

Ultrasound Scanning in Fetal Renal Pelvis Dilatation: not only Hydronephrosis

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Introduction

Routine fetal ultrasound has revolutionized management of pregnancies by improving accuracy of gestational age assessment and detection of fetal anomalies. But most findings considered "abnormalities" are probably normal variants with minimal or uncertain clinical significance. (1,2,3)

In each cases, an abnormal findings can affect parental attitude toward the pregnancy and their unborn baby (4,5). Therefore, it is important for the urologist and obstetrician to understand differential diagnosis and clinical implications in order to offer an accurate counselling to the parents.

Prenatal Hydronephrosis is the most common organ-specific fetal condition detected antenatally and one of the most difficult diagnostic challenges (6).

It occurs in approximately 1% of fetuses (range 0.6% to 4.3%) (7).

The diagnosis is based on an increased anteroposterior renal pelvic size in mm, with variable ascertainment criteria between studies.

Prenatal assesment with ultrasonography provides excellent imaging of fluid-filled structures and renal parenchima. This information leds to differential diagnoses and their ramifications.

The differential diagnoses can range from a self-limited condition without clinical significance (resulting in spontaneous resolution in early infancy, without long term sequelae) to condition that require post-natal treatment.

Discussion

There are many others factors investigated by ultrasound exam in order to assess hydronephrosis: fetal

wellbeing, gestational age, unilaterality versus bilaterality, amniotic fluid volume.

Prenatal hydronephrosis may be caused by various obstructive and non obstructive etiologies (8,9):

- ureteropelvic junctions obstruction
- vesicoureteral reflux
- ureterocele
- ureterovesical junction obstruction
- ectopic ureter
- posteriore urethral valves
- megacystis megaureter
- physiologic dilatation
- multicystic dysplastic kidney
- autosomal recessive polycystic kidney disease
- exstrophy
- Prune-Belly Syndrome

Ultrasound can scan more elements of fetal genitourinary abnormalities:

Hydronephrosis, its grade of severity, with pelviectasis and/or caliectasis;

Caliectasis : intrarenal dilatation

Pelvic anterior-posterior diameter

Renal parenchima echogenicity (less than liver or spleen)

Urothelial thickening

Duplication: separation of renal pelvic sinus echoes whitout hydronephrosis visualization

Renal cysts

Intravescical Cystic structures

Bladder filling: fill and void cycles

Bladder wall thickness

Oligohydramnios

The evaluation of these parameters can explain possible causes of these findings (obstructive/ non obstructive etiologies), may be helpful in predicting residual fetal renal function, in establishing neonatal outcome.

The threshold for the diagnosis of hydronephrosis is based on the recognition that renal pelvic diameter may vary with gestational age (10,11,12). There is considerable variation in the definition of prenatal hydronephrosis in the literature. Then this sign is assessed using the grading system (13): from grade 1 to grade 5, when it is associated with severe caliectasis and cortical atrophy.

A recent sysuematic review of cohort studies of fetus with renal pelvis dilatation (RPD) > 15 mm have shown that the risk of postnatal RPD and obstruction increased as the mean fetal renal pelvis increased from 5 to 15 mm. For a given measure of fetal renal pelvis, the risk of postnatal RPD decreased with gestational age at presentation (14,15,16,17,18).

Some studies evaluated increased renal echogenicity as a sonographic sign for differentiation between obstructive and non obstructive etiologies of fetal bladder distention (19). They found that the criteria of oligohydramnios

and increased renal echogenicity were highly predictive of an obstructive etiology; this has implications for prenatal and postnatal management. (20,21, 22).

The total volume of amniotic fluid is also an important factor in fetus with hydronephrosis (23).

By 16 weeks of gestation most of amniotic fluid is fetal urine. The volume increases until the end of second trimester at a relative constant rate, then it remains steady, and then decreases shortly before term (24). Oligohydramnios refers to a reduced amount of amniotic fluid, which results in pulmonary maldevelopment and somatic compression (25). This sign is due to obstruction and/or renal failure and represent an important prognostic factor for fetal outcome.

Fetal urologic abnormalities encompass a spectrum of disease processes that present a challenge for the pediatric urologist and obstetrician.

Knowledge about the specific conditions will help with prenatal counseling, determination of the need for therapeutic intervention in utero versus early delivery, and the postnatal evaluation and management of these condition.

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