ISUOG Basic Training

Distinguishing between Normal & Abnormal Appearances of the Urinary Tract

Learning objectives

At the end of the lecture you will be able to:

- Describe how to obtain the 2 planes required to assess the fetal urinary tract & umbilical arteries correctly
- Recognise the differences between the normal & most common abnormal ultrasound appearances of the urinary tract

Key questions

- What are the key ultrasound features of plane 13? (kidneys)
- What are the key ultrasound features of plane 14?(bladder)
- What probe movements are required to move from plane 13 to plane 14?
- Which abnormalities should be excluded after correct assessment of planes 13 & 14?

Imaging the kidneys plane 13 - Technique

Longitudinal scan of spine
Rotate counterclockwise at the lumbar region and gently swivel probe to see kidneys

Sagittal to transverse rotation of probe

Rotate the probe counter-clockwise and angulate slightly upwards or downwards depending on the orientation

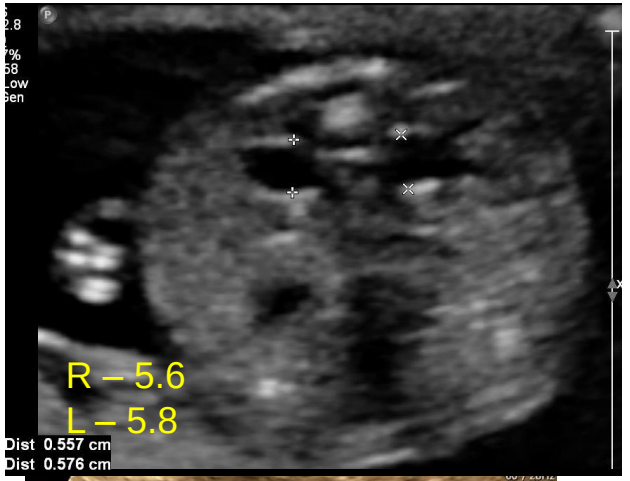
Structures to be evaluated during renal assessment (13)

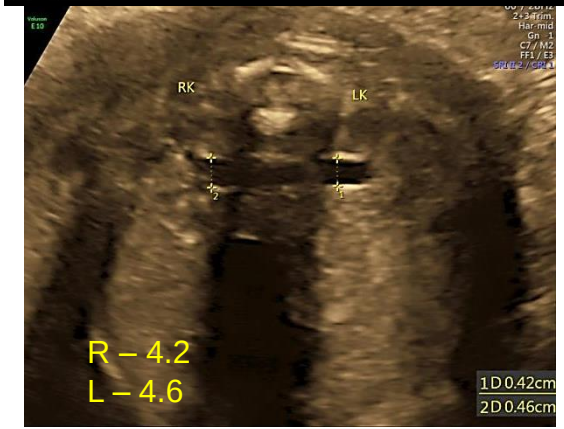
- Renal Outline (capsule)
- Renal pelvis
- Bowel may be mistaken for kidneys.
  - Identify kidneys by means of the renal pelvis
- If the renal pelvis appears subjectively dilated, measure the antero-posterior diameter in the transverse plane

Always assess the kidneys in 2 planes to avoid fallacies

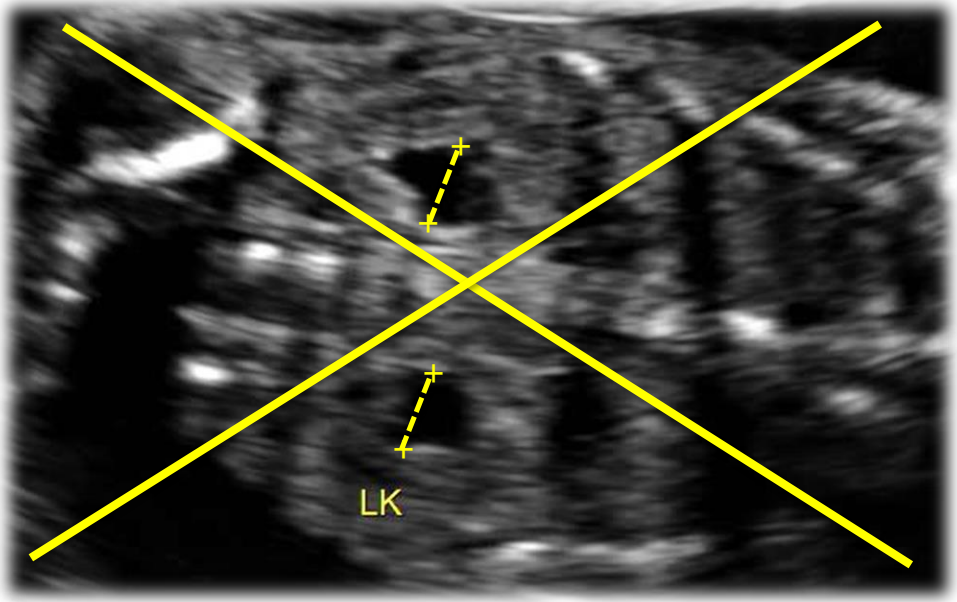
Assessment of renal pelvis

- Measurement of renal pelvis done when they appear prominent
- Transverse section – symmetrical kidneys
- Measure AP diameter
- Between 16-27 weeks < 7mm is normal
- > 7mm – refer to a specialist





Renal pelvis assessment caution!

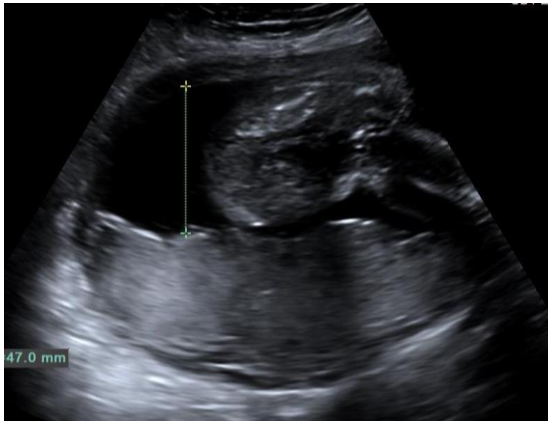


- Measurement should **NOT** be done in the coronal plane

Transverse section of fetal lower abdomen showing bladder and umbilical cord entry(14)

Liquor volume assesment

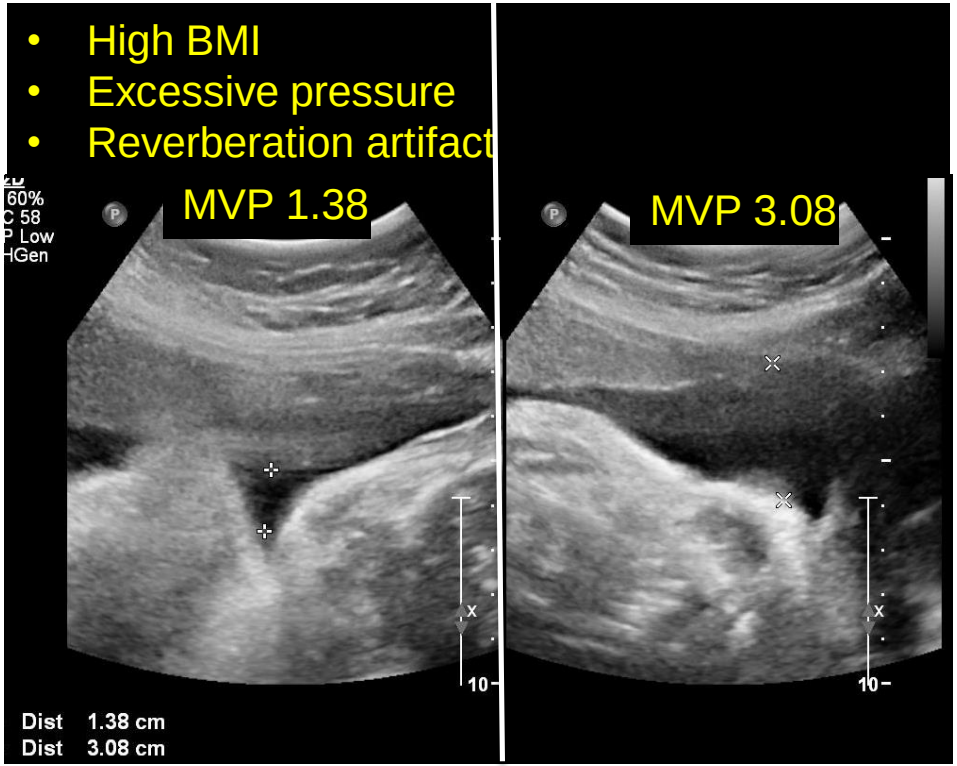
- Surrogate marker of renal function
- Starts increasing from 15-16 weeks
- Kidneys as the primary source of liquor is predominantly from 15-16 weeks
- Good fetal activity is a sign of good liquor volume



Single deepest vertical pool
Normal 2-8 cms .
< 2 oligohydramnios

Liquor

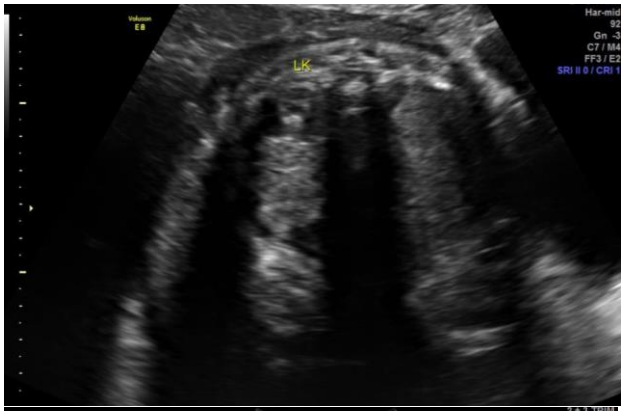
- Fallacies in liquor assessment
  - Excessive abdominal pressure
  - Very high maternal BMI

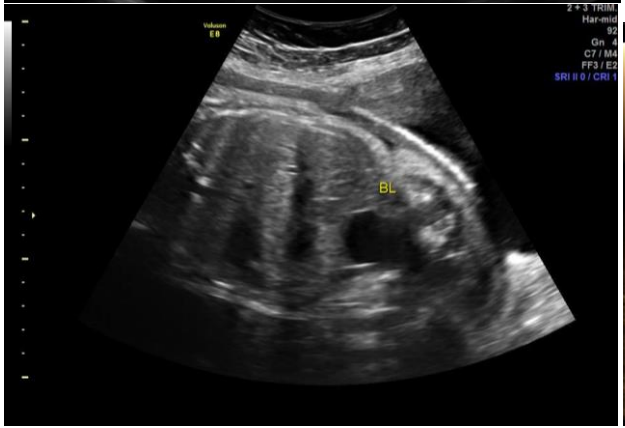


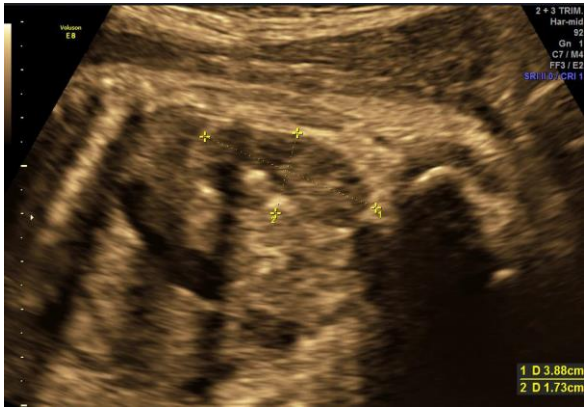
Colour Doppler assesment of three vessel cord

Abnormalities of kidneys/ bladder

Renal agenesis – unilateral





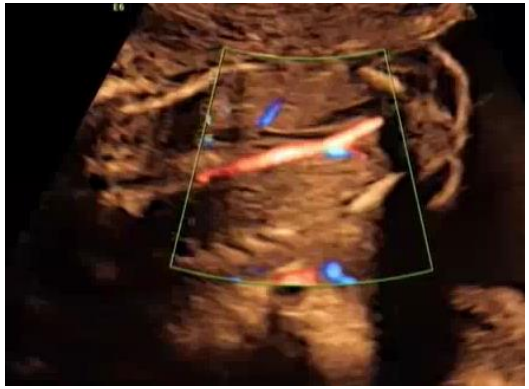


- Unilateral or bilateral
- Transverse section – 1 empty renal fossa
- Bladder seen
- Liquor normal if 1 kidney looks normal

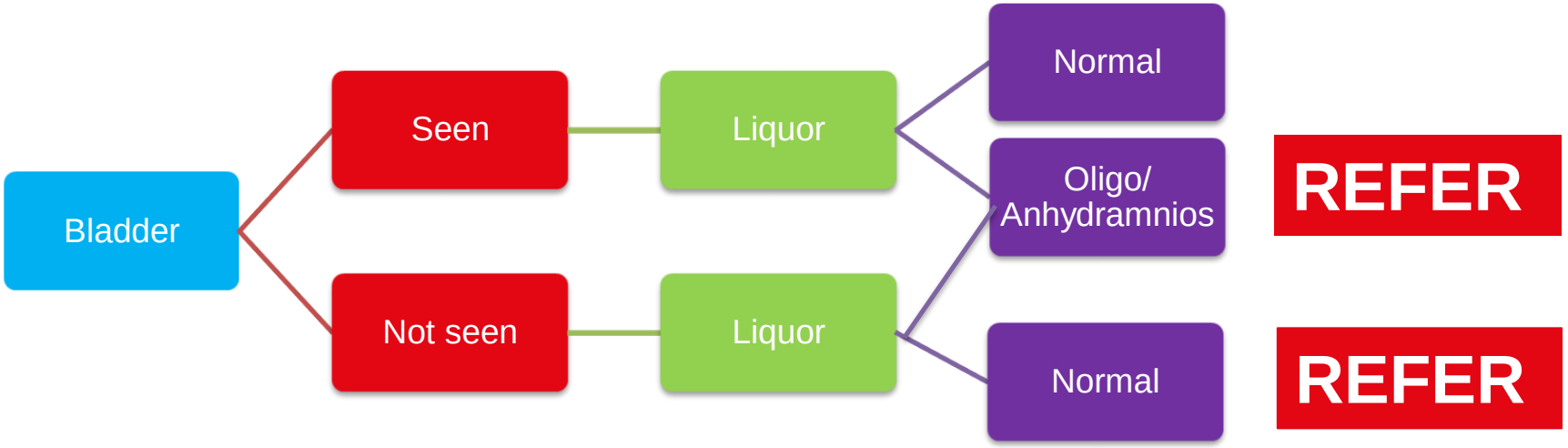
Renal agenesis - bilateral

- Transverse section – Both renal fossae empty
- Absent bladder on persistent scanning
- Severe oligohydramnios / anhydramnios after 16 weeks

Severe oligo/anhydramnios – Persistent non visualisation of bladder even if liquor normal – REFER

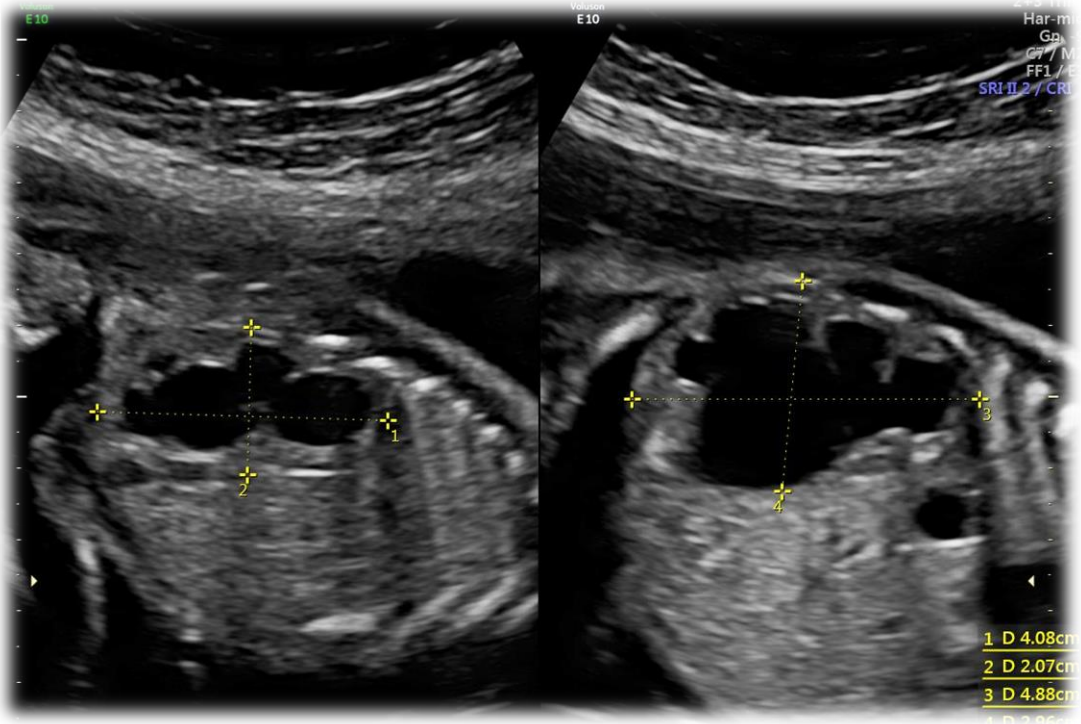


Bladder



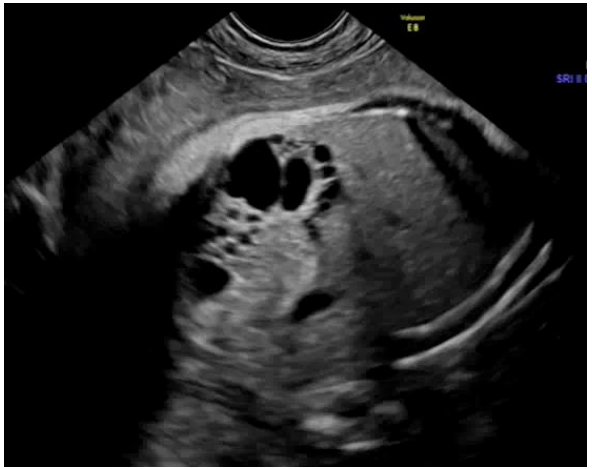
Presence of a bladder and liquor is indicative of functioning kidney/kidneys

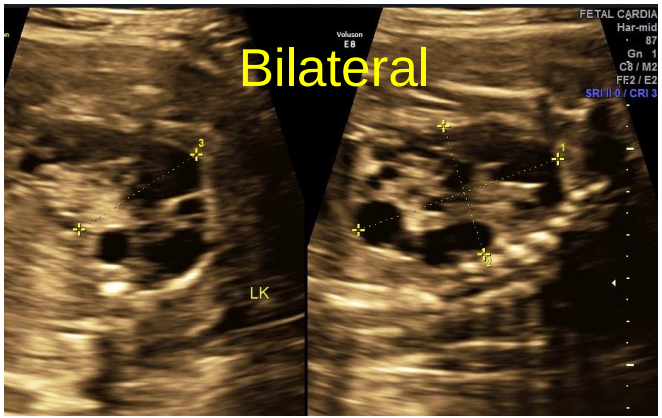
Hydronephrosis

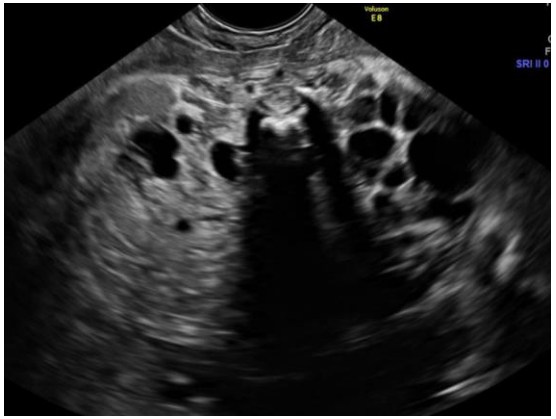


- Renal pelvis >10mm
- Varying degrees
- Unilateral/bilateral
- Dilatation of central & peripheral calyces is noted signifying severe hydronephrosis
- Seen as a progressive finding

Cystic Dysplastic Kidneys

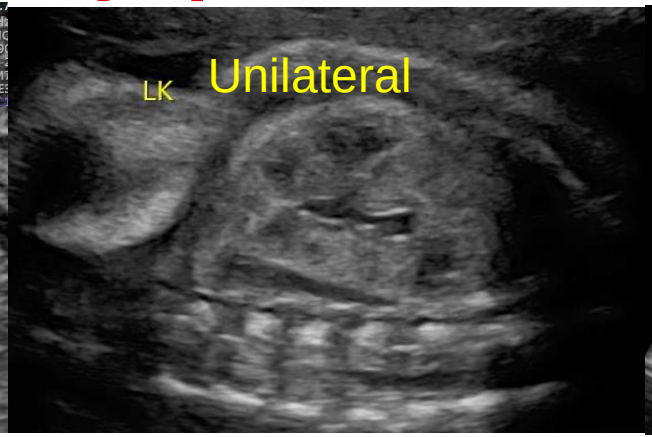


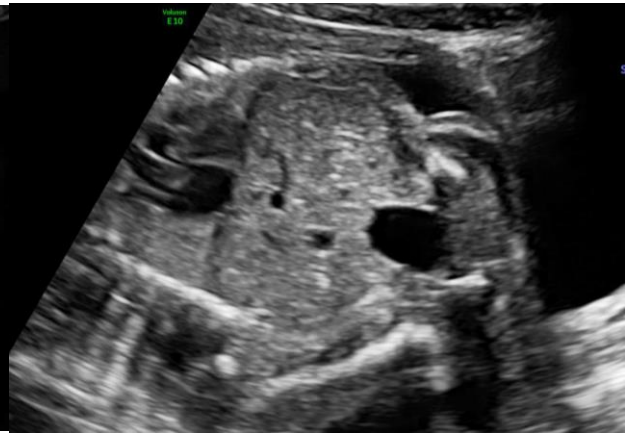




- Multiple cystic spaces of varying sizes
- Non-communicating cysts
- Echogenic renal architecture
- Anhydramnios due to non-functioning kidneys

Cystic Dysplastic Kidneys





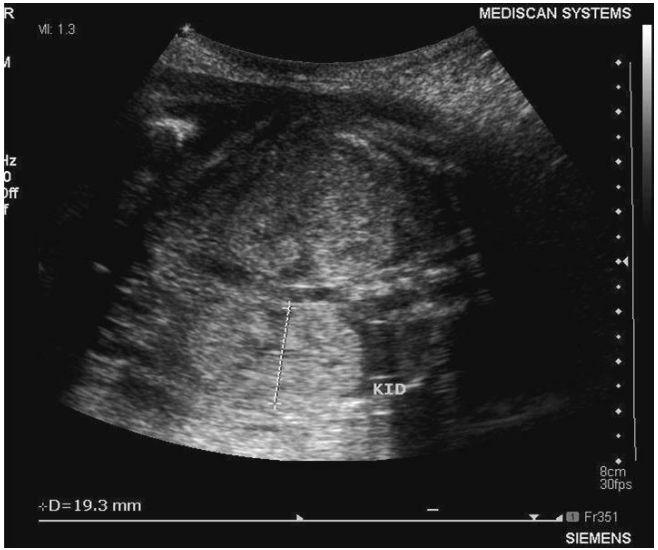
RK: Multicystic dysplastic

LK : Normal

Normal Bladder

- Single functioning kidney – Bladder, liquor normal
- Possibilities of Hydronephrosis / VUR in contralateral kidney

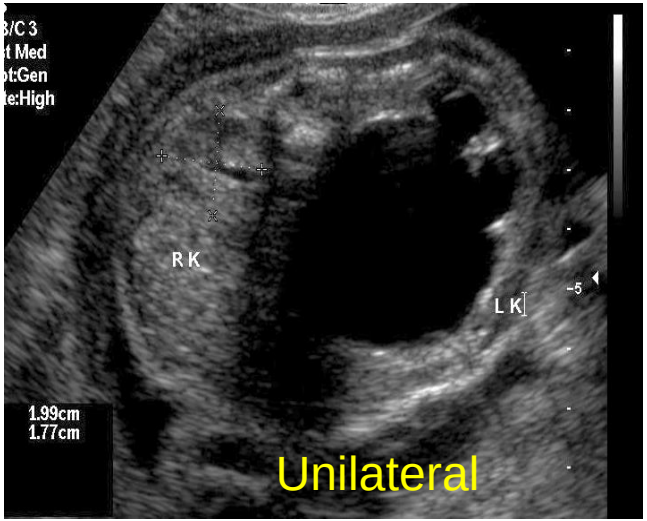
Enlarged echogenic kidneys



- Autosomal Recessive Polycystic kidneys
- Refer if kidneys enlarged , Echogenic

Hydronephrosis

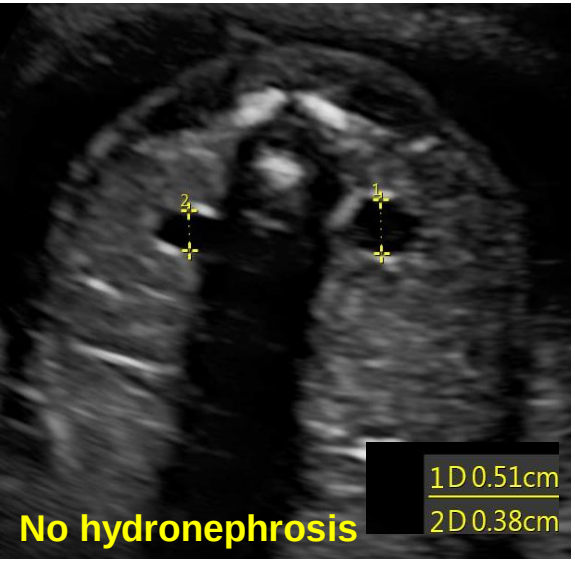
Bilateral

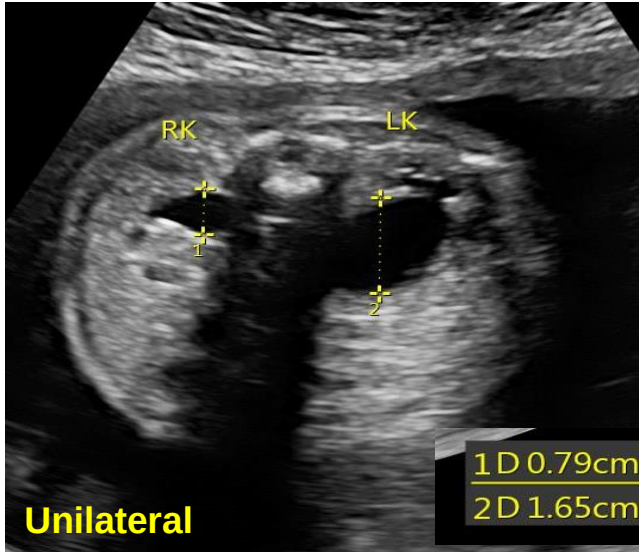


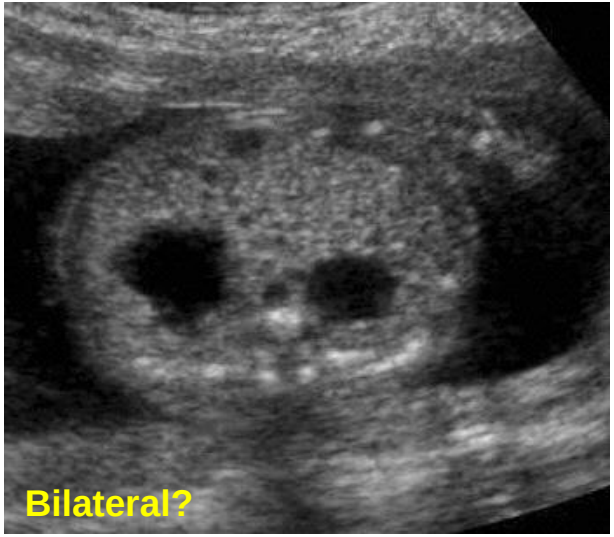
Renal pelvis > 10 mm

Calyceal dilatation

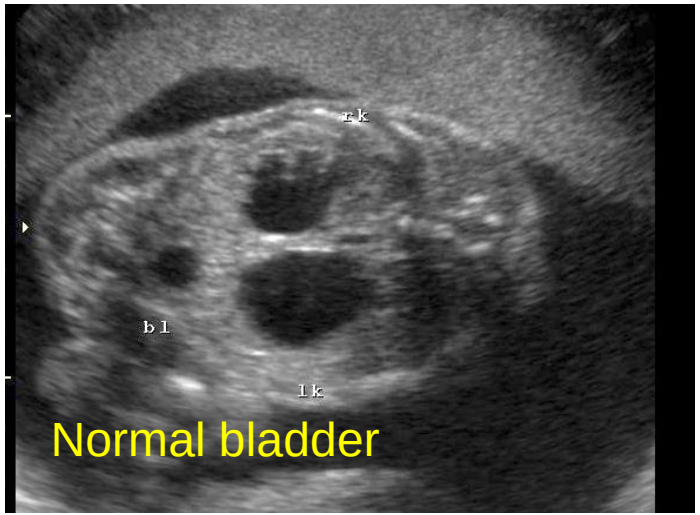
Hydronephrosis – Unilateral/Bilateral



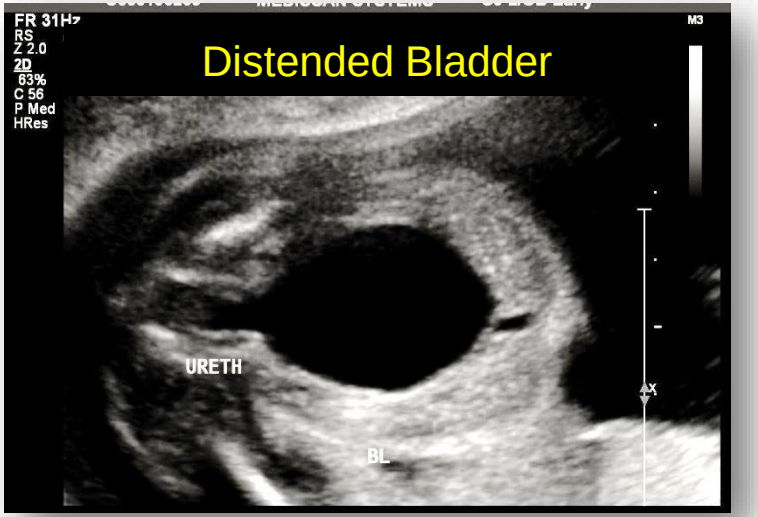




Bladder in hydronephrosis

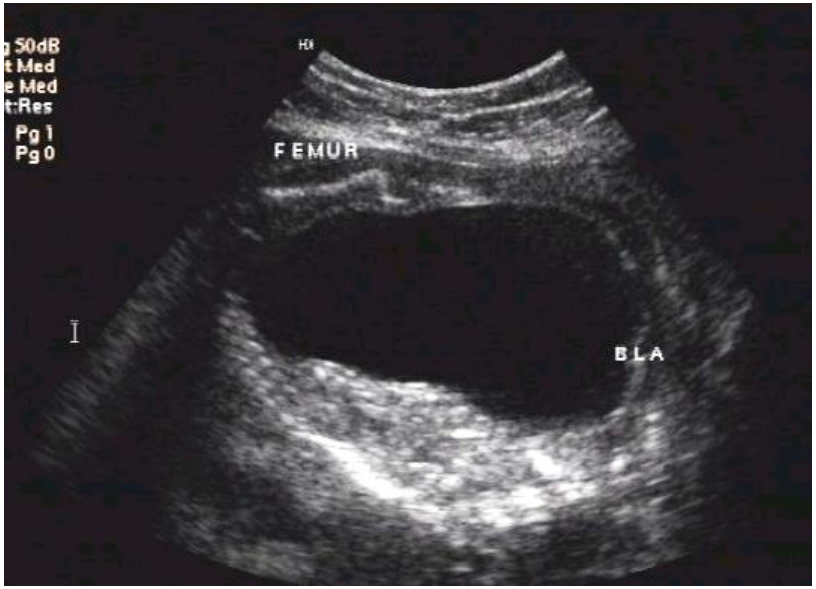


Most likely upper tract obstruction



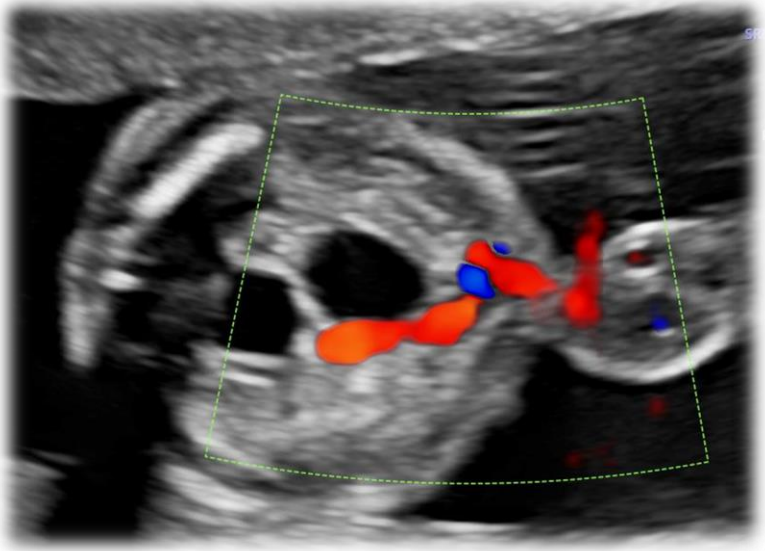
Lower urinary tract obstruction(LUTO)

Obstructed bladder



- Very large distended bladder
- Anhydramnios
- Bladder outlet obstruction

Single Umbilical artery



Genitalia

Male

Female

Key points

1. Fetal kidneys are to be assessed in transverse and sagittal planes
2. Identification of the kidneys is by means of the renal capsule and the fluid in the pelvis
3. AP diam of Renal Pelvis > 7mm is abnormal
4. Liquor is an important determinant of renal function
5. Colour doppler of cord entry in the abdomen and para bladder helps identify umbilical arteries