasound Symposium 2018

September 28-30, 2018

Placenta and Umbilical Cord
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Course Director
JACQUES ABRAMOWICZ, MD
DO YOU SEE WHAT I SEE?
THE UMBILICAL CORD
AND PLACENTA

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UNIVERSITY OF CHICAGO
SEPTEMBER 29, 2018

DISCLOSURES

• I have the following financial relationships to disclose
  • Honoraria for speaking—Munster Community Hospital, MacNeal Hospital
  • Spouse works for ACGME as senior financial analyst
• I will not discuss off label or investigational use in my presentation

OBJECTIVES

• Be able to document normal characteristics of umbilical cord and placenta
• Differentiate types of placentas sonographically
• Identify who should be evaluated for abnormal placentation
• Identify sonographic markers of morbidly adherent placentas
• Be able to optimize imaging for morbidly adherent placentas
DOCUMENTATION FOR NORMAL UMBILICAL CORD

- Placental and fetal cord insertions
- 2 umbilical arteries
  - View of 2UA around bladder
  - View of cord transecting 3 vessels at once
    - Avoid near placenta cord insertion due to UA fusion

FETAL CORD INSERTION

2 VIEWS TO PROVE 3 VESSEL CORD IS PRESENT
SINGLE UMBILICAL ARTERY

UMBILICAL VEIN VARIX

DOCUMENTATION FOR NORMAL PLACENTA

- Location
  - Anterior, posterior, left or right lateral
  - Transvaginal ultrasound
  - If concern for low lying or previa
  - Document distance from os if < 2cm from the os
  - Important for low lying and previa
  - Ex: Posterior placenta extending 3mm past the internal os

- Appearance of placenta
- Location of cord insertion
DOCUMENT THE PLACENTA

- 2nd trimester homogeneous or smooth appearance
- 3rd trimester heterogeneous with sonolucencies and calcifications
- Retroplacental hypoechoic zone or line is present
- Edges of placenta are attached to uterine wall

NORMAL RETROPLACENTAL BLOOD FLOW

DISTANCE BETWEEN PLACENTAL EDGE AND INTERNAL OS
CIRCUMVALLATE PLACENTA

• Chorionic membrane inserts inward distance from margin rather than edge
• Rolled edge
• Very common - 0.5-18% post delivery diagnosis

GESTATIONAL TROPHOBLASTIC DISEASE

SUBCHORIONIC HEMATOMA
HEMATOMA

PLACENTAL LAKES

• Avillous vascular spaces
• Internal blood flow on color Doppler
• <20.25 wks: 91% if >3cm and ≥2 lesions
• >25 wks: ≥3 lesions and <5 cm

PLACENTAL CORD INSERTION

• Central
• Eccentric
• Marginal—cord insertion within 2 cm of placental edge
• Furcate—vessels separate before centrally inserting into placenta
• Velamentous—cord insertion into membranes
  • 1.2% singletons, 7% dichorionic twins, up to 40% monochorionic twins.
  • Less prone

CENTRAL CORD INSERTION

MARGINAL INSERTION

VASA PREVIA
- Velamentous cord insertion over cervix (type I)
- Succenturiate lobe with vessels between placental lobes (type II)
  - 1 or more lobes
  - Synonyms: bilobed or accessory placenta

VASA PREVIA 22 WEEKS-SUCCENTURIATE LOBE

24 WEEKS 32 WEEKS

LOW LYING PLACENTA

• < 2 cm from internal os
PLACENTA PREVIA

- Covers or meets the internal os
- Document distance past the os

32 WEEKS POSTERIOR PREVIA

32 WEEKS POSTERIOR PREVIA
RISK OF PLACENTA PREVIA WITH PRIOR CESAREAN


<table>
<thead>
<tr>
<th>Cesarean section</th>
<th>Patients (N = 97,780)</th>
<th>Placenta previa (N = 2,062)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>42,397</td>
<td>396</td>
<td>0.92</td>
</tr>
<tr>
<td>1</td>
<td>3020</td>
<td>15</td>
<td>0.50</td>
</tr>
<tr>
<td>2</td>
<td>656</td>
<td>15</td>
<td>2.30</td>
</tr>
<tr>
<td>3</td>
<td>154</td>
<td>3</td>
<td>1.93</td>
</tr>
<tr>
<td>4, 5, or 6</td>
<td>29</td>
<td>3</td>
<td>10.34</td>
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PERSISTENCE OF PLACENTA PREVIA AT TIME OF CESAREAN RELATIVE TO GESTATIONAL AGE AT DIAGNOSIS


MORBIDLY ADHERENT PLACENTA

- Trophoblastic invasion past the normal boundary established spongious (Nitabuch) layer within the decidua basalis
- Chorionic villi attach to myometrium

WHO IS AT RISK FOR MORbidLY ADHERENT PLACENTA?

- Clinical risk factors
  - Prior cesarean deliveries
  - Placenta previa, low lying placenta
  - History of endometrial ablation
  - Prior uterine surgery
  - 1st or 2nd trimester bleeding with other risk factors for placenta accreta

1/533 pregnancies

- Sonographic risk factors
  - Abnormal placental appearance
  - Abnormal uterine shape
  - Abnormal vascularity of myometrial wall
  - Current or previous cesarean scar ectopic

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TIMEING OF ULTRASOUND

- At time abnormal ultrasound markers are seen or anatomy scan
  - Bladder should be partially full
HOW GOOD IS OUR IMAGING FOR MORBIDLY ADHERENT PLACENTAS?

- Grayscale ultrasound imaging → 77-87% sensitive and 96-98% specific.
  - Positive predictive value is 65-93%. Negative predictive value 98%.


SHOULD WE GET AN MRI?

- MRI is 80-85% sensitive
- Specificity 65-100%
- Confirms incorrect diagnosis or changes to incorrect diagnosis 21% & 17% of time.


ULTRASOUND FINDINGS

- Loss of retroplacental hypoechoic zone → vascular decidua basalis
- Placental lacunae
- Bridging vessels
- Placental bulge into the bladder
- Retroplacental myometrium <1mm
- Exophytic mass
- Retroplacental vascularity
RETROPLACENTAL HYPOECHOIC LINE

22 WEEK, DETAILED ANATOMY SCAN AMA, PRIOR C/S X 3—STANDARD IMAGING WITH EMPTY BLADDER

- Myometrial thinning
- Loss of hypoechoic line
BRIDGING VESSELS

PLACENTAL BULGE AT 31W5D

Bladder
Transadominal imaging shows lacunae, vascularity near cervix.

CERVICAL VASCULARITY

PLACENTAL LACUNAE
LACUNAE

- Vascular spaces within placenta—turbulent flow
- Finberg and William Grading
  - 0 → none seen
  - 1 → 1-3 seen, small in size
  - 2 → 4-6 present, larger in size, irregular shape
  - 3 → many throughout placenta, large and bizarre appearance

PLACENTA PREVIA + PRIOR CESAREAN

- In the setting of previa, the risk of a placenta accreta is 3%, 13%, 40%, 61%, and 67% for the first, second, third, fourth, and fifth cesareans respectively.
- No uterine surgery + previa → 1.5% risk Accreta
- 75% are accretas and 7% are percretas.

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<td>2/21 (9.5%)</td>
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<tr>
<td>Second</td>
<td>12/22  (54.5%)</td>
<td>1/22 (4.5%)</td>
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<tr>
<td>Third</td>
<td>8/16  (50.0%)</td>
<td>1/16 (6.3%)</td>
</tr>
<tr>
<td>Fourth</td>
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<tr>
<td>Fifth</td>
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* Percentage of accretas in women with placenta previa

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Table 6. Placenta previa and Placenta Accreta by Number of Cesarean Deliveries

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CASE 1 - 41 YO G4P3003, PRIOR CD X 3, PRIOR APPY
ANATOMY SCAN AT 22 WEEKS

VAGINAL BLEEDING AT 27 WEEKS

Loss of hypoechoic line
Bridging vessels
CASE 2- 34 YO G4P2002 REFERRED FOR ANTERIOR PLACENTA PREVIA, PRIOR C/S X 2
Loss of echolucent line and myometrium

LOSS OF RETROPLACENTAL HYPOECHOIC LINE
CASE #3, 24 WEEKS, PRIOR CD X 2 (CLASSICAL X 1)

CASE #4, 29 WEEKS, PRIOR CD X 5
POSTERIOR EXTENSIVE MYOMECTOMY, C/S X 1

PITFALLS

- Full bladder
  - Elongates lower uterine segment giving appearance of low lying placenta
- Focal myometrial contraction
- Succenturiate Lobe
- Acute placental hemorrhage
- Umbilical cord false knot
REFERENCES

- ACOG Committee Opinion. OB-GYN 2012

REFERENCES


Perform at time sonographic indications are identified or at the anatomy scan. Maternal bladder should be partially full.

Transabdominal and transvaginal scanning are performed every 4 weeks during a pregnancy if abnormal placentation is confirmed at first evaluation. Transvaginal scanning is only performed on follow up ultrasounds if placenta is low lying or previa.

Transabdominal US evaluation of the placenta and bladder wall should be performed first.

- Dual screen with 2D gray scale and color Doppler imaging should be documented for the suspicious areas
- Image and quantify placental lacunae or lakes. Note if they are irregular in shape.
- Image bladder wall and any areas suspicious for invasion.
• Transvaginal US should be performed first with a partially filled bladder.
  • Dual screen with 2D gray scale and color Doppler imaging should be documented for the suspicious areas.
  • Image bladder wall and any areas suspicious for invasion.
  • One clip should be taken from right to left to determine which portion or side of uterus has invasion.
  • Quantify area of invasion with measurements in 3 dimensions.
  • Measure thickness of uterine wall if there is any remaining normal uterine wall between the placenta and bladder.
MORBIDITY & MORTALITY
- Maternal death up to 6-7%
- Average blood loss is 2-5 L.
- 75% accretas transfused with mean of 5.4 units
- 25% ICU admission rate with hysterectomy. 10% reoperation rate.
- Cystotomy occurs in 15%, and ureteral injury in approximately 2%.

References:

MORBIDITY

Table 5. Placenta Accreta and Morbidity

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>No Accreta (%)</th>
<th>Accreta (%)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cystotomy</td>
<td>0.15</td>
<td>15.4</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Uterine injury</td>
<td>0.03</td>
<td>2.1</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Pulmonary embolus</td>
<td>0.13</td>
<td>2.1</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>0.4</td>
<td>14</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Renal failure</td>
<td>0.4</td>
<td>24.6</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Reoperation</td>
<td>0.35</td>
<td>3.8</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Uterine segment</td>
<td>3.34</td>
<td>3.30</td>
<td>.81</td>
</tr>
</tbody>
</table>

References:

PLAN
- Planned preterm cesarean delivery between 34-36 weeks.
- Antenatal steroids can be given 2-7 days prior to delivery.
CHORIOANGIOMA

BRIDGING VESSELS IN BLADDER WALL/PLACENTAL BULGE