V .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(lt)

lymphangiomatous

Umblical 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,Chuchill Livingstone,2000

FETAL GENITOURINARY SYSTEM

Contents:

Embryology
Assesment
Renal anomalies
Renal agenesis
Renal ectopia
Horst shoe kidney
Hydronephrosis
MCDK
Heriditary ploycystic kidney disease
Renal mass and cyst
Urinary bldder
Reproductive organ

Study target:

1.To evaluate fetal urinary tract systemically.
2.To know the definition and prognosis of Pyelectasis.
3.To explain the principles of intrauterine fetal treatment.
4.Can diagnosis the various cystic renal anomalies.

I .EMBRIOLOGY;

A.Intermediate mesoderm-

Pronephros: transitory,non-functioning tissue in cervical region
Regress during 4th week

Mesonephros: rudimentary renal tissue,mesonephric duct connects to the cloaca,
From upper thoracic to lumbar region.

Urine production between 6~ 10 weeks.

Metanephros: nephron from ureteric bud(which from distal mesonephric duct), differentiates

Into the collecting tubules, calyces, pelvis,ureter

In the sacral region

6-9wks ; ascend to their permanent position in lumbar region.

10th weeks:becomes functional(connection bet.nephron and collecting system)

Second trimester ; major contributor to the amniotic fluid volume .

T-V sono ; 9wks

T-A sono ; 13wks (fetal kidney are seen in most patients by 16-18wks)

*bladder ; TV sono - 11wks, TA sono -16wks

Anomalies of urinary tract ; arrest development early in organogenesis
failure of normal ascent
obstruction of the collecting system
abnormal formation of renal tubules

B.Embryology of genital system

Internal;genital ridges are formed from primordial germ cells(migrate from the yolk sac)

External;5th week-clacal folds

.cloaca devided into bladder and rectum by urorectal septum.

7th week-meet to form the urogenital fold and anal fold

late 7th weeks-urogenital folds breaks down

II.ASSESSMENT OF URINARY TRACT

Renal size

Pelvic dimension

Calyceal dimension

Renal echogenicity-compare to liver

Ureteric dilatation

Bladder size, wall(at UA) and emptying(q. 30~40 min)
Renal artery Doppler
Fetal sex

A. Increased renal parenchymal echo.
Total 19 ; normal 4
Survived with renal abnormality 10
Died 5

B. Fetal urine : Na < 50 mMoM
Calcium,beta-2 microglobulin level

III. CONGENITAL RENAL ANOMALIES

A. Renal agenesis
; failure of development of the ureteric bud
; 1 / 2000 (unilateral agenesis) -> good prognosis
be avoid by recognizing that the adrenal gland doesn't have central sinus echoes
and doesn't have a reniform shape in the longitudinal plane

; Bilateral agnesis – lethal(1 / 5000), (M : F = 2.5 : 1)
; severe oligohydramnios – from 17 weeks.
; potter's syndrome (oligo-, pulmonary hypoplasia, anormaly facies, limb positional anormalities)
; sono-diagnosis - severe oligo.
- nonvisualization of the kidneys and urinary bladder(from 14 weeks)
- dolichocephaly , small throax

B. Renal ectopia
; fail to ascend normally into the renal fossa (one or both)
; 1 / 1200 births
; pelvic kidney - most common
; sono - findings - kidney in pelvis adjacent to the urinary bladder
empty renal fossa with a flattened adrenal gland

C.Horst shoe kidney

;may be associated with Turner syndrome,
inferior located

D. Hydronephrosis

incidence-1%,

;Mild pyelectasia(AP diameter of pelvis)<Benacerraf,1990>,ass. trisomy 21

>4 mm at 15~19 weeks: >4 at 16~23 weeks

>5 mm at 20~29 weeks: >6 at 24~30 weeks

>7 mm at 30~40 weeks: >8 at 31~40 weeks

-about 20%:underlying abnormalities(UPJ obstruction,VUR requiring surgery)

Moderate pyelectasia(>10mm)

-more than 50% need surgery during the first 2 years.

Natural history of renal pelvic dilatation

;stable in 39.6%

worse in 14.3%

returns to normal in 46%<Morin. Et al,1996>

Interventional approach .

In utero- does not prevent renal insufficiency

May have respiratory effect, not proved

Postnatal- observation for recovery

Potential candidates for intrauterine surgery

1.Bilateral moderately severe pelvicalyceal dilatation
with Normal cortical echogenicity

2.Sever megacystis and oligohydramnios
with Normal levels of urinary sodium,calcium, beta-2 micreglobulin

Assesment of significance of mild RPD

Gestational age
Side(male, left)
Bladder effect
Maternal effect
Modify postnatal F/U:
-delay 3~5 days postnatally(early dehydration)
-F/U 6 weeks later.

1. Ureteropelvic junction obstruction

; most common cause of hydronephrosis
; M : F = 2 : 1
; sono findings - dilated renal pelvis with/or without dilated calyces
- ureters are not dilated
- AFV is uually normal.

Management-Surgery if
: A-P diameter over 50 mm
differential renal function less than 35%
Pain
Urinary tract infection

2. Vesicoureteral reflux

; abnormal relationship between the distal ureter and bladder wall
; ureter has a steep, short course through the bladder wall
; male > female
; often bilateral
; sono-findings - hydronephrosis , hydroureter
- intermittent dilatation of the upper urinary tract

; Prenatal diagnosis<Tibbalis, 1996>
-prenatal US diagnosis correlates poorly with VUR
-58% of male kidneys with grade 3 reflux had normal postnatal US.
-75% of female kidneys with grade 3 reflux had normal postnatal

US.

PPV of RPD for VUR-17%, Sensitivity-31% by criteria 5mm . <Malch, 1996>

; often resolves spontaneously within the first 1-2 years of life.

3. Primary megaureter

; funstional obstruction at the distal ureter

; aperistaltic distal ureteral segment

; good prognosis

; sono - findings - hydronephrosis, hydroureter

DDX(reflux and megaureter) ;can't in utero.

4. Bladder outlet obstruction

; exclusively in males

; most often as a result of postrior urethral valves

; occur with urethral atresia or caudal regression syndrome

; sono-fondings - dilated urinary bladder with thick wall(> 2mm)

- dilated posterior urethra, ureters
- variable appearance of kidneys

; variable prognosis - on the basis of AFV

the lower ,the worse .

; prenatal treatment. (selection criteria)

- presence of oligo.
- previable gestational age and normal appearing renal parenchyma
- no other lethal anomalies and a normal karyotype
- normal renal function

5. Renal duplication

; affects female

; diagnosis - hydronephrosis that differentially affects the upper and lower poles

of the kidneys

; associated dilated ureter , ectopic ureterocele (in the urinary bladder)

; mimic a cyst or hydronephrosis o the entire kidney

E. Multicystic displastic kidney(MCDK,Potter type 2)

;1 in 1,000 births

; complete obstruction or atresia at the level of the renal pelvis and infundibulun

or of the proximal ureter before 10wks gestation.

; noncommunicating cysts of variable sizes replacing the normal renal parenchyma

; contralateral renal anomalies ; 40% (most common of which is UPJ obs.)

; fatal condition

; sono-findings - a mass in the renal fossa composed of the multiple cysts of

various sizes

; AFV is usually normal.

(lower fluid volume- careful inspection of the contralateral kidney, searching

for obstruction dysplasia or genesis)

;associate defects(50%)-trisomy 18,cardiac defects

;unilateral-normal prognosis,

prophylactic nephrectomy-not recommended.

;parents and family-should be examed.

F. Heriditary polycystic kidney disease

; autosomal recessive abnormality or autosomal dominant -

①. Autisomal recessive polycystic kidney disease(Potter type 1)

;1 per 30,000 births,lethal

; infantile polycystic kidney disease

; short arm of 6th chromosome

; often with hepatic fibrosis

; impaired or absent renal function

; sono - findings ; enlarged kidney with homogenous echogenicity

enhanced through-transmission.

bladder is often absent

severe oligohydramnios (as early as 16wks,may not apparent 24 weeks)

pulmonary hypoplasia secondary to the severe oligo.

② . Autosomal dominant polycystic kidney

; 1 in 1,000

; usually asymptomatic until the 3rd or 4th decade

; multiple renal cysts, hypertension, renal failure.

; sono-findings –enlarged hyperechoic with or without multiple systs.

-AF,reduced or normal

-kidney size, usually smaller than infantile type.

;prenatal diagnosis by CVS,or Amnio.

G. Renal mass and cysts

; solid mass - mesoblastic nephroma, which is hamatoma of the kidney

; wilms's tumor

; isolated cyst

IV. ABNORMALITIES OF THE URNARY BLADDER

A. Megacysts

; ineffective emptying of the urinary bladder

; leading to marked dilation of the bladder

; hydronephrosis and hydroureter

; mimic posterior urethral valves.

; diminished AF

B. Extropy

; failure of regression or incompletely regression of the cloacal membrane .

; male = female x 2

; sono findings - absence of the urinary bladder
- soft tissue mass on the surface of the lower
abdominal wall.
; exposed bladder mucosa

V. ABNORMALITIES OF THE REPRODUCTIVE SYSTEM AND EXTERNAL GENITALIA

A. Ovarian cysts and masses

; most follicular cyst
; simple cyst in the lower abdomen
; ovarian torsion - acute change in a previously identified ovarian cyst
with increase size and development of echoes within
the
cyst.
; congenital ovarian solid masses is rare.

B. Hydrometrocolpos

; cystic pelvic mass, lower level echoes.
; located posterior bladder and extending into the abdomen

C. Hydrocele

; collection of fluid between the layers of the tunica vaginalis in the
scrotum .
; little or no clinical significance(without asites).

D. Cryptochidism

; undesended testicle

; at least 10% (mid -third trimester)

E. Ambiguous genitalia

; external genitalia that are not clearly of either sex.

; abnormal hormone level