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ongenital Anomalies of Renal and Urinary Tract : Antenatal Diagnosis

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BJECTIVES – To diagnose congenital anomalies of renal and urinary tract by routine antenatal ultrasonography. **IETHOD** – A prospepctive study was done over a period of 4 ½ years. The study population consisted of families of serving soliders. **RESULTS** - A total of 2490 women underwent 3952 obstetric sonograms. Congenital anomalies of renal and urinary tract were present in 14 (0.56%) fetuses. Mean gestational age at diagnosis was 27.8 weeks (range 22 to 34 weeks). The following anomalies were found: unilateral renal agenesis (02), multicystic dysplastic kidney disease (05), unilateral vesicoureteric junction obstruction (01), unilateral pelviureteric junction obstruction (01), bladder out flow tract obstruction (01), echogenic kidney (bilateral) (01) and congenital hydronephrosis (03). All cases of multicystic dysplastic kidney disease had associated oligohydramnios. Oligohydramnios was found to be an indicator of poor prognosis. **CONCLUSION** – Careful screening for anomalies of renal and urinary tract should be part of routine obstetric sonograms.

Key words : congenital anomalies, urinary system, antenatal ultrasonography

Introduction

Routine use of high resolution ultrasonography in antenatal care has led to frequent discovery of fetal anomalies at an early stage[1,2,3] .Evaluation of the fetal genitourinary system is now an important component of fetal anomaly scans. Of all the fetal anomalies 30-50% are related to genitourinary tract[4]. The incidence of clinically significant congenital anomalies of the renal and urinary tract (CARUT) varies widely from 0.2% to 14% of all gestations[5,6]. Early detection of CARUT enables to start the treatment in utero, modify obstetric management, facilitate pediatric and surgical care of the new born or even allow for elective termination of pregnancy in case of fetal anomaly[7]. We wish to share our experience of CARUT during routine antenatal ultrasonography over a period of 4 ½ years.

Materials and Methods

Between April 1999 and Oct 2003, 2490 women underwent 3952 obstetric sonograms. All were from families of serving soldiers representing a cross section of various regions of India. All women were referred by obstetricians for routine antenatal sonography. Ultraonographic (USG) studies were carried out by a radiologist in the radiodiagnosis department. As a routine, women reporting to the antenatal clinic had at least one ultrasonographic examination between 18-30 weeks. Those who registered late or those who reported from other stations were asked to undergo antenatal ultrasonography on the day of first reporting. All USG examinations were carried out with 3.5 MHz/5MHz convex probe (Wipro GE: RT 3200 Advantage II and LOGIC α 100 V_4). Besides screening for fetal maturity and position, special emhasis was laid on anomaly scans. Fetal kidneys, urinary bladder and ureters were examined in all. Women and amniotic fluid volume recorded. Whenever an anomaly was suspected it was confirmed by a subsequent elaborate scan within the next 2-3 days. All subjects positive for anomaly scan were followed up every fortnight or even earlier whenever indicated to assess serial progress till the final outcome. All abnormal scan findings were tabulated and recorded. At the end of the study period these data were analyzed.

Results

The age group ranged from 19 to 38 years (mean age 24 years), 31% were primigravidas and 14 (0.56%) fetuses were found to have an abnormal scan for the urinary system. Two fetuses had unilateral renal agenesis, while five had multicystic dysplastic kidney disease (MDCDKD), (unilateral: three, bilateral: two). One of the following conditions was found in each of the five fetuses unilateral vesicoureteric junction obstruction, unilateral pelviureteric junction (PUI) obstruction, bladder out flow tract obstruction (?posterior urethral valve) and bilateral echogenic kidneys. Hydronephrosis was detected in three fetuses (Photographs 1 to 4). Mean gestational age at diagnosis was 27.8 weeks (range 22 to 34 weeks). Out of the five fetuses with MCDKD) four ended up with spontaneous abortion and one had therapeutic termination of pregnancy. All fetuses with MCDKD were associated with oligohydramnios. There were eight live births. Transient dilatations of the renal pelvis which were found in 59 (2.3%) fetuses, mostly in the third trimester, were not detectable postnatally.

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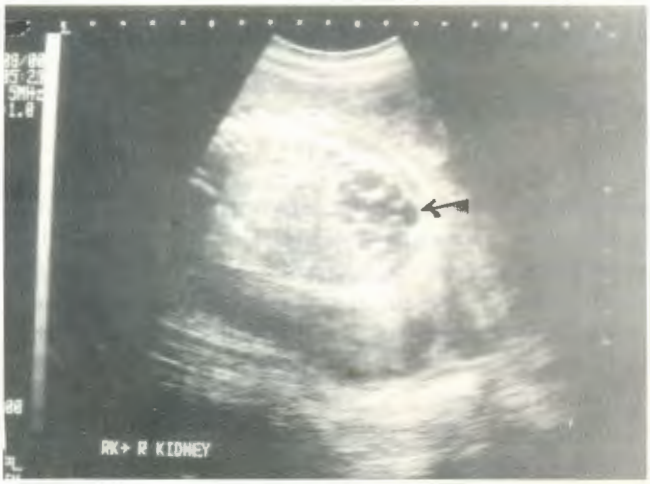
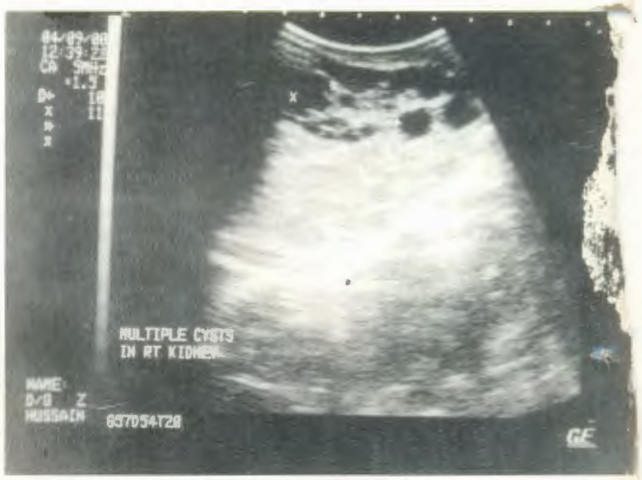
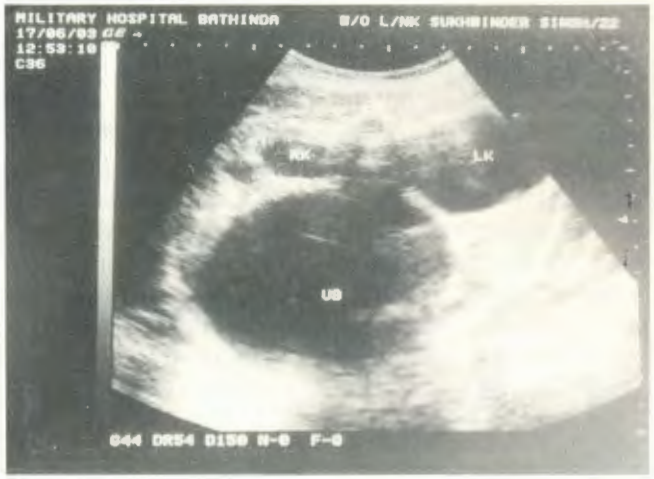


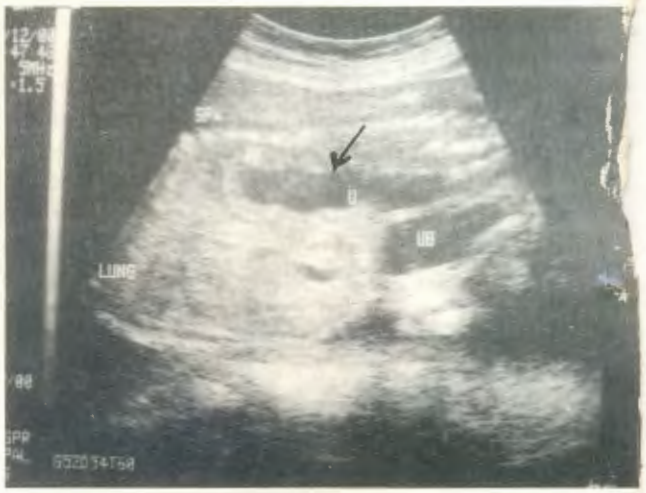
Photograph 1A . Multicystic dysplastic kidney disease : antenatal USG at 24 weeks



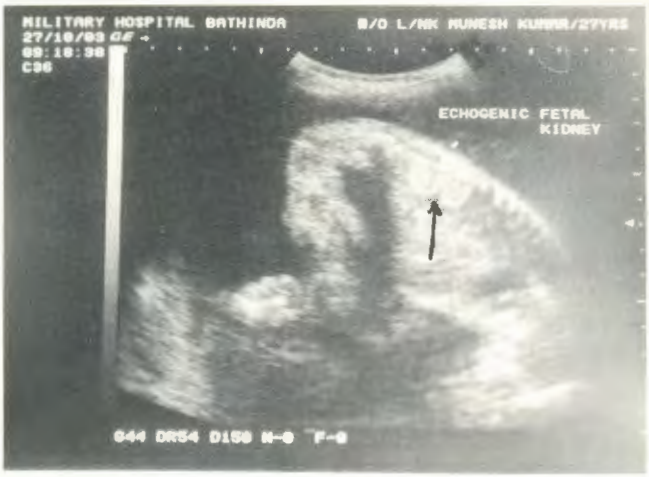
Photograph 1B . Postabortal USG of the same fetus showing multiple cysts in the kidney



Photograph 2. Vesicoureteric junction obstruction : antenatal USG at 28 weeks showing dilated ureter and hydronephrosis.



Photograph 3. Bladder outlet obstruction: Note dilated urinary bladder and bilateral hydronephrosis.



Photograph 4. Echogenic fetal kidney : USG at 26 weeks

Table I : Congenital anomalies of renal and urinary tract

Type of anomaly/ No. of Cases	Cases	Diagnosed at gestational age (weeks)	Associated anomalies	Amniotic Fluid	Outcome	Remarks
Agenesis of unilateral kidney 02 cases	Case 1	27	Nil	Normal	FTND	Confirmed post-natally in both cases
	Case 2	32	Nil	Normal	FTND	
Multicystic dysplatic kidney a) Bilateral 02 cases	Case 1	24	Dilated bowel loops. IUGR of 03 weeks	Oligohydramnios	Spontaneous, abortion at 27 weeks of gestation	History of consanguinity. Lost to follow-up
	Case 2	26	Dilated bowel loops IUGR of 03 weeks	Oligohydramnios	Spontaneous abortion at 30 weeks of gestation	Post-abortion : diagnosis confirmed
b) Unilateral 03 Cases	Case 1	26	Contralateral kidney echogenic	Oligohydramnios	Spontaneous abortion at 28 weeks	Post abortion : large cleft palate found
	Case 2	22	IUGR of 04 weeks	Oligohydramnios	Therapeutic termination at 24 weeks	Post abortion : bilateral CTEV and imperforate anus found
	Case 3	27	Nil	Oligohydramnios	Spontaneous abortion at 32 weeks	Post abortion : unilateral CTEV found
Vesico ureteric junction obstruction (unilateral) 01 case		28	Nil	Normal	FTND	Confirmed postnatally, MCU ruled out vesico-ureteric reflux
Unilateral PUJ obstruction 01 case		34	Nil	Normal	FTND	Confirmed postnatally. Planned for surgery
Bladder out flow tract obstruction (?PUV) 01 case		34	Nil	Normal	FTND	Operated upon immediately after birth at a tertiary care hospital. Lost to follow-up.
Echogenic kidney (bilateral) 01 case		26	Dilatation of lateral ventricles. IUGR : 03 weeks	Polyhyydramnios	Spontaneous abortion at 32 weeks	Abortion took place in the village. Abortus could not be examined.
Hydronephrosis a) Unilateral 02 cases	Case 1	28	Nil	Normal	FTND	On follow up of three months hydronephrosis regressed.
	Case 2	26	Nil	Normal	FTND	Hydronephrosis regressed over six months postnatally.
b) Bilateral 01 case		30	Nil	Normal	FTND	Diagnosis confirmed post natally. Cause of hydro-nephrosis not known

FTND : Full term normal delivery
CTEV : congenital talipes equino varus
PUV : posterior urethral value
PUJ : pelvi ureteric junction

Additional abnormalities missed during antenatal ultrasonography were deep cleft palate, bilateral congenital talipes equino varus (CTEV), unilateral CTEV and imperforate anus each in one fetus. The neonate with bladder out flow tract obstruction was operated upon during the immediate postnatal period in a tertiary care center, but was lost to follow-up. Surgery was scheduled for the neonate with unilateral PUJ obstruction at a tertiary care Armed Forces Hospital.

Discussion

Anomalies of the fetal urinary system are common[2]. High resolution antenatal ultrasonography enables us to follow the changes of nephrogenesis from early second trimester onwards. Increasing experience with prenatal ultrasonography has led to discovery of more and more milder forms of CARUT which otherwise may go unnoticed even after birth. Anomalies like renal agenesis, obstructive uropathies, dysplastic diseases may be clinically silent but readily diagnosed by antenatal ultrasonography. Prenatal sonography not only allows detection of structural aspect of CARUT but also enables diagnosis of associated anomalies. The incidence of CARUT found in our study is the same as that noted by Dillon and Ryall[8] although our study population was smaller. All five fetuses with MCDKD were associated with oligohydramnios and varying degrees of IUGR. Associated anomalies were also more with this particular condition. Oligohydramnios seems to be an indicator of poor prognosis. This has been highlighted by earlier authors[2,6,7]. Certain associated anomalies like cleft palate, CTEV and imperforate anus were all missed by us on antenatal ultraonography. One reason for not having been able to diagnose these conditions may be presence of oligohydramnios, making it difficult to visualize all the organs. A 3D ultrasonographic study may be a better option for detecting such associated anomalies. We also feel that one may be able to diagnose these conditions antenatally with more exposure and experience in this field. Needless to say that one must have a very strong index of suspicion for picking up such anomalies antenatally. One fetus with bilateral increased renal echogenicity had dilatation of both lateral ventricles. We could not establish the cause for dilatation of lateral ventricles. One fetus with unilateral renal agenesis, one with unilateral PUJ obstruction and one with bladder out flow tract obstruction were diagnosed between 32 and 34 weeks of gestation at the time of first reporting. They could have been diagnosed much before had they reported at an earlier stage of gestation. Our women are unique in the sense that they represent a cross section of various regions of our country rather than being from one small locality.

Careful evaluation and accurate prenatal sonographic characterization of renal abnormality is essential for fetal prognosis and management and should be a part of routine obstetric sonograms. The value of antenatal sonography lies in the fact that it alerts the parents and prepares the pediatrician for the management of possibly serious neonatal problems and allows for elective termination of pregnancy with fetal anomalies.

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