ORIGINAL ARTICLE

ULTRASOUND DETECTION OF RENAL ANOMALIES ANTENATALLY AND POSTNATAL OUTCOME

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ABSTRACT: OBJECTIVES: To study the outcome of antenatally detected fetal renal tract anomalies by II/III trimester ultrasound and its co-relation postnatally. **METHODS:** Prospective longitudinal study between Jan- Dec 2009 conducted at Govt. Medical College Kozhikode, Kerala, India. 100 antenatal women with isolated renal anomaly in II/III Trimester were followed up. On confirmation of anomaly, renal function tests, MCU and isotope scanning were done as indicated. Neonates were scanned at end of first week of life Post natal follow up ranged between 6 weeks to 8 months. **RESULTS**: The incidence of fetal urinary tract anomalies was 0.75%. 88% were male babies, 45% had bilateral renal involvement. Hydronephrosis was the most common abnormality detected (79%) with good co-relation with final diagnosis (p=0.00001).On evaluation of babies with moderate -severe hydronephrosis; persisting abnormality was seen in 17.4% and 1.1% respectively. 20% (19) of babies with severe abnormalities needed confirmatory tests and 10% (10) had elevated RFT (p=0.0092) and UTI (p=0.001). 8.6% (8) of babies needed surgical intervention (PUV-6,Grade V-VUR-1,Duplex collecting system-1). **CONCLUSIONS**: Majority of renal anomalies found in male babies. Mild hydronephrosis resolved in 85%. Moderate - severe hydronephrosis associated with pathology postnatal. Valve ablation in PUV and unilateral MCDK showed good prognosis.

KEYWORDS: Renal anomalies, Hydronephrosis

INTRODUCTION: Interest in fetal development has grown enormously in the past decades. With the introduction of routine prenatal ultrasound scanning since early 1990's; it has become possible to diagnose anomalies in utero. The first report of antenatal detection of fetal renal anomalies dates back to 1970 (Garrette et al). Anomalies of the urinary tract are the largest group of anomalies diagnosed by ultrasound in pregnancy.

It corresponds to 20-25% of all antenatally diagnosed anomalies.[1,2] The prevalence of renal anomalies is 1 in 250-1 in 1000 deliveries[3] with a detection rate of 90%. Hydronephrosis is the most common anomaly detected.

With modern high resolution scans, fetal kidneys can be evaluated by 12 weeks of pregnancy and urinary bladder can be identified by 13 weeks.[4] The kidneys and urinary bladder can be almost identified by 16 weeks. In longitudinal section, the kidneys are as bilateral elliptical structures and in transverse section, they have a circular appearance adjacent to the lumbar spine. A normal amount of amniotic fluid implies the presence of at least one functioning kidney and a patent urinary conduit to the amniotic cavity. Although fetal kidney size increases with

gestational age, the kidney circumference to abdominal circumference ratio remains constant at 0.27-0.3 throughout gestation.

The severity of renal tract disorders ranges between lethal disorders (with genetic syndromes or chromosomal defects) to transient, mild renal pelvic dilatation in an otherwise normal fetus and an excellent prognosis.12% of fetuses with renal anomalies may have associated chromosomal abnormalities.[5] Abnormalities in renal tract can be classified as,

A. **Renal tissue abnormalities:** a) Abnormalities of number: i) Renal agenesis - Inability to image kidneys, severe oligiamnios and an empty urinary bladder are the most common sonographic findings of renal agenesis. Absence of renal arteries on colour Doppler may assist in identification of renal agenesis.[7] ii) Duplex kidney-This occurs when the kidney is divided into two separate pelvicalyceal system with duplication of ureter either complete or partial.
B. **Abnormalities of position:** a) Ectopic kidney-Abnormal position may be pelvis, iliac region, abdominal, thoracic, and contralateral or crossed. Empty renal fossa with normal amniotic fluid is renal ectopia.

Many patients with antenatally detected urinary tract anomaly can be managed conservatively both pre and postnatally. In some cases intrauterine interventions has been attempted but the results have not been promising. However conservatively treated patients need regular follow up. Surgical correction is required in those cases where renal function is poor or at risk of declining. Surgical management is multidisciplinary approach involving the obstetrician, pediatrician and pediatric urologist.

The greatest advantage of antenatal detection of renal anomalies can be managed immediately after birth, before possible damage due to urinary tract infection develops.

AIM: To study the outcome of antenatally detected fetal renal tract anomalies by II/III trimester ultrasound and its co-relation postnatally.

MATERIAL AND METHODS: Prospective longitudinal study between Jan- Dec 2009 conducted at Govt Medical College Kozhikode. 100 antenatal women with isolated renal anomaly in I/II TM were followed up. Neonates were scanned at end of first week of life. On confirmation of anomaly, renal function tests, MCU and isotope scanning technetium-99m-Dimercaptosuccinis acid [^{99m} Tc] (DMSA) or technetium-99m-diethylene triamine pentaacetic acid [99mTc] (DTPA) were done as indicated. Post natal follow up ranged between 6 weeks to 8 months.

RESULTS: The incidence of fetal urinary tract anomalies was 0.75%. Worldwide incidence 6.4%[8] Hydronephrosis was the most common abnormality detected (79%) with good co-relation with final diagnosis.(p=0.00001) On evaluation of babies with moderate-severe hydronephrosis, persisting abnormality was seen in 17.4% and 1.1% respectively. 20% (19) of babies with severe abnormalities needed confirmatory tests and 10% (10) had elevated RFT(p=0.0092) and UTI (p=0.001). 8.6% (8) of babies needed surgical intervention (PUV-6, Grade V-VUR-1,Duplex collecting system-1). (Fig 1)

DISCUSSION: Information published by Cornell University states that hydronephrosis is the most commonly detected fetal kidney disease, affecting about 1.4 percent of unborn babies. Kidney dysplasia usually only affects one kidney, so the baby can develop normally using the remaining healthy kidney. If both kidneys are affected, the fetus usually does not survive, and if he does live he will need dialysis and a kidney transplant. Kidney dysplasia can be inherited or it can be caused by the mother's use of illegal drugs or prescription medication used to treat seizures and high blood pressure.

Several potential maternal risk factors for renal anomalies are gestational diabetes, obesity, maternal smoking, alcohol ingestion, caffeine consumption during pregnancy. In this study 9% of mothers had Gestational diabetes mellitus. Moore L L[9] in their study found that pregnancies of women who were both obese and diabetic were 3.1 times as likely to produce off springs with renal anomalies.

Hydronephrosis was the most common anomaly detected antenatally, 79% of which were mild, 29% moderate and 8% severe. In a study by Sairam etal, mild hydronephrosis present in 80% and moderate- severe in 20%. Uniateral MCDK (Multicystic disease of kidney) was the most common cystic abnormality detected in this study with male to female ratio of 4:1. Management was conservative in all these cases. Lethal renal anomalies are associated with severe oligoamnios and carries poor prognosis.88% of our babies with renal anomalies were male and 8 % females (Fig 2).60 % of infants were male in a study by Ai A etal.[10]

In the post natal period there was complete resolution in 41.3% of which majority were mild hydronephrosis. PUJ obstruction was the cause of hydronephrosis in 5.4%.Majority of the babies were managed conservatively those babies with severe hydronephrosis six cases needed surgical management included 6 posterior urethral valve(PUV),1 vesico-ureteric reflux and one had duplex collecting system. The urinary stream and renal functions of all babies with PUV improved after valve ablation. V Bhatnagar et al in their study on 23 patients on PUV found that after endoscopic valve ablation all babies had good stream of urine.[11]

CONCLUSIONS: Antenatal ultrasound is an effective tool for screening fetal urinary tract abnormalities with majority being diagnosed in third trimester. The prognosis of prenatal diagnosed fetal renal anomalies depends on specific anomaly detected. Lethal anomalies like renal agenesis, bilateral polycystic kidneys carry poor prognosis. Mild hydronephorosis resolves spontaneously in the post natal period. Moderate- severe hydronephrosis may be associated with pathology postnatally and need investigations. Valve ablation in posterior urethral valve improves renal function. Unilateral MCDK shows good prognosis with conservative treatment.

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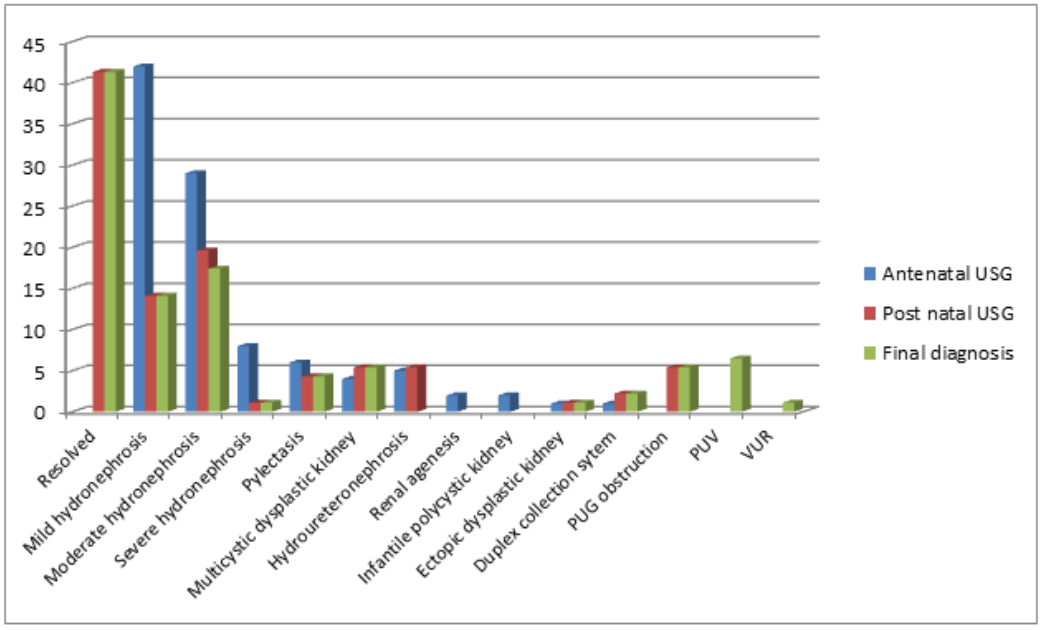

Fig. 1: Renal anomalies and Follow

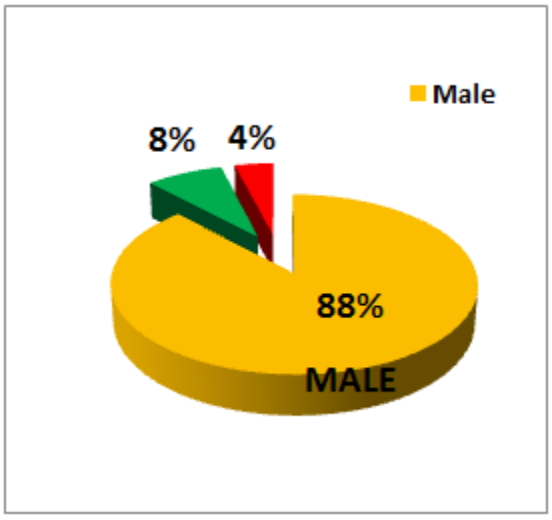

Fig. 2: Sex of babies

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