ORIGINAL ARTICLE

A STUDY OF RENAL ANOMALIES

Komarabattina Rattaiah[1], Kotikala Prabhakara Rao[2]

HOW TO CITE THIS ARTICLE:
Komarabattina Rattaiah, Kotikala Prabhakara Rao. "A Study of Renal Anomalies". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 08, February 23, 2015; Page: 946-951.

ABSTRACT: INTRODUCTION: The subject of congenital renal anomalies including their incidence had created much interest to scientists in late 1950's & 1960's with the aim of prevention and curing them & inculcate knowledge to Urologists & Surgeons. **MATERIALS AND METHODS:** The present study is undertaken on congenital renal anomalies of 176 kidneys from cadavers, 60 from sonograms and 40 from stillborn fetal kidneys; SMC Vijayawada and KMC Warangal. **RESULT AND DISCUSSION:** In the present study renal specimens of fetal kidneys show unilateral agencies[1] of specimen no 176; the cause is due to involution of multi cystic or dysplastic kidney[2] occurs in the 4th week of gestation affecting mesonephric duct and its ureteric bud. Congenital anomalies of the urinary tract rank third or fourth in position, seen in 2 to 3% of population and the study being useful for clinicians and urologists at large.

KEYWORDS: Adult and fetal renal anomalies, unilateral renal agenesis [URA], bilateral renal agenesis [BRA], ultrasonograms, cadavers.

INTRODUCTION:

- The subject of kidney anomalies[3] including their incidence has created much interest to scientists in the late 1950's and 60's with the aim of prevention and curing them as much as possible.
- Knowledge about their incidence particularly helps us to know how frequently they are seen in the population and makes us to search the possible etiological factors for such high occurrence.
- Embryology[4] explains the etiological factors of many birth defects including the anomalies of the kidney and among the explained many are due to various genetic and environmental factors such as physical, chemical, nutritional and biological factors causing mutations in the genes and affecting the development at various stages of foetal growth. It is the intricate action between the differentiation and maturation of the organ systems of the body.
- An attempt has been made to know the various anomalies.
- The study has been taken up with the fond hope of helping the clinicians, sonologists, and surgeons during their routine work.
- For the incoming post graduates to apply this knowledge in their research works.

EMBRYOLOGICAL BASIS:

- The absence of a nephrogenic ridge on the dorso lateral aspect of the coelomic cavity. The failure of ureteral bud to develop from the wolffian duct leads to agenesis of the kidney. The absence of both the, therefore requires a common factor causing renal or ureteral mal development on both sides of the midline.

- The embryologic basis for URA does not differ significantly from that described for the bilateral type. The fault lies most probably with the ureteral bud. Complete absence of bud or aborted ureteral bud development prevents maturation of the metanephric blastoma into adult kidney tissue.
- The sequence of interdependent events involved in ureteral bud formation and Meta nephric blastoma development, which is required for the maturation of the normal kidney, probably also allows for the occurrence of a supernumerary kidney. It is postulated that a deviation involving both of these processes must take place to create the anomaly. A second ureteral bud appears to be a necessary first step. Next step the nephrogenic anomaly may divide into two metanephric tails, which separate entirely when induced to differentiate by the separate or bifid ureteral buds.

REVIEW OF LITERATURE:

- Longo and Thompson in 1952 described clinical incidence of urogram of unilateral agenesis at Mayo clinic is 1 in 1500.
- Ghose in 1954 described the incidence of congential absence of kidney[5,6,7] as 1:2000.
- Welchil in 1959 in a study of 20 cases came to a conclusion that bilateral renal agenesis was associated with a characteristic facies know as potter facies. (The newborn appears prematurely senile and has low set ears, bowing and clubbing of lower extremities, claw like hands). Associated anomalies were partial or total absence of ureters;[8] hypoplastic bladder if present; absence of ureters; hypoplastic bladder if present; absence of identifiable renal arteries.
- Ashley and Mostuffi in 1960 studied 47 cases of bilateral renal agenesis. Only few new borns lived for a day with bilateral renal agenesis.[9,10]
- Doroshow and Abeshouse in 1961[11] reported that the incidence of unilateral renal agenesis (URA) was 1:1100 in births with male to female ratio of 1,8:1(male predominance).
- Semmen in 1962 described that 43% of women with congenital anomalies have unilateral renal agenesis.[12]
- Amin Barkert and main seikely in 1986 stated that anomalies of the urinary system rank 3rd & 4th position among all congenital anomalies and occur in 10% of population. They stated also that about 3-4% of population suffer with upper urinary tract anomalies were due to teratogenic factors. According to them critical period of urinary tract was 15-94 days. Insults after 24weeks were less likely to cause urinary anomalies.
- Lynch in 1998 reported a foetus with an unusual combination of features including bilateral renal agenesis, hydrops, cardiac hypertrophy and pancytopenia. He suggested foetal blood sampling to be considered in similar cases of BRA.

MATERIALS & METHODS: The present study has been undertaken on 76 kidneys from cadavers and 60 from sonograms and 40 from foetal kidneys. The study was started and finished in a period of 2 years. The specimens from cadavers were obtained from Siddhartha Medical College, Vijayawada and Kakatiya Medical College, Warangal. The sonograms are obtained from Govt. general hospital Vijayawada from the in and out patients attending Radiology department.

The parameters like weight, length, breadth of the kidney and the breadth at the superior pole, inferior pole and at the hilum are identified and the photographs are taken in- situ where ever necessary. The parameters were taken, anomalies noted and detailed diagrams were drawn.

Screening of the general population by non-invasive imaging produces like plain X-ray of kidney, ureter and bladder (KUB), ultra sound of the abdomen, etc.

Screening of patients attending various outpatient (OP) departments of the hospitals.

Looking for any renal anomalies during various genitourinary abdominal operative procedures and noting down the incidence.[13]

Cadaveric studies including fetal dissections, fetuses were obtained from GGH Vijayawada. It should be emphasized once again that the incidence of congenital anomalies varies greatly depending upon the methodology adopted for the study. For example Hollinshed (1956) and K. Mortn (1958) observed renal anomalies in 2-3% of all operations and 0.5 to 1% in all autopsies respectively.

The present study was conducted on:

- 76 adult cadavers.
- 20 still born foetuses of kidney - specimens of 40.
- 60 kidneys from patients attending general outpatient department of GGH, Vijayawada [sonographic study].
- Screening of patients for any renal anomalies, who were attending urological outpatients.

DEPARTMENTS:

1. **Anomalies:**
   Cadavers of anatomy dissection hall and autopsy: 76 specimens were studied and the study of upper urinary tract was undertaken in detail, after noting the Sl. No, Sex, parameters. Anomalies were studied and photographs were taken:

Unclaimed still born fetus: 40 specimens were studied after noting the following particulars.

- Sl. No:
- Approx. age of fetus
- Sex of fetus
- Parameters:
- Anomalies

PROCEDURE: the abdomen was opened by right para median incisions and two parallel transverse incisions, which were taken at the end of the right para median incision. The superficial viscera were studied in detail and the anomalies if any were noted. Next the coils of small intestines were removed from abdominal cavity to get a clear view of the posterior abdominal organs.

The size, shape and position of the kidney were recorded. The hilum of the kidneys and the structures in relation to it were noted down. Next the pelvic viscera, diaphragm, great vessels were examined for any anomalies.

OBSERVATIONS: In the present study 176 specimens of kidneys were studied out of which 40 were foetal specimens and the rest were adult specimens/images from cadavers and sonograms

The following observations were made:

Aberrant renal arteries- 12
Aberrant renal viens-2
Hypo plastic kidneys – 10
Lobulated adult kidneys -5
Hydronephrosis -10
Renal agenesis of the left kidney[13]- 176
Rest were renal calculi.

DISCUSSION: In the present study a fetal kidney showed unilateral agenesis; specimen: No.176.URA[2] is more common than BRA.[14,15] They are due to involution of a multi cystic or dysplastic kidney before birth (Mesrobin et al, 1933; Hitchcock and Burge.in 1994 Eophytous undertaken a family study where the grandfather andfather[16] have a unilateral renal agencies according to Doroshow & Abeshouse 1961 URA occurs in one among 1100 births with a higher incidence in males (Doroshow & Abeshouse). Wolffian duct differentiation occurs early in the male than does mullerian duct development in the female, taking place closer to the time of ureteral bud formation. The ureteral bud is more influenced by the abnormalities of wolffian duct and hence more in males. Absence of one kidney[17] was also more frequent on the left side. In the present study unilateral agenesis was observed in a male on the left side.

- Doroshow -1:1100 - 0.09%.
- Present study - 1:176 -0.5%.

SUMMARY AND CONCLUSION: It is of interest to note that congenital anomalies were noted from as early as 460-377 B.C. It is started that anomalies of the urinary tract rank 3rd or 4th in position and they constitute 3-4% of the total congenital anomalies and seen in 2-3% of the population.

The present study is confined mainly to study various anomalies of kidney. The study was undertaken in 176 specimens, which includes cadavers (including fetuses) and sonograms.

Further in the present study, a foetal kidney showed unilateral agenesis.

To conclude the findings of the present study may be useful to clinicians and urologists at large.

REFERENCES:

1. Ashley DJB, Mostofi FK: Renal agenesis and dysgenesis. J. Urol 1960; 83:211.
2. Boulgaknew in 1929 observed a neonate born with complete absence of kidney, ureters, bladder, urethra, external genitalia and anus; Campbell urology page 1712.
3. Burnell & Kent, 1950, unilateral renal agenesis, embryology for surgeons, 443.
4. Bawden M ed J. Australia, 1949, Congenital absence of kidney, Journal of Surg. Obst & Gyneac. 1949.

5. Collins DC: Congenital absence of one kidney: unilateral renal agenesis, Ann surg 1928; 88:1039.
6. Collis in 1932 reported about unilateral renal agenesis. Campbell Urology. Page 1712.
7. Edith L potter, 1965, Bilateral agenesis of Kidney and absence of ureters, The Journal of Surg. Obst & Gyneac., 1965.
8. Georgieff MK, Petry CD, Wobken JD, Oyer CE: Liver and brain iron deficiency in new born infants with bilateral renal agenesis. Pediatr pathol lab med 1996; 16 509-519.
9. Doroshow LW, Abeshouse BS: Congenital unilateral solitary kidney: Report of 37 cases and a review of the literature. Urol Surv 1961; 11: 219.
10. Schumacker HB: Congenital anomalies of the genitalia associated with unilateral renal agenesis. Arch Surg 1938; 37: 586.
11. Glastone, R.J. (1915). A case of congenital absence of left kidney and ureter. J. Anat. Physiol, 69: 418-428.
12. In 1947 Auer reported cases of bilateral renal agenesis.
13. Davidson & Ross, 1954, Bilateral renal agencies, Embryology for Surgeons, 443.
14. Stella A: Hereditary renal agenesis. Minerva Ginecol 1998; 50: 255-259.
15. Gutierrez R: Surgical aspects of renal agenesis: with special reference to hypoplastic kidney, renal aplasia, congenital absence of one kidney; Arch Surg 1933, 27: 686.
16. Lyon, Jr M.W. (1917) An hereditary case of congenital absence of one kidney. Anat. Rec. 13: 303-304.
17. Mc Nally. A (1932) unilateral renal agenesis: Case report with resume of nineteen additional cases from the literature. J. Urol 28: 289-296.

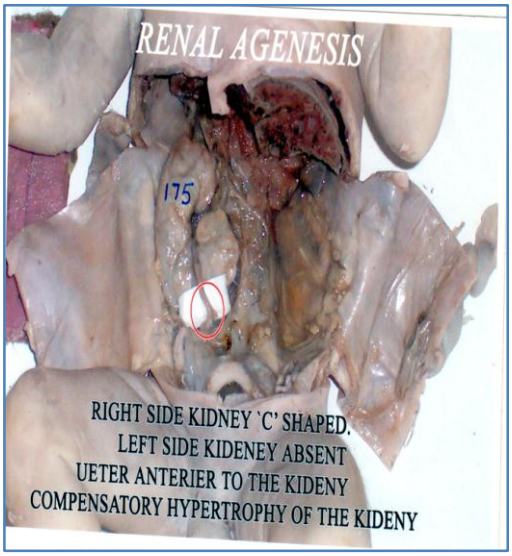

Figure 1

ORIGINAL ARTICLE

AUTHORS:

1. Komarabattina Rattaiah
2. Kotikala Prabhakara Rao

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Anatomy, Katuri Medical College, Katuri Nagar, Guntur.
2. Professor & HOD, Department of Biochemistry, Katuri Medical College, Katuri Nagar, Guntur.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Komarabattina Rattaiah,
Sarada Colony, 17th Lane,
#866, Guntur,
Andhra Pradesh, India.
E-mail: drkotikala@gmail.com

Date of Submission: 02/02/2015.
Date of Peer Review: 03/02/2015.
Date of Acceptance: 07/02/2015.
Date of Publishing: 17/02/2015.