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Original Research Paper

Anatomy

Postnatal Presentation of "Antenatal Hydronephrosis" - Anatomical and Embryological Perspective

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ABSTRACT Antenatal hydronephrosis is the dilatation of collecting system of fetal kidney and common anomaly detected during fetal ultrasonography. The condition may be unilateral or bilateral and usually resolves by birth or during infancy, while others may require intervention. CASE REPORT: Here patient was diagnosed with antenatal bilateral hydronephrosis on routine USG at 6 months of fetal life. At birth both kidneys were normal with no hydronephrosis as per USG findings done on 7th day. At 3rd month patient had febrile UTI with positive urine culture, USG showing left sided hydronephrosis with Antero Posterior diameter of 19 mm of renal pelvis, antibiotics were started and vesico-ureteric reflux was ruled off on Micturating Cyctourethogram. Patient was on prophylactic antibiotic and USG at 7 months showed AnteroPosterior diameter of 8mm of left kidney, she left antibiotic at 1 year of age . Patient is presently 16 months old , and she is doing well without antibiotic , her lt kidney AP diameter is maintained at 8mm.In most cases hydronephrosis resolves itself within 1 year postnataly, it is important to select an appropriate postnatal imaging and to follow up based on clinical scenario and to prescribe prophylactic antibiotics to those patients most likely to benefit and rule out if any surgical intervention is needed.

KEYWORDS : Hydronephrosis, Ultrasonography, Pelviureteric Junction, Mesenchyme, Mesonephric, Renal

Introduction:

Antenatal Hydronephrosis is defined as the dilatation of collecting system of fetal kidney which may be associated with dilatation of ureter 1. Fetal hydronephrosis is the most common anomaly detected on antenatal ultrasonography with 1-5% incidence 2. The condition can be unilateral or bilateral , bilateral condition is seen in 17-54% of patients and additional abnormalities may be associated [3].

In more than 50% of cases the antenataly detected dilatation is transient and resolves spontaneously .Antenataly detected dilation which persists after birth is termed as neonatal hydronephrosis1,4. The Usual Causes of antenatal hydronephrosis are Pelviureteric junction obstruction ,Vesicouretric reflux ,Vesicouretric Obstruction ,Multicystic Kidney, Posterior urethral Valves,Obstructive and non obstructive megaureter, Ureterocele, Neurogenic bladder, Prune belly syndrome and Urethral Atresia . Pelviuretric junction obstruction accounts for 50-60 % patients with neonatal hydronephrosis1. While vesicouretricreflux is detected in 20-30 of the cases [5].

A maximum antero posterior diameter of renal pelvis of more than 10 mm or the ratio of antero posterior diameter of renal pelvis to kidney of more than 0.5 after 30 weeks of gestation require evaluation [6].

The hydronephrosis is graded on the basis of Anteroposterior diameter . APD during second trimester of <7mm is considered as mild, between 7-10mm as moderate and more than 10mm is considered as severe . APD during third trimester of <9mm is considered as mild, between 9-15mm as moderate and >15mm as severe[7].

Case report

A 3 months old female infant was bought to OPD with symptoms of High grade Fever, Foul smelling urine, Poor feeding and Lethargy.

Previous History : Patient was diagnosed with antenatal bilateral hydronephrosis on routine antenatal USG.USG finding at 26 weeks gestation showed Bilateral hydronephrosis ,left kidney APD 11mm, Right kidney APD 9mm, as shown in fig 1(a).

At birth Patient was admitted in hospital and USG was done on 7th day of life,USG findings were as follows : Both kidneys normal with no hydronephrosis. Kidney Function Test was done and was within normal range, Patient was discharged with no medication.

Investigations:

Following investigations were done on admission which showed on urine routine :Pus cells 35-40 HPF and Urine Culture was positive for E coli .

Ultra Sonogram showed left kidney grade I hydronephrosis with anteroposterior diameter of 19 mm of renal pelvis. Cortical thickness of 11mm. Right kidney normal with no hydronephrosis. Micturating CystoUrithogram was done and it was Normal Vesicouretric reflux ruled out as shown in fig 1 (b).

Management:

Patient was put on IV antibiotics for 5 days followed by oral antibiotics till urine culture came negative.Patient was discharged home and was put on prophylactic oral antibiotics (nitrofuration 5 ml OD) and parents were advised to keep check on any sign of UTI .Patient was advised for USG after every 2 month. Repeated USG were done :

USG 6months of age showed left kidney with grade I hydronephrosis with APD of renal pelvis -14 mm , cortical thickness of left kidney was 12mm .Left kidney measuring 64x24mm, Right kidney normal with no hydronephrosis.

USG 8 months of age showed left kidney Grade I hydronephrosis with APD of 08mm of renal pelvis , cortical thickness of left kidney was 14 mm, Lt kidney measuring 64x31mm.

USG at 12 months of age had findings as left Kidney grade I hydronephrosis with APD of 08mm of renal pelvis, cortical thickness was 15 mm , left kidney measuring 66×25mm.

At 12 months of age patient left antibiotic , she is now 16 months old and doing good without antibiotics , APD of renal pelvis is maintained at 8mm , as seen on USG done on 15 months of age fig 1(c) (Renal APD of less than 8 mm is considered normal in neonatal life),and cortical thickness of kidney is increasing . Patient is advised USG after every 6 months.

Embryological basis

The ureteral bud arises from mesonephric (wolffian) duct during 5th week of gestation .It penetrates mesenchyme on the nephrogenic ridge, which is known metanephricblastema and induces differentiation into renal parenchyma .Most nephrons are present by the middle of the second trimester , and differentiation is completed by 36 weeks gestation .The ureteral bud undergoes approximately 15 generations of division to complete the collecting system from collecting tubules proximally to hemitrigone of the bladder distally.The ureter begins development as solid cord of tissue that lengthens and canalizes during development.The placenta functions as the fetal hemodialyser , fetal kidneys produces hypotonic urine between fifth to ninth week of gestation and increases throughout gestation to reach rates as high as 50 ml/h, therefore a deficiency at any point along the urinary tract can lead to transient or permanent , partial or complete obstruction of urine flow, causing proximal dilatation of collecting system that manifest as antenatal hydronephrosis. Ultrasonography can detect the fetal kidney and bladder by15 weeks gestation and distinguish a central echo(renal sinus) by 18-20 week. At 20 weeks fetus is larger and an anomaly is easier to detect8,9)

Conclusion:

Fetal hydronephrosis is a common congenital anomaly seen in 1% of all pregnancies , usually detected by fetal ultrasound .50% of cases are transient and resolve spontaneously.Routine ultrasound screening of pregnant women has led to an increase in the number of detected renal anomalies.A single ultrasound in the first week of life might not detect all abnormalities of the kidney due to low urine flow secondary to dehydration and low GFR . A ultrasound at 6 weeks is more sensitive and specific .Detection of antenatal dilatation of the urinary tract does not always indicate postnatal urinary tract obstruction.10% of the cases have transient worsening at some point, they all ultimately resolve.Prophylactic antibiotic should be administered to all neonates with hydronephrosis for initial 3 months. In absence of VUR prophylactic antibiotics should be discontinued after one year of age.Kidneys with renal pelvic diameter of more than 20mm are more likely to show deterioration in renal function.It is important to select appropriate imaging studies and follow up based on clinical scenario and prescribe prophylactic antibiotics to those patients most likely to benefit.Infants with symptomatic hydronephrosis (recurrent UTI , palpable lump, hematuria, hypertention) should undergo surgical intervention

Figures:

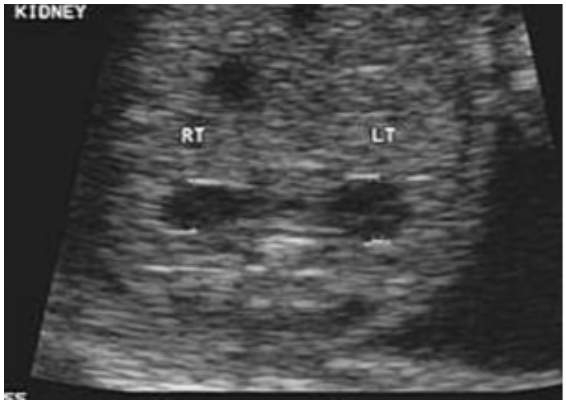

Fig 1(a):USG Showing Bilateral hydronephrosis, left kidney APD 11mm, Right kidney APD 9mm.

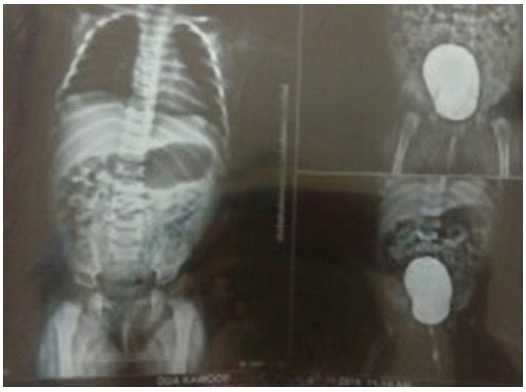

Fig 1 (b): Micturating cystourithogram reflux absent

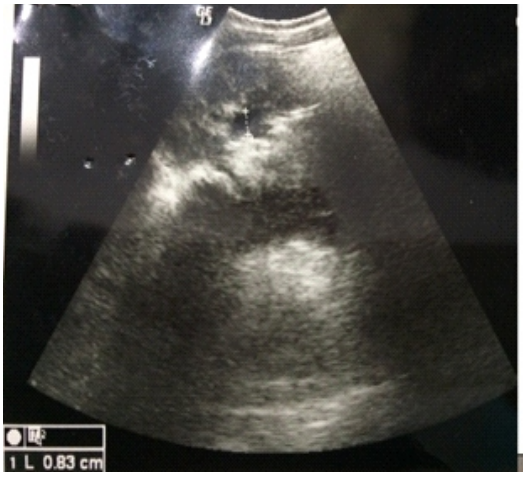

Fig 1 (c) USG showing Left kidney APD of 8mm .

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