FETAL GASTROINTESTINAL & ABDOMINAL ANOMALIES:
SONOGRAPHIC EVALUATION

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NORMAL ANATOMY LIVER

NORMAL ANATOMY UMBILICAL CORD INSERTION

NORMAL ANATOMY FETAL CIRCULATION

NORMAL ANATOMY BOWEL

GI & ABDOMINAL ANOMALIES
- ABDOMINAL WALL ANOMALIES
- GASTROINTESTINAL ATRESIA
- INTRAPERITONEAL ANOMALIES
- LIVER, GALLBLADDER, SPLEEN ANOMALIES
- PELVIC ABNORMALITIES
ABDOMINAL WALL ANOMALIES

- EMBRYOLOGY
- OMPHALOCELE
- GASTROSCHISIS
- LIMB-BODY WALL COMPLEX
- CLOACAL DYSTROPHY

MIDGUT HERNIATION

Midline defect through which abdominal contents herniate
2.5 per 10,000 births
Associated with other anomalies:
- Trisomy 13, 18, 21
- Beckwith-Wiedemann syndrome
- Pentalogy of Cantrel
- Turner syndrome
- Klinefelter syndrome
- Cardiac anomalies

OMPHALOCELE

SONOGRAPHIC FINDINGS

- Midline location
- Covered by a membrane
- May contain any or all anatomical structures
- Decreased abdominal circumference
- Polyhydramnios
OMPHALOCELE
SONOGRAPHIC FINDINGS

GASTROCHisis
SONOGRAPHIC FINDINGS
- Lateral to cord insertion
- No membrane
- Thick-walled bowel loops in AF
- Decreased abdominal circumference
- Polyhydramnios

GASTROCHISIS
SONOGRAPHIC FINDINGS
- Lateral to cord insertion
- No membrane
- Thick-walled bowel loops in AF
- Decreased abdominal circumference
- Polyhydramnios

GASTROCHISIS
SONOGRAPHIC FINDINGS
- Left sided abdominoschisis
- Absent umbilical cord
- Exteriorization of abdominal contents
- Viscera attached directly to placenta
- Associated anomalies include:
  - Neural tube defects
  - Facial clefts
  - Caudal regression syndrome
  - Limb anomalies
LIMB-BODY WAL COMPLEX
SONOGRAPHIC FINDINGS
- Fetus appears tethered to placenta
- Short umbilical cord
- Herniation of liver and abdominal viscera
- No membrane present
- No free-floating umbilical cord identified in amniotic cavity

CLOACAL DYSTROPHY
SONOGRAPHIC FINDINGS
- Association of anomalies arising from abnormal embryology of cloaca
- Lower abdominal wall defect
- Exstrophy of bladder
- Omphalocele
- Associated anomalies include:
  - Multicystic dysplastic kidneys
  - Hydronephrosis
  - Undescended testes
  - Cleft clitoris
  - Epispadias

GASTROINTESTINAL ATRESIA
- ESOPHAGEAL ATRESIA
- DUODENAL ATRESIA
- SMALL BOWEL OBSTRUCTION
- IMPERFORATE ANUS
ESOPHAGEAL ATRESIA
- Interruption of esophageal lumen
- 90% association with TE fistula
- Associated anomalies include:
  - VACTERL association
  - Charge syndrome
  - Concomitant GI atresia
  - Pyloric stenosis
  - Trisomy 18, 21

ESOPHAGEAL ATRESIA SONOGRAPHIC FINDINGS
- Failure to demonstrate stomach on serial sonograms
- Polyhydramnios
- IUGR (40% of cases)

DUODENAL ATRESIA
- Interruption of GI tract
- Second/third portion of the duodenum
- Etiologies: embryological/compression
- Associated anomalies include:
  - VACTERL association
  - Congenital heart disease
  - Concomitant GI atresia
  - Pyloric stenosis
  - Trisomy 21

DUODENAL ATRESIA SONOGRAPHIC FINDINGS
- “Double bubble” sign
- Identification of focal atretic segment
- Polyhydramnios
**DUODENAL ATRESIA**

**SONOGRAPHIC FINDINGS**

- Multiple dilated fluid-filled bowel loops
- Small bowel inner diameter >7 mm
- Abdominal distention
  - (AC measurements > than expected for dates)
- Polyhydramnios

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**SMALL BOWEL OBSTRUCTION**

**SONOGRAPHIC FINDINGS**

- May occur at any level in jejunum or ileum
- Etiologies:
  - Volvulus
  - Ischemic vascular insult

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**SMALL BOWEL OBSTRUCTION**

**SONOGRAPHIC FINDINGS**

- Multiple dilated fluid-filled bowel loops
- Small bowel inner diameter >7 mm
- Abdominal distention
  - (AC measurements > than expected for dates)
- Polyhydramnios

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**SMALL BOWEL OBSTRUCTION**

**SONOGRAPHIC FINDINGS**

- Obliteration of anal opening
- Membranous separation
- Absence of entire anal mechanism
- Associated anomalies include:
  - VACTERL association
  - Caudal regression syndrome
  - Esophageal atresia
  - Trisomy 21
IMPERFORATE ANUS
SONOGRAPHIC FINDINGS
► Absent perineal “echogenic spot”
► Dilated colon
► Signs of meconium peritonitis

INTRAPERITONEAL ABNORMALITIES
► MECONIUM PERITONITIS
► ECHOGENIC FETAL BOWEL

MECONIUM PERITONITIS
► Inflammatory reaction to spillage of meconium
► Etiology: Increased intra-intestinal pressure
► Meconium ileus
► Associated anomalies include:
  ► Cystic fibrosis
  ► Intestinal atresia
  ► Polyhydramnios

MECONIUM PERITONITIS
SONOGRAPHIC FINDINGS
► Fetal ascites
► Intraperitoneal calcifications
► Meconium pseudocyst
► Polyhydramnios

HEPATOMEGALY
SONOGRAPHIC FINDINGS

B
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1/30/2014
**ECHOGENIC BOWEL**

- Abnormal increase in bowel echogenicity
- Isolated finding 70% of cases
- Small, but definite association with:
  - Trisomy
  - Congenital sequelae
  - Prompts focused ultrasound exam
- Associated with:
  - Cystic fibrosis
  - Meconium ileus
  - CMV infection
  - IUGR

**ECHOGENIC BOWEL SONOGRAPHIC FINDINGS**

- Bowel echogenicity ≥ than iliac bone

**LIVER, GALLBLADDER, SPLEEN**

- HEPATOMEGALY
- SOLID LIVER MASSES
- CYSTIC LIVER MASSES
- HEPATIC CALCIFICATIONS
- FETAL GALLSTONES
- SPLENIC ABNORMALITIES

**LIVER, GALLBLADDER, SPLEEN SONOGRAPHIC ANATOMY**

1 = left lobe  
2 = umbilical vein  
3 = main portal vein  
4 = right lobe  
5 = stomach  
6 = spleen
HEPATOMEGALY
- Enlargement of liver
- Associated with:
  - Isoimmunization
  - Rh disease
  - Congenital infections
  - Beckwith-Weidemann syndrome

HEPATOMEGALY
SONOGRAPHIC FINDINGS

SOLID LIVER LESIONS
- Always ominous sign
- May be benign or malignant
- Wide variety of histologic type:
  - Hemangioma
  - Mesenchymal hamartoma
  - Hepatoblastoma
  - Metastases

SOLID LIVER LESIONS
SONOGRAPHIC FINDINGS
- Focal, echogenic or complex mass in located in the liver
- Doppler demonstrates arterial supply to mass; high and low resistance flow patterns

SOLID LIVER LESIONS
SONOGRAPHIC FINDINGS

CYSTIC LIVER LESIONS
- Uncommon
- Little clinical significance
- Biliary origin - most common
CYSTIC LIVER LESIONS
SONOGRAPHIC FINDINGS
- Well-circumscribed, anechoic mass within the liver
- Posterior acoustic enhancement

HEPATIC CALCIFICATIONS
- Common finding:
  - 1 in 1,750 2nd trimesters sonograms
- Site, size and distribution are significant
- Associated with TORCH infections:
  - Toxoplasmosis
  - Other (syphilis, varicella, parvovirus B19)
  - Rubella
  - CMV
  - Herpes

Similar sonographic appearance; variable patterns of distribution.
- Brightly echogenic focus without or without casting a posterior acoustic shadow.
SONOGRAPHIC FINDINGS

HEPATIC CALCIFICATIONS

FETAL GALLSTONES
- Not adult-type gallstones
- Echogenic material in GB lumen
- After 28 weeks
- Clinically insignificant finding

FETAL GALLSTONES

SPLENIC ABNORMALITIES
- Few and rare
- Splenomegaly - in utero infections
- Congenital cysts
- Pseudocysts
- Solid masses
  - Dermoids
  - Epidermoids
  - Hemangiomas

SPLENIC ABNORMALITIES

PELVIC ABNORMALITIES
- OVARIAN CYSTS
- OVARIAN TERATOMAS
OVARIAN CYSTS
- Stimulation of fetal ovaries by maternal hormones
- Functional cysts
- Unilateral more common
- Little clinical significance

OVARIAN CYSTS
- Simple cystic mass found in fetal pelvis separate from the GI and GU tracts
- Female gender identified
- May be difficult to distinguish from urachal or mesenteric cysts.

OVARIAN CYSTS
- Sonographic Findings
  - Complex, large mass seen in the fetal pelvis or arising from the fetal rump
  - May contain cystic, solid and calcific components
  - Pre-sacral: projecting into the fetal abdomen
  - Sacrococcygeal: projecting exophytically off the fetus into the amniotic cavity

OVARIAN TERATOMAS
- Congenital germ cell tumors
- May be cystic, solid or complex
- May be difficult to distinguish from urachal or mesenteric cysts.
- Pre-sacral vs. sacrococcygeal
- Associated with:
  - Myelomeningocele
  - Vertebral anomalies
  - Hydrops fetalis
  - Ureteric obstruction
  - GI obstruction
  - Tumor rupture
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