

FETAL ABDOMEN

Contents:

Gastrointestinal tracts

Esophagus, Stomach, Small intestine, Large intestine,
Anorectal malformation

Other abdominal organs

Liver, Spleen, Pancreas, Gall bladder, Bile ducts

Meconium peritonitis

Abdominal wall

Cystic mass in abdomen

Study target:

To know key sonographic features of abdominal malformations

.GASTROINTESTINAL TRACTS

A. Esophagus

;normal fetal esophagus- tubular echogenic structure in the neck and posterior chest.

normal esophagus is collapsed and not usually visualized

Esophageal atresia

;most common esophageal anomaly(1 in 3000 births)

malformation results in an abrupt termination of the esophagus as a pouch
90% of case- associated with a tracheoesophageal fistula, which most often connects the trachea to the distal esophagus.

Result from failure of the primitive foregut to divide in the anterior trachea

And posterior esophagus

additional abnormalities occur in a high percentage

chromosomal anomaly(20%) -21+,18+

major defect(50%)-mainly heart

VACTERAL complex

Vertebral, anal, cardiovascular, tracheoesophageal, renal, radial,
and limb malformations

sonographic diagnosis

polyhydramnios(60~70% after 24 weeks)

absent fetal stomach bubble(should be larger than 1 cm)

DDx

Intrathoracic compression in CDH

Inability of swallowing

Prognosis

Isolated T-E fistula after surgery-more than 95%

B.Stomach

:fetal stomach is visible from 9 weeks

C.Small intestines

Small bowel

small bowel loops - occasionally be seen in the normal fetus

active peristalsis and change in configuration during
real-time observation

individual segments of small bowel

diameter- < 7mm

length- < 15mm

small bowel obstruction ? sono finding

multiple interconnecting, overdistended bowel loops

The number of dilated loops depends on the level of obstruction

Polyhydramnios occurs in association with many cases of jejunal and ileal
obstruction

DDx with dilated small bowel

cysts in an enlarged multicystic dysplastic kidney,

a dilated tortuous ureter

normal-caliber large bowel.

Duodenal atresia

Embriology:

At 5 weeks-obliterated by proliferating epithelium

By 11 weeks-patency restored

most common type of congenital small bowel obstruction
associated anomaly

Congenital heart disease

esophageal atresia

imperforate anus

small bowel atresia

biliary atresia

renal and vertebral anomalies

at least 40% - trisomy 21

Sono finding

polyhydroamnios

double bubble(continuity)

D.Large bowel

Dilatation > 2cm

Ex-agangliosis(Hersprung disease) most common

Hirschsprung's disease

due to congenital absence of the ganglion cells of the myenteric plexus

findings- polyhydroamnios

multiple loops of dilated fetal bowel

Hyperechoic Bowel

Probably abnormal if

>4cm, unform or inhomogenous, may have mass effect

>echogenicity of Bone—cystic fibrosis,chromosomal abnormality,IUGR

perinatal death

same risk even if desappears

Probably normal

< 2cm,vaguly identified

< echogenicity of bone

sometimes mesentery echogenicity visible

E. Anorectal malformation

:associated anomaly(80%)

including imperforated anus, anal agenesis, anorectal agenesis and rectal agenesis

additional anomalies- VACTERAL syndrome or the caudal regression syndrome

Sono-findings:

dilated V_ or U_ shaped segment of bowel in the fetal pelvis or lower abdomen
calcified intraluminal meconium in the fetal pelvis

Two group

high lesions

terminate above the levator sling

associated with - fistula to the genitourinary system

require an abdominal surgical approach

low malformation-

terminate below the levator sling in an orifice on the perineum or inside the posterior vaginal fourchette

usually treat with a perineal surgical approach

.OTHER ABDOMINAL ORGANS

A. Fetal liver

:measurement- longitudinal plane, from the dome of the right hemidiaphragm to the tip of the right lobe

hepatomegaly

severe isoimmunization(fetal hydrops)

fetal anemia(fetal hydrops)

in utero infection

fetal congestive heart failure

neoplasm(hepatoblastoma, hemangioma)

infiltration metabolic disorder

macrosomia

decreased in asymmetric growth retardation

hepatic calcification

;ass. Congenital infection, chromosomal infection

isolated foci of no meaning

B. Fetal spleen

;visualized on transverse scans as a homogeneous solid structure

posterolateral to the stomach

C. Fetal pancreas

not usually seen during routine obstetric scanning

D. Gall bladder and bile ducts

fetal gallbladder

seen on transverse image as an ovoid or teardrop, fluid-filled structure

between the right and left lobes of the liver

choledochal cyst

localized dilatation of the biliary system

15 weeks to 37 weeks

all-female

.MECONIUM PERITONITIS

;chemical peritonitis resulting from intrauterine bowel perforation

underlying bowel disorder (65%)

small bowel atresia, meconium ileus, volvulus, and intussusception

no bacterial contamination

sono finding

intraperitoneal calcification (85%)

posterior shadow may or may not be seen

usually linear or clumpy

ascites (54%) - usually with internal echoes

bowel dilatation (27%)

pseudocyst (14%)

polyhydramnios (65%)

Meconium plug syndrome

due to transient colonic obstruction from meconium in the distal colon
occurs in both normal fetuses and in those with cystic fibrosis

.ANTERIOR ABDOMINAL WALL

:Umbilical Herniation:8~12 weeks.

Fusion of four ectomesodermic folds

Cephalic,caudal,two lateral

A.Omphalocele

;a midline defect in which abdominal contents herniate through
the umbilicus

Incidence-1 per 4000 birth

Pathogenesis:

Failure of the bowel to return to the abdomen

Defective enclosing growth of the lateral folds during the 5th to 6th week

high risk for additional anomalies(50~70%)

cardiac defect

genitourinary lesions

neural tube lesions

gastrointestinal lesions

chromosomal anomaly(40~60%)

Diagnosis:

Smooth surface

Umbilical cord enters the mass

Ascites –common

Management:

Full search for additional abnormality

Karyotyping

Survival rate after surgery for isolated lesion-90%

B.pentalogy of Cantrell(Defect in cephalic embryonic fold)

Upper mid-line omphalocele
Anterior diaphragmatic hernia
Sternal cleft
Ectopia cordis

C. Extrophy of the bladder, or cloaca

; external, well defined, solid or complex mass immediately superior to the fetal genitalia. (bladder-not visible)

Ass. With

Horseshoe kidney
Imperforat anus
Colonic atresia
Sacral vertebral defect

Recurrence risk-less than 1%

D. Gastroschisis

: a paraumbilical defect that involves all layers of the abdominal wall
incidence_1 per 4000 births

Pathogenesis:

Abnormal involution of the umbilical vein
Intravascular accident of the omphalomesenteric artery
Early intrauterine rupture of an omphalocele with complete resorption of the sac.

usually an isolated

rarely associated with anomalies (10 ~ 30%)

-mainly gut atresia

Diagnosis:

not covered by membrane, the edges are irregular
only the small and large intestine are herniated
on the right of the umbilical cord

Prognosis:

30%-growth restricted

Karyotyping is not recommended

Surgical resection of necrotic bowel with one or two stage closure

.CYSTIC MASS IN ABDOMEN

In female-ovarian cyst(m/c)

:after 25 weeks

more common in diabetic,Rh isoimmunization

resolve spontaneously in neonatal period

In both-mesenteric cyst

:obstructed lymphatic drainage

midline cystic lesion of variable size

multiseptate or unilocular

duplication cyst

tubular or cystic,variable size

Hepatic syst

right lobe of the liver

unilocular

ass.polycystic kidneys(30%)

Urachal cyst

Choldochal cyst(rt)

Splenic cyst(It)

Lymphangiomas

Umbilical vein varix

:extrahepatic vein enlargement

normal upper limits(3mm at 15weeks,8mm at term)

associated with fetal hydrops and third trimester demise

Reference:

1.RAL, Differential diagnosis in obstetric and gynecologic
ultrasound,Saunders,1997

2. Peter Twining,Fetal abnormalities,Churchill Livingstone,2000