MM

- 25 yo at 36+4 weeks. 142/83: hypertension precautions

- 37+2 135/98, c/o headaches, visual spots, edema for 1 day
  - L&D: 121/63, trace protein, non-stress test (NST)
• 25 yo at 36+4 weeks. 142/83: hypertension precautions
• 37+2 135/98, c/o headaches, visual spots, edema for 1 day
  – L&D: 121/83, trace protein, non-stress test (NST) normal. Sent home.
• 38+3: c/o decreased fetal movement; NST normal. Sent home.
• 39+3: NST normal….
• 25 yo at 36+4 weeks. 142/83: hypertension precautions
• 37+2 135/98, c/o headaches, visual spots, edema for 1 day
  • L & D: 121/63, trace protein, non stress test (NST) normal. Sent home.
• 38+3: c/o decreased fetal movement; NST normal. Sent home.
• 39+3: NST normal.
• 39+4: Intrauterine fetal demise (IUDM)

• Weight < 1st %ile

• Why didn’t the Ob know the placenta was so small?
Current State of Clinical Practice

- Focus is on the fetus

Current State of Clinical Practice

- Focus is on the fetus
- Not knowing the size of the placenta is like not having a gas gauge in your car

IUFD

Fetal Status
IUFD Demographics

- IUFD: ≥ 20 w
- 25,000/yr (6.2/1000)
- Causes (218 cases)
  - Small placenta
  - Genetic (+TIs)
  - Cord accident
  - Infection
  - Abruption

IUFD Tests

CONCLUSION: The most useful tests were placental pathology and fetal autopsy, followed by genetic testing and testing for antiphospholipid antibodies.
MM

- Weight < 1st %ile
- Why didn’t the Ob know the placenta was so small?
- Can we measure the size of the placenta before delivery?

Prior Technologies

- Hafner et al., Ult Ob Gyn 12:97-102, 1998
  - Used sums of serial sections
  - Method not confirmed with comparison to actual placental weights

Prior Technologies

- Falcon et al., Ult Ob Gyn 25:546-550, 2005
  - VOCAL: Virtual Organ Computer-aided AnaLysis
  - Six sections rotated by 30° with manual image reconstruction
  - Time consuming and operator limited

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Is There a Better Way?

- Simple, free
- Can be performed using standard ultrasound equipment
- Equation can be incorporated into devices for convenient real-time calculation

Azpurua et al., AJP, 27:151-55, 2010

Estimated Placental Volume (EPV)

EPV is Simple

- Normal patient at 18 weeks

Azpurua et al., AJP, 27:151-55, 2010

EPV is Simple

- Normal patient at 18 weeks
- Width

Azpurua et al., AJP, 27:151-55, 2010
EPV is Simple

- Normal patient at 18 weeks
- Width
- Height

Azpurua et al., AJP, 27:151-55, 2010

EPV is Simple

- Normal patient at 18 weeks
- Width
- Height
- Thickness

Azpurua et al., AJP, 27:151-55, 2010

EPV is Simple

- Normal patient at 18 weeks
- Width
- Height
- Thickness
- Estimated Placental Volume (EPV) = 251 cc

Azpurua et al., AJP, 27:151-55, 2010
Validation Study

Determination of Placental Weight Using Two-dimensional Sonography and Volumetric Mathematic Modeling

Humberto Azpurua, M.D.,* Edmund F. Funai, M.D.,* Luise M. Corluzzi,† Leo F. Doherty, M.D.,* Isaac E. Sasso, M.D.,* Merwin Kliman, M.S.E.E.,‡ and Harvey J. Kliman, M.D., Ph.D.*

Validation Study

• 29 patients
• Median gestational age 37 w (29-41)
• Spearman’s rho (r_s) = 0.80, p < 0.001

Preterm Cases

• 14 patients
• Spearman’s rho (r_s) = 0.89, p < 0.001
Cornell Normative Data

- 446 patients 9.7 – 39.3 w
- 12.5±1.5w (n=444): 73±47cc
- 20±2w (n=151): 276±106cc
- EPV = (0.384GA – 0.00366GA^2), parabolic fit
- 10th and 90th are ± 1.28SE

Yale EPV Study

- 366 patients 11.0 – 38.9 w
- 12±1w (n=78): 63±27cc
- 20±1w (n=69): 238±103cc
- EPV = (0.372GA – 0.00364GA^2), parabolic fit
- 10th and 90th are ± 1.28 SE

Oslo Data

- 1,006 patients
- Prospective, double-blinded
Oslo Data

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Oslo Data

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In Firmware

In Firmware

Vscan for EPV
Introduction

Estimated placental volume (EPV) measurements, a previously validated ultrasound method of calculating the placental volume (Azpurua et al, 2010), can serve as a means to identify patients with abnormally small or large placentas. Our study aim was to validate the utility of the Vscan portable ultrasound scanner for measuring EPV in routine prenatal examinations.

Methods

Following IRB approval, pregnant patients with singleton pregnancies presenting for routine first trimester screenings or anatomical ultrasounds were consented. The placenta was imaged at maximal width, at which point width, height and thickness were measured using a GE VolusonE8 or Philips IU22 (full-size ultrasound machines) and the GE Vscan. EPV was calculated with both machines and compared using Pearson correlation coefficient (r).

Results

Thirty patients were scanned between 11+1 and 22+3 weeks. EPVs calculated using Vscan correlated very closely to the EPVs calculated using the full-sized ultrasound devices (r=0.94, p<0.0001) (Figure).

Conclusion

The Vscan can accurately assess EPV up to approximately 20 weeks. Beyond 20 weeks, the Vscan’s 75 degree field-of-view may not be able to fully image a placenta with a width greater than 10 cm. In spite of this limitation, the portability and affordability of the Vscan may enable healthcare providers to assess placental growth in the context of routine prenatal care, increasing the chances of identifying cases of abnormal placental growth.