How to Manage Those Pesky US Findings

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Prenatal Ultrasound

- 3-4% of women will deliver a baby with a major birth defect or congenital anomaly
- Much more common are "pseudo" abnormalities identified in ~15% of pregnancies
- Many of these are not pathologic in and of themselves, more often are normal variants
- Some may be associated with aneuploidy or other abnormalities
- Are we doing more harm than good?

Is ultrasound risk free?

May cause harm by:
- Creating anxiety related to false-positive diagnoses
- Prompting unnecessary interventions
- Falsely reassuring women at high risk
- Dissuading high risk women from undergoing diagnostic procedures

Obstetrical Sonography: The Best Way to Terrify a Pregnant Woman

I have just reached the 20th anniversary of the first obstetrical sonogram I performed. Even having witnessed such of the technological advancements in sonography over those three decades, it is still difficult to comprehend the enormous improvements in image quality that have occurred. These improvements have brought sonography from a "promising" diagnostic tool to a mainstay of modern obstetric medicine.

Today, I no longer feel that way. There is a growing number of patients to whom I am having to speak. I have reviewed the sonographer’s scans and they disclose findings that will send the mother into a phase of confusion and worry. I’m not talking about hydrocephalus or bilateral renal agenesis. I have a great deal of experience discussing such devastatings diagnoses with pregnant women. And...
From: “terrifiedmommy”

“I am in the same situation.... my first ultrasound showed a CPC ... my level 2 ultrasound showed that the cyst had disappeared. Since there is no other problems, there is every reason to be optimistic. Like you, I was ashamed that I wasn’t enjoying being pregnant at first. Not enjoying it was putting it mildly. I decided that since there is a pretty good chance that everything is fine, I decided to start enjoying being pregnant. This doesn't mean that I don't think of this everyday... I decided not to cheat myself of enjoying this special time. I always knew that I would love being pregnant, and I did up until I heard of CPC’s. Keep me posted. This website, will be good for you. It is nice to know that you are not alone eh?”

Patient reactions to CPC

Cristafalo et al. J Perinatol, 2006

- Interviewed 34 women with isolated CPC
- All informed that likely benign
- All reported negative responses: shock, fear, distress, decreased attachment
- 79% sought information from internet, etc
- Half reported that negative emotions temporary
- 62% believed that CPC presented “danger” to pregnancy

Pseudo & Quasi Fetal Abnormalities

Findings with no pathologic significance
- Choroid plexus cysts
- Echogenic intracardiac focus

Findings with borderline significance
- Renal pelviectasis

Findings with potential for significant abnormality, but often seen in normal fetuses
- Echogenic bowel / intra-abdominal calcifications
- Mild ventriculomegaly
Findings with NO pathologic significance

Choroid Plexus Cysts
- Cyst in choroid plexus of developing brain
- Resolve in essentially all cases
- Marginal association with trisomy 18

Heterogeneous Choroid
Choroid Plexus Cysts

**Demasio et al. Am J Ob Gyn, 2002**
- Isolated choroid plexus cysts in women < 35
- Meta-Analysis of studies of CPC
- 8 studies, 1990-2000
- N=106,732 women screened
- 1.0% of fetuses had isolated CPC (n=1017)
- Isolated = no anomalies & normal triple screen
- NONE had Trisomy 18

**Recommendations:**
- Level II ultrasound (depending on facility where initial US was performed)
- Correlation with screening results
- No ultrasound follow up is warranted
- Amniocentesis not warranted in absence of other risk factors

"An isolated CPC was identified. While this finding has been associated with fetal chromosome abnormalities, no other major or minor anomalies were identified in this fetus. In the absence of other risk factors, this finding most commonly represents a normal variant and no further evaluation is recommended."
**Audience response**
When an isolated CPC is seen by US, do you currently:

A. Not tell the patient  
B. Only report if patient is > 35 yo  
C. Only report if abnormal screening  
D. Always tell the patient

- 5%  
- 1%  
- 13%  
- 82%  

**Echogenic Intracardiac Focus**
- Calcifications of papillary muscle, typically seen in 2nd trimester  
- Most common in left ventricle (85%)  
- More common in non-Caucasian fetuses  
- NOT associated with congenital heart defects  
- Marginally increased risk of chromosome abnormalities (Trisomies 18 and 21)

**Potential Pitfalls / Mimics:**
- moderator band in RV  
- high contrast settings  
- transducer frequency

**Add'l Evaluation:**
- humeral length  
- nuchal fold

**EIF as a Down Syndrome screening tool**
*Caughey et al. Am J Ob Gyn, 2001*
- Decision analysis of utility of amnio for EIF  
- Doing amnio for isolated EIF would result in an additional 120,000 amnios to detect 244 fetuses with DS  
- These amnios would result in 582 miscarriages  
- It would be necessary to perform 485 amnios, with 2.4 miscarriages, for each DS fetus detected
EIF and Down Syndrome

Although the presence of an EIF appears to be associated with a small increased risk of DS, its use as a screening tool in low risk populations will lead to a large number of amniocenteses and miscarriages to detect a small number of Down syndrome fetuses.

Echogenic Intracardiac Focus

Recommendations:
- Correlation with other risk factors for chromosome abnormalities (triple screen, maternal age)
- No ultrasound follow up or echocardiogram warranted
- Amnio not warranted in absence of other risk factors

Echogenic Intracardiac Focus

“An isolated EIF was identified. While this finding has been associated with fetal chromosome abnormalities, no other major or minor anomalies were identified in this fetus. In the absence of other risk factors, this finding most commonly represents a normal variant and no further evaluation is recommended.”

Audience response

When an isolated EIF is seen by US, do you currently:

A. Not tell the patient
B. Only report if patient is > 35 yo
C. Only report if abnormal screening
D. Depends on ethnicity
E. Always tell the patient
Audience response
In your practice, the observation of an isolated EIF prompts amniocentesis in:

A. Essentially none of my patients
B. A small number of patients
C. About half of the patients
D. Most of my patients
E. Depends on their screening results

Findings of MINIMAL significance to the fetus

Pelviectasis
- Dilatation of anteroposterior diameter of renal pelvis without frank hydronephrosis
- In > 90% of cases, this is a physiologic response to maternal progesterone and other factors
- In a low percentage of cases, this represents true pathology, such as UPJ obstruction or reflux

“Physiologic” Pelviectasis
Dilated Calyces $\rightarrow$ Hydronephrosis

Hydroureter

Fetal Hydronephrosis
Differential Diagnosis: UPJ obstruction, Reflux

US evaluation:
- amniotic fluid volume
- urinary bladder
- fetal gender
Pelviectasis

*Siemens et al. Tech Urol, 1998*

- Threshold of renal pelvic diameter to predict insignificant postnatal pelviectasis
- Cutoff of < 6mm, < 8mm, < 10mm predicted normal outcome
- Sensitivity, specificity, PPV and NPV of 89%, 96%, 95% and 91%

Pelviectasis

**What warrants follow up?**

- > 4 mm before 20 wks
- > 7 mm between 20-30 weeks
- > 10 mm from 30 weeks until term

Pelviectasis

**Recommendations:**

- Repeat US in mid-third trimester to rule out progression and determine need for postnatal F/U
- Risk of DS marginally increased, if at all
- Amnio not warranted in absence of other risk factors

*If findings persist in 3rd trimester*

- Postnatal follow up at least 10 days after delivery
- ? Antibiotic prophylaxis until follow up obtained

Findings with potential for significant abnormality, but often seen in normal fetuses
Echogenic Bowel

- Can be seen as diffuse, multifocal bright bowel (must be as bright as bone) or discrete calcifications, either intra-hepatic or intra-abdominal
- Intra-abdominal calcifications can indicate meconium peritonitis (a chemical peritonitis often due to antenatal bowel rupture), small bowel atresia, volvulus or meconium ileus


Ultrasound Technique
- transducer
- frequency
- harmonics
- settings
Focal Area of Echogenic Bowel

Peritoneal Calcifications +/- Ascites

Meconium Peritonitis

Meconium Pseudocyst
Echogenic Bowel

- Associated with trisomies, cystic fibrosis, viral infection, IUGR, fetal demise
- CF/Aneuploidy cases tend to present with diffuse, echogenic bowel, while CMV tends to present as unifocal calcifications

Clinical Significance of Echogenic Fetal Bowel

*Al-Kouatly et al. Am J Ob Gyn, 2001*
- Study of 175 fetuses, 1993-2000
- 5 cases of CF (3%)
- 5 aneuploid fetuses (3%)
- No toxoplasmosis (161 fetuses tested)
- 1 CMV (111 tested)

Echogenic Bowel

**Recommendations**
- CF screening
- Maternal or fetal testing for CMV, possibly toxoplasmosis
- Unclear whether amnio warranted (for karyotype) in otherwise low risk patient
- Follow up ultrasound for bowel & growth in 3rd trimester

Ventriculomegaly

- Fetal cerebral ventricles of 10 – 15 mm
- Most cases are normal variants, in rare cases represent obstructive hydrocephalus
- Can be marker for other underlying CNS pathology
- More common, less concerning in male fetuses
- When isolated, outcome usually normal
- When associated with other CNS or non-CNS findings, outcome much worse
Lateral Ventricle

Mild Ventriculomegaly

Posterior Fossa

Agenesis of the Corpus Callosum
Ventriculomegaly

**Recommendations**

- Level II ultrasound
- Fetal MRI
- Amniocentesis for karyotype and CMV/Toxoplasmosis testing

Corpus Callosum

- Normal
- Agenesis

Periventricular Heterotopia
Isolated Mild Ventriculomegaly

Audience response
In your practice or region, is fetal MRI generally offered to patients when isolated ventriculomegaly (or other CNS abnormalities) are seen?

- Almost always
- Sometimes
- Never
- Don’t know, haven’t had a case myself

Pseudo- and Quasi-Abnormalities of the Placenta & Umbilical Cord seen on Ultrasound

Placental Lucencies
Are Placental Lakes of ANY Clinical Significance?

Association betw placental lakes by US @ 20 wks and complications / poor pregnancy outcomes 1198 consecutive US exams. Routine screening Placental Lakes seen in 18%
NO association with demographic factors, smoking, pre-eclampsia, HTN fetal mortality, BW < 5%
Placental lakes more common with increased placental thickness


The Confusing Terminology of Placenta Previa

Complete Central Previa

“Pseudo” Placenta Previa
Complete Previa seen on Endovaginal US

Placental "Migration"

Early

Late
Endovaginal US in Predicting Previa at Delivery

381 singleton pregnancies
- Lower placental edge overlapping os
- EV US @ 11-14, 20-24, 30-34 weeks GA
- Incidence of Previa: 42%, 4%, 2% at term

* IF placental edge overlaps os by 23 mm at 11-14 weeks,
  THEN probability of previa at term is 8% (sens 83%, spec 86%)


Incomplete / Marginal / Partial Previa

Placental Edge-Os Distance in Late 3rd Trimester & Mode of Delivery in Placenta Previa

121 Pregnancies
- Mean US-delivery time 10 days
- C-section rate:
  90% when edge-os distance 0.1 - 2.0 cm
  37% when distance > 2.0 cm
- Likelihood of vaginal delivery increased significantly as placental edge to os distance increased


Terminology of Previa

- Ask your sonologists to report precisely regarding placental location
  OR
- Assure that you agree on definition of “marginal” “incomplete” “partial” previa
**Audience Response**

If an asymptomatic placenta previa is seen in the second trimester, do you:

A. Put the patient on bedrest  
B. Put the patient on pelvic rest  
C. Put the patient on restricted activity  
D. No special instructions unless she bleeds

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**Cord (Funic) Presentation**

![Cord Image]

**Vasa Previa**

![Vasa Previa Image]
Succenturiate Lobe
Marginal Cord Insertion
Velamentous Cord Insertion

Vasa Previa

Placenta
Vasa Previa

Fetal vessels run through membranes over cervix and under presenting fetal part
Estimated incidence 1 in 2500 deliveries
Among most lethal fetal conditions
75% mortality with ROM/fetal bleeding
Fetal exsanguination rapid
   Total fetal blood volume = 80-100 mL/kg
Perinatal loss rate 50-60% even w/o bleeding due to vessel compression

Retrospective series:
   Perinatal mortality 56% when vasa previa was NOT recognized prenatally
   97% survival when diagnosis was made by prenatal US
   * 8/18 cases preceded by placenta previa

Association of Vasa Previa at Delivery with History of 2\textsuperscript{nd} Trimester Previa

*Retrospective case-control study of vasa previa*
13 cases over 10 years, matched 1:4 w/controls
9/13 cases of vasa previa had 2\textsuperscript{nd} trimester previa by US
2/52 controls had 2\textsuperscript{nd} trimester previa
(p < 0.000001, OR=56)

*Highly significant association between vasa previa at delivery and history of 2\textsuperscript{nd} trimester placenta previa*


*Follow up for resolution of previa should include evaluation for vasa previa*

**Umbilical Cord**

1\% of all pregnancies. Primary agenesis or atrophy/atrophy.
**Single Umbilical Artery**

*Study of 5967 exams:*
Increased incidence of fetal morphologic abnormalities (incl cardiac & GU defects) in 15%
Those cases with aneuploidy ALL had other findings identified by US
ALL serious malformations were recognized prenatally

*Cristina MP. Acta Obstet Gynecol Scand, 2005*

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**Single Umbilical Artery**

With SUA, ? increased risk of IUGR

Recommend:
- Search for assoc’d fetal malformation
- Level 2 OB US +/- Fetal Echocardiogram
- ? Follow-up to assess fetal growth

* SUA most often found in healthy, structurally normal fetuses

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**Umbilical Cord Coiling**

*Undercoiled*  
*Overcoiled*
**Umbilical Cord Coiling Index**

Normal: 1 coil per 5 cm (0.2 coils/cm)  
normal range 0.1 – 0.3 coils/cm

1329 consecutive cases referred for placental pathology

• 21% overcoiled, 13% undercoiled
• Associated w/ poor perinatal outcomes
• Cause of abnormal coiling not known


**Abnormal cord coiling**

HYPO-coiled
• IUFD, low Apgar scores, fetal anomalies, velamentous insertion, single umbilical artery
• Less common IUGR, fetal acidosis & asphyxia

HYPER-coiled
• Trisomies, SUA, fetal acidosis & asphyxia, IUGR

**Abnormal cord coiling**

• Associations with no pathologic significance versus abnormal coiling as causative?
• Kinking, compression, thrombosis, etc?
• Clearly, most have normal outcome
• BUT, consistent associations with abnormal coiling and range of abnormal outcomes
• Providers should NOT assign causality of any adverse outcome purely based on umbilical cord coiling
Umbilical Cord Insertion Site

Sonographic evaluation of the placental cord insertion site

Marginal Cord Insertion

Velamentous Cord Insertion

Relatively uncommon
1% of singletons
8% of twins
15% of MC twins
More common in anomalous fetuses

Audience response
Would you want the observation of a marginal / velamentous cord insertion included in a routine OB US report?

A. Yes, it would be helpful
   - Yes, but not sure what to do with the info
   - No
Audience response

The OB US findings discussed in the last hour would best be described as:

A. Clinically relevant
B. Of doubtful clinical significance
C. Warranting additional research
D. Pesky

Summary

- “Pseudo” abnormalities affect a significant proportion of prenatal ultrasounds
- Help women understand risks, benefits, limitations of these tests
- Consider carefully how to report “abnormal” results
- Accurate counseling, coordinated care, thoughtful follow up after abnormal results