

A CLINICO- EPIDEMIOLOGICAL STUDY OF HYDRONEPHROSIS AT ERA'S LUCKNOW MEDICAL COLLEGE , LUCKNOW

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ABSTRACT

Hydronephrosis is defined as aseptic distension of the renal calyces and pelvis with urine as a result of partial obstruction of the outflow of urine. It is a clinical condition which is caused by dilatation of the renal collecting system most frequently caused by incomplete or complete obstruction. Although this condition is quite common yet its incidence and prevalence, aetiology, diagnosis and management is less commonly reported in literature especially in context with adults and non-pregnant women. This prospective study was conducted to evaluate the etiology, classify causes of hydronephrosis and to study common clinical presentation of Hydronephrosis. hydronephrosis was seen as a highly male dominant disease with renal calculi as the major aetiology and BPH and VUR being age-associated risk factors. Aetiology based management of hydronephrosis yielded good outcome. The present study is perhaps the first detailed clinico-pathological profile of hydronephrosis.

KEYWORD: Hydronephrosis, Renal lump, Renal swellings

INTRODUCTION

Hydronephrosis is a condition where urine overfills, or backs up, into the kidney, which causes the kidney to stretch (dilate), much like a balloon when it is filled with water (1). Hydronephrosis is defined as aseptic distension of the renal calyces and pelvis with urine as a result of partial obstruction of the outflow of urine (2). It is a clinical condition which is caused by dilatation of the renal collecting system most frequently caused by incomplete or complete obstruction. There could be a number of underlying causes of hydronephrosis including congenital blockage (present at birth, scarring of tissue (from injuries or previous surgery), calculus, tumours or cancer, vesical mass, urinary tract infection (UTI) and benign prostatic hypertension (BPH) and pregnancy (3-4). Hypertrophy Secondary to ureteropelvic junction obstruction may present as acute severe flank pain radiating to the inguinal and genital area (5). Hydronephrosis was first studied in 1824 by Fiorep. Since that time, several investigators have studied this association and the prevalence of hydronephrosis with uterine prolapse has varied from 0% to 100%(6-7). This variation can probably be accounted for by differences in the severity of prolapse and by small patient numbers (8). Although this condition is quite common yet its incidence and prevalence, aetiology, diagnosis and management is less commonly reported in literature especially in context with adults and non-pregnant women (9). Most of the literature available is related with hydronephrosis in fetuses, neonates and children and pregnant women (10). Most of the studies in adults are case-reports or

concerned only with diagnostic aspect and as such there is no comprehensive study highlighting the clinical profile, aetiology and management of hydronephrosis in adults only (11-12). In view of this void in literature, the present study was planned in which in order to maintain the exclusiveness, paediatric age group and pregnant women were excluded. It was also kept in mind that hydronephrosis in severely ill patients there might be multiple underlying aetiologies which may confound in exact evaluation of aetiologies and their diagnosis as proposed in present study; hence it was decided to exclude very sick patients with renal failure and patients with associated severe co morbid diseases (13). Patients were selected consecutively as and when they present during the study period considering the inclusion and exclusion criteria. Data for the study was collected from patients attending the Emergency/Surgery OPD in the Department of General Surgery at Era's Lucknow Medical College and Hospital, Lucknow. The outcome of results was assessed upon cases of Hydronephrosis diagnosed by USG findings. Careful history taking was done to determine any etiological factors.

- Complete physical examination
- Blood Investigations (CBC, RFT), LFT if required.
- Urine Investigations (Urine R/M and C/S).
- Radiological investigations including X-ray abdomen/KUB, IVP, Ultrasound KUB, RGU and MCU if needed.
- Procedures performed on each admitted patient were noted.

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Patients were followed up for upto 3 months after discharge and any complications noted were carefully followed. The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software. The values were represented in Number (%) and Mean \pm SD.(14).

MATERIALS AND METHODS

Study Design

Prospective Study

Place of Study

Department of General Surgery, ERA'S Lucknow Medical College & Hospital, Lucknow.

Duration of Study

18 months.

Inclusion Criteria

Patients were included on following basis:

- All patients admitted in General Surgery with Ultrasonographical evidence suggestive of Hydronephrosis.
- Age more than \geq 12 yrs.

Exclusion Criteria

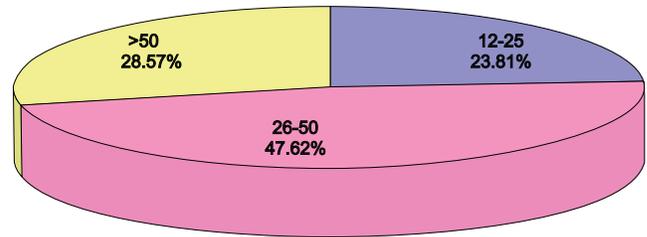
- Patients less than 12 years of age
- Pregnant women
- Very sick patients with renal failure, patients with associated severe co morbid diseases, patients not willing to participate in study.

RESULTS

The present study was conducted in the Department of Surgery, Era's Lucknow Medical College & Hospitals, Lucknow to evaluate the etiology, classify causes of hydronephrosis and to study common clinical presentation of hydronephrosis. A total of 105 patients of hydronephrosis attending the Emergency, OPD of Department of Surgery during the study period, fulfilling the inclusion criteria were included in the study. The outcome of results was assessed upon cases of Hydronephrosis diagnosed by USG findings.

Age Group (years)	Number	Percentage
12-25	25	23.81
26-50	50	47.62
>50	30	28.57

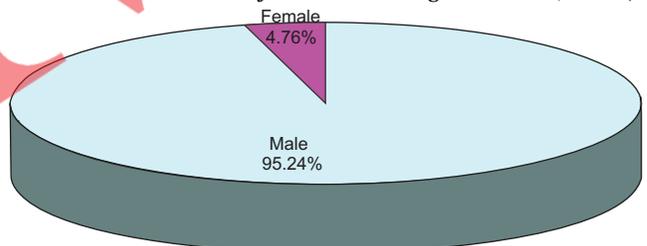
Table 1: Distribution of Cases according to Age (N=105)
 Min-Max: 12-79 years (Median: 41.00 years);
 Mean \pm SD: 42.17 \pm 18.10



Minimum age of patients enrolled in the study was 12 years while maximum age was 79 years, median age in the study population was 41 years. Mean age of the patients was 42.17 \pm 18.10 years. Most common age group in 105 patients of hydronephrosis in our study was 26-50 years (47.62%) followed by >50 years (28.57%). Approximately three-fourth of the patients were aged >25 years. Only 23.81% patients were aged <25 years.

Gender	Number	Percentage
Male	100	95.24
Female	5	4.76
Total	105	100.00

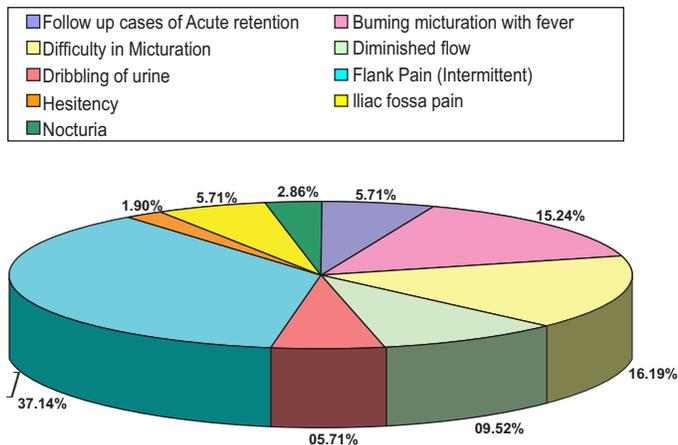
Table 2: Distribution of Cases according to Gender (N=105)



Majority of the patients in our study were males (95.24%) only 5 (4.76%) were females.

S.No.	Chief Complaints at presentation	No. of patients	Percentage
1.	Follow up cases of Acute retention	6	5.71
2.	Burning micturition with fever	16	15.24
3.	Difficulty in micturition	17	16.19
4.	Diminished flow	10	9.52
5.	Dribbling of urine	6	5.71
6.	Flank Pain (Intermittent)	39	37.14
7.	Hesitancy	2	1.90
8.	Iliac fossa pain	6	5.71
9.	Nocturia	3	2.86

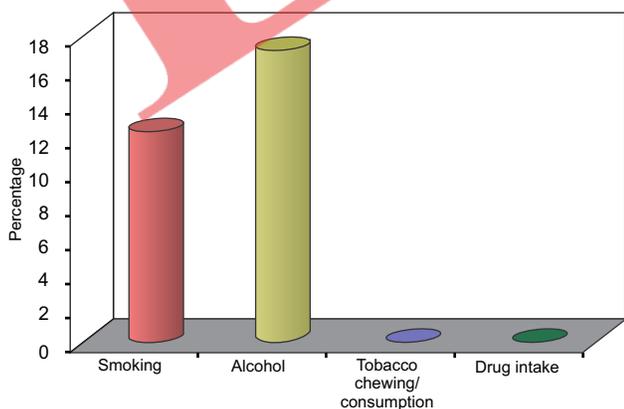
Table 3: Distribution of Study Population according to Chief Complaints at presentation



Chief complaint of most of the patients was intermittent flank pain (37.14%), followed by difficulty in micturition (16.19%), burning micturition with fever (15.24%). Diminished flow was observed in 9.52%, 5.71% each for follow up cases of acute retention, dribbling of urine and iliac fossa pain. Hesitancy was the least common chief complaint (1.90%) followed by Nocturia (2.86%).

S.No.	Personal History	Number of patients	Percentage
1.	Smoking	13	12.38
2.	Alcohol	18	17.14
3.	Tobacco chewing/ consumption	0	0.00
4.	Drug intake	0	0.00

Table 4: Incidence of Personal Habits in Study Population

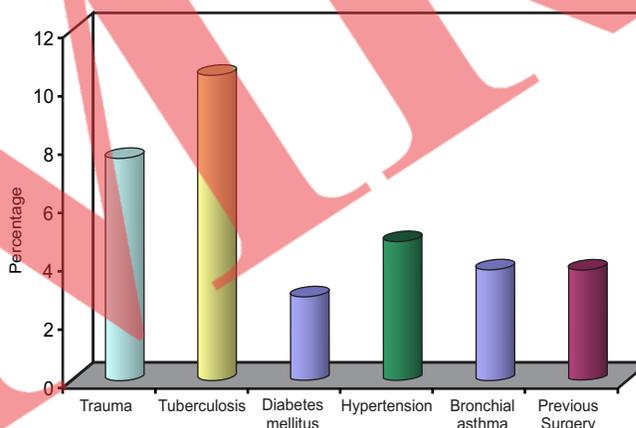


Only 12.38% of patients had habit of smoking and 17.14% were habitual of alcohol. None of the patients

included in the study was tobacco chewer/consumer or habitual of drug intake.

S.No.	Clinical History/ Personal History	Number of patients	Percentage
1.	Trauma	8	7.62
2.	Tuberculosis	11	10.48
3.	Diabetes mellitus	3	2.86
4.	Hypertension	5	4.76
5.	Bronchial asthma	4	3.81
6.	Previous Surgery	4	3.81

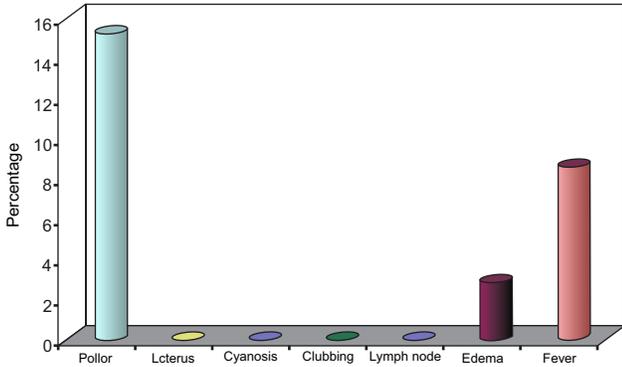
Table 5: Incidence of Clinical/Personal History in Study Population



Only 10.48% were suffering from tuberculosis, 7.62% had experienced a traumatic event, 2.86% had diabetes, 4.76% were suffering from hypertension, 3.81% had bronchial asthma and 3.81% had undergone surgery previously.

S.No.	Clinical Signs	Number of patients	Percentage
1.	pallor	16	15.24
2.	icterus	0	0.0
3.	cyanosis	0	0.0
4.	clubbing	0	0.0
5.	lymph node	0	0.0
6.	oedema	3	2.86
7.	fever	9	8.57

Table 6: Incidence of Clinical Signs in Study Population



Most common clinical signs was Pallor (15.24%), followed by Fever (8.57%), Oedema (2.86%). In none of the patient icterus, cyanosis, clubbing, lymphadenopathy was found.

Variable	No. of patients	Min.	Max.	Median	Mean	SD
Pulse rate (per min)	105	60	110	88	87.66	11.49
SBP (mm Hg)	105	110	150	120	122.55	9.33
DBP (mm Hg)	105	70	90	80	81.31	6.26
RR (beats/min)	105	16	80	20	22.48	10.29

Table 7: Hemodynamic Variables in Study Population

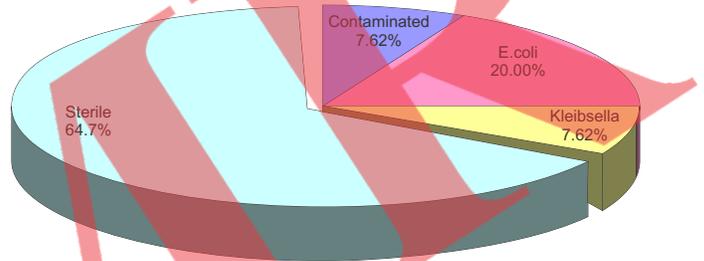
Variable	No. of patients	Min.	Max.	Median	Mean	SD
Haemoglobin	96	7	16	10.70	10.73	2.12
TLC	100	3000	14000	7000	7031.0	2492.4
DLC (Neutrophils)	100	55	84	76	74.67	6.13
DLC (Lymphocytes)	100	15	38	25	24.95	6.25
DLC (Eosinophils)	96	0	15	0	2.06	3.57
S. Urea	100	1	102	35	47.55	27.25
S. Creatinine	100	0.60	6.10	1.50	1.57	1.06
RBS	105	109	141	125	126.34	10.73
S. Na ⁺	105	135	144	138	139.01	2.65
S. K ⁺	105	3.2	5.1	4.2	4.34	0.62

Table 8: Haematological/Biochemical Variables in the Study

Hemodynamic variables and haematological variables of the study population have been tabulated in Table 7 and Table 8.

S.No.	Urine Culture	Number of patients	Percentage
1.	Contaminated	8	7.62
2.	E. coli	21	20.00
3.	Klebsiella	8	7.62
4.	Sterile	68	64.76

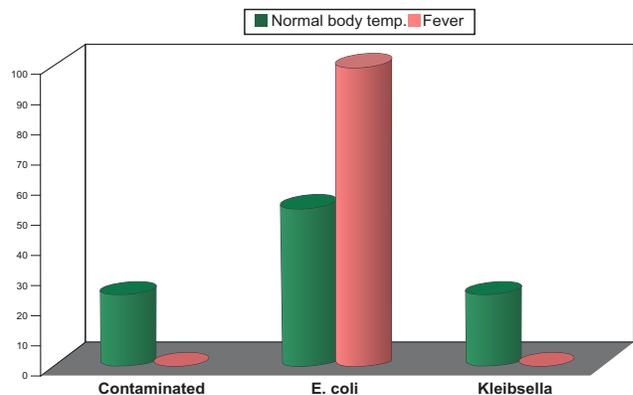
Table 9: Urine Culture Findings of Study Population



Out of 105 Urine culture specimens, 68 (64.76%) were found to be sterile, 8 (7.62%) specimens contaminated. E. coli and Klebsiella were isolated from 20.0% and 7.62% urine culture specimens respectively.

	Total	Normal Temp. (n=34)		Fever (n=3)	
		No.	%	No.	%
Contaminated	8	8	23.53	0	0.00
E. coli	21	18	52.94	3	100.00
Klebsiella	8	8	23.53	0	0.00
		$\chi^2=2.487$ (df=2); p=0.288			

Table 10: Association of Positive Urine Culture with Fever



Of 37 patients with positive Urine Culture, only 3 (8.11%) were found to be suffering of fever and rest 34 had normal body temperature. All the patients suffering from fever were isolated for E. coli. Proportion of patients with normal body temperature was higher as compared to suffering from fever, with contaminated urine culture (23.53% vs. 0.0%) and isolated for Klebsiella (23.53% vs. 0.0%) while proportion of patients suffering from fever was higher as compared to normal body temperature in whom E. coli was isolated from urine specimens. Association of isolate of Urine culture with fever was not found to be statistically significant.

S.No.	X-ray Findings	Number of patients	Percentage
1.	Anterior/ Middle/ Post. urethral stricture	13	12.38
2.	B/L renal calculi	18	17.14
3.	Dil ureters with VUR	1	0.95
4.	Dilated calyx with VUR	1	0.95
5.	Left renal calculus	17	16.19
6.	Lt multiple renal cal	2	1.90
7.	Lt PUJ/ureteric obstruction	10	9.52
8.	Rt PUJ obstruction	4	3.81
9.	Rt renal cal	15	14.29
10.	rt ureteric calculi	1	0.95
11.	urethral calculus	1	0.95
12.	Vesicle calculus positive	2	1.90
13.	Ureteric strictures	2	1.90
14.	WNL/NAD	18	17.14

Table 11a: X-ray Findings of Study Population

X-ray of 17.14% patients were found to be within-normal limits or without any abnormality. Bilateral renal calculi (17.14%) was found to be the most common X-ray finding, followed by Left renal

calculus (16.19%), Right renal calculi (14.29%).

S.No.	Urine Culture	Number of patients	Percentage
1.	Bilateral hydronephrosis	19	18.1
2.	Bilateral renal calculi with hydronephrosis	18	17.1
3.	Unilateral renal calculi with hydronephrosis	34	32.4
4.	BPH	9	8.6
5.	Dilated calyx with PUJ obstruction	12	11.4
6.	Dilated calyx with VUR	1	0.95
7.	Unilateral ureteric calculus with hydronephrosis	9	8.6
8.	Genitourinary Tuberculosis	1	0.95
9.	Severe UTI with BOO	1	0.95
10.	Vesicoureteric reflux with dilated ureters	1	0.95

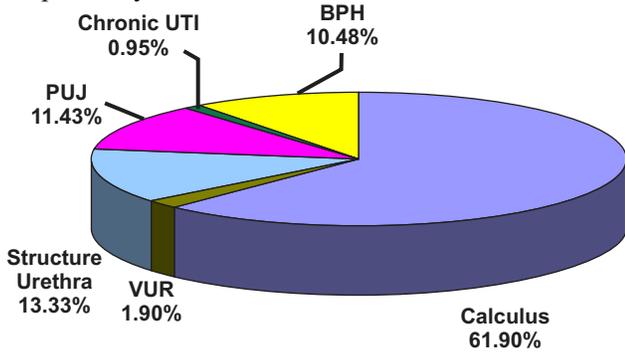
Table 11b USG Findings of Study Population

Unilateral renal calculi with hydronephrosis was the most common USG findings (n=34; 32.38%). Bilateral hydronephrosis was reported in 19 (18.1%) while bilateral renal calculi with hydronephrosis were

S.No.	Diagnosis	Number of patients	Percentage
1.	Calculus	64	61.90
2.	VUR	2	1.90
3.	Stricture Urethra	14	13.33
4.	PUJ	12	11.43
5.	Chronic UTI	1	0.95
6.	BPH	11	10.48
7.	Ureteric stricture	1	0.95

Table 12: Final Findings of Study Population

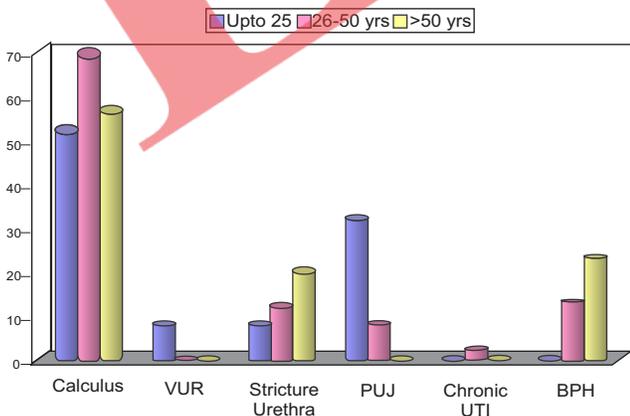
reported in 18 (17.14%) cases. Dilated calyx with PUJ obstruction, BPH, unilateral ureteric calculi with hydronephrosis were seen in 11.4%, 8.6% and 8.6% patients respectively. There was 1 case each with USG findings suggestive of dilated calyx with VUR, Genitourinary Tuberculosis, Severe UTI with BOO and Vesicoureteric reflux with dilated ureters respectively.



Most common diagnosis was Calculus (61.90%) followed by Stricture (13.33%), PUJ (11.43%), BPH (10.48%), VUR (1.90%), and Chronic UTI (0.95%).

	TOTAL	12-25 yrs (n=25)		26-50 yrs (n=50)		>50 yrs (n=30)	
		No.	%	No.	%	No.	%
Calculus	65	13	52.00	35	70.00	17	56.67
VUR	2	2	8.00	0	0.00	0	0.00
Stricture Urethra	14	2	8.00	6	12.00	6	20.00
PUJ	12	8	32.00	4	8.00	0	0.00
Chronic UTI	1	0	0.00	1	2.00	0	0.00
BPH	11	0	0.00	4	8.00	7	23.33

Table 13: Association of Age with Final Diagnosis



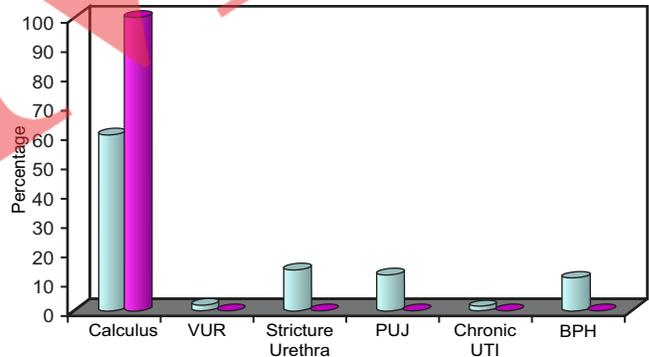
Calculus was diagnosed in majority of the patients of each age group., Proportion of patients aged 12-25 years was higher as compared to 26-50 years and >50

years for VUR (8.00% vs. 0.0% & 0.0%), PUJ (32.00% vs. 8.0% & 0.0%). Proportion of patients aged 26-50 years was higher as compared to 12-25 years and >50 years for Calculus (70.00% vs. 52.00% & 56.67%). Proportion of patients aged >50 years was higher as compared to 12-25 years and 26-50 years for Stricture urethra (20.0% Vs. 8.0% and 12.0%) and BPH (23.33% vs. 0.0% & 8.0%). Difference in Final diagnosis in different age groups was found to be statistically significant (p<0.001).

	Total	Males (n=100)		Females (n=5)	
		No.	%	No.	%
Calculus	65	60	60.00	5	100.00
VUR	2	2	2.00	0	0.00
Stricture Urethra	14	14	14.00	0	0.00
PUJ	12	12	12.00	0	0.00
Chronic UTI	1	1	1.00	0	0.00
BPH	11	11	11.00	0	0.00

$\chi^2=3.231$ (df=5); p=0.664

Table 14: Association of Gender with Final Diagnosis

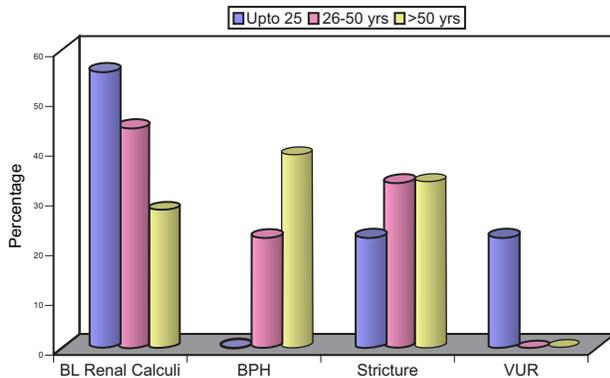


Only 5 patients were female and all were diagnosed as Calculus. No statistically significant association in gender and Final diagnosis was found.

	TOTAL	2-25 yrs (n=9)		26-50 yrs (n=18)		>50 yrs (n=18)	
		No.	%	No.	%	No.	%
BLRenal calculi	18	5	55.56	8	44.44	5	27.78
BPH	11	0	0.00	4	22.22	7	38.89
Stricture	14	2	22.22	6	33.33	6	33.33
VUR	2	2	22.22	0	0.00	0	0.00

$\chi^2=13.364$ (df=6); p=0.038

Table 13: Association of Bilateral Hydronephrosis (n=45) with Age



Only 45 patients were found to be suffering from Bilateral hydronephrosis. For of patients aged 12-25 was found to be higher as compared to 26-50 years and >50 years for Bilateral renal calculi (55.56% vs. 44.44% & 27.78%) and VUR (22.22% vs. 0.0% & 0.0%) while proportion of patients aged >50 years and 26-50 years was higher for BPH (38.89% & 22.22% vs. 0.0%) and Stricture (33.33% & 33.33% vs. 22.22%).

CONCLUSIONS

From our study, we concluded that age of patients ranged from 12 to 79 years with a mean age of 42.12 years. Out of them, majority of patients were males (95.24%). There were only 4 (4.76%) females. Intermittent flank pain was the most common complaint at presentation (37.14%) followed by difficulty in micturition and burning micturition with fever (16.19% and 15.24% respectively). Diminished flow (9.52%), iliac fossa pain, h/o acute retention, dribbling of urine (5.71%), nocturia (2.86%) and hesitancy (1.9%) were some of the less common presenting complaints. History of smoking (12.38%) and alcohol use (17.14%) were reported as the personal habits with health risk. None of the patients reported of drug use / tobacco chewing habit. Evaluation of medical history revealed history of tuberculosis (10.48%) as the most common finding followed by trauma (7.62%), hypertension (4.76%), bronchial asthma and previous surgery (3.81% each) and diabetes mellitus respectively (2.86%). Most of the patients did not present with any particular clinical sign. Pallor (15.24%) and fever (8.57%) were the most common clinical signs. A total of 3 (2.86%) reported with oedema. Mean hemodynamic and haematological parameters of patients were within normal range. Mean serum urea level was 47.55±27.55 mg/dl, thus indicating a high degree of derangement. Urine culture was sensitive in 29 (27.6%) cases. *E. coli* was isolated in 21 and *Klebsiella* in 8 cases. No significant association of microbial positivity with body temperature was observed. X-ray

findings did not show any abnormality in 18 (17.14%) cases. Most common X-ray abnormality was presence of renal calculi (18; 17.14% bilateral and 32; 30.5% unilateral; 2; 1.9% multiple). Urethral stricture in 13 (12.38%) cases and Unilateral obstruction in 14 (13.3%) cases. Ureteric calculi were seen in 3 (2.9%) cases. Vesicular calculi were seen in 2 (1.9%) cases. There was 1 (0.95%) case each with dilated uterers with VUR, dilated calyx with VUR; Urethral calculi were seen in 1 case each. USG findings were positive in all the cases. Unilateral renal calculi with hydronephrosis was the most common USG findings (n=34; 32.38%). Bilateral hydronephrosis was reported in 19 (18.1%) while bilateral renal calculi with hydronephrosis was reported in 18 (17.14%) cases were the most common findings. Dilated calyx with PUJ obstruction, BPH, unilateral ureteric calculi with hydronephrosis were seen in 11.4%, 8.6% and 8.6% patients respectively. There was 1 case each with USG findings suggestive of dilated calyx with VUR, Genitourinary Tuberculosis, Severe UTI with BOO and Vesicoureteric reflux with dilated ureters respectively.

The aetiology of hydronephrosis was established as calculus in 64 (61.9%) cases followed by stricture urethra (13.33%), PUJ (11.43%), BPH (10.48%), VUR (1.9%), Chronic UTI (0.95%) and ureteric stricture (0.95%) respectively. Calculus was most common diagnosis in all age groups, however, in younger age group (12-25 yrs) PUJ was the second most common diagnosis whereas in age group >50 years, BPH was the second most common diagnosis. Statistically, a significant association was seen between age and aetiology of hydronephrosis. All the 5 females were diagnosed to have calculus as the aetiology of hydronephrosis as compared to 60% of males presenting with calculus as the aetiology. In cases with bilateral hydronephrosis, in younger age group (12-25 years) calculi were the most common aetiology (55.56%) followed by stricture and VUR (22.22% each), in age group 26-50 years renal calculi were the most common aetiology (44.44%) followed by stricture (33.33%) and BPH (22.22%) whereas in older age group >50 years, BPH was the most common aetiology (38.89%) followed by stricture (33.33%) and renal calculi (27.78%) respectively. Statistically, there was a significant difference in aetiology of hydronephrosis in different age groups. Management based on aetiology was successful in all the case with a significant reduction in renal size from the first month follow up itself. By third month follow up resolution of hydronephrosis was seen in all the cases. None of the cases showed recurrence.

DISCUSSION

The findings of present study suggested that the clinical signs and symptoms of hydronephrosis were non-specific to the aetiology which was dependent mainly on age and gender. After ruling out paediatric age group and pregnant women, hydronephrosis was seen as a highly male dominant disease with renal calculi as the major aetiology and BPH and VUR being age-associated risk factors. Aetiology based management of hydronephrosis yielded good outcome. The present study is perhaps the first detailed clinic pathological profile of hydronephrosis. In fact, there is tremendous life of large case series on hydronephrosis – though the present study has made to fill this gap, yet further studies on this entity are recommended to build a proper data base regarding epidemiology, pathogenesis, clinical presentation and management.

REFERENCES

1. Jones DF. Intermittent hydronephrosis with a report of four cases, *Boston Med. Surg. J.*, 1909; 160:529-539.
2. Mayo WJ, Braasch WF, and McCarty WC. Relation of anomalous renal blood vessels to hydronephrosis, *J.A.M.A.*, 1909; 52:1383-1388.
3. Braasch WF. Clinical considerations of intermittent hydronephrosis caused by anomalous renal vessels, *J.A.M.A.*, 1909; 52:1384-1386.
4. Covington T and Reeser W. Hydronephrosis associated with overhydration, *J. Urol.*, 1950; 63:438-440.
5. Maluf NSR. A method for relief of upper ureteral obstruction within bifurcation of renal artery. *J. Urol.* 1956; 75: 229-241, 1956.
6. Brettauer J, Ruben IC. Hydroureter and hydronephrosis: a frequent secondary finding in cases of prolapse of the uterus and bladder. *Am J Obstet Gynecol* 1923;6:696-709.
7. Frank RT. Fatal uremia due to complete prolapse of the uterus. *Am J Obstet Gynecol* 1931;22:270-2.
8. Lieberthal F, Frankenthal L Jr. The mechanism of ureteral obstruction in prolapse of the uterus. *Surg Gynaecol Obstet* 1941; 73: 838-842.
9. Elkin M, Goldman SM, Meng CH. Ureteral obstruction in patients with uterine prolapse. *Radiology* 1974;110:289-94.
10. Klempner E. Gynecological lesions and ureterohydronephrosis. *Am J Obstet Gynecol* 1952;64:1232-41.
11. Wallingford AJ. The changes of the urinary tract associated with prolapse of the uterus. *Am J Obstet Gynecol* 1939;38:489-94.
12. Stabler J. Uterine prolapse and urinary tract obstruction. *Br J Radiol* 1977;50:493-8.
13. Grasso M, Caruso Rp, Phillips CK. UPJ Obstruction in the Adult Population: Are Crossing Vessels Significant? *Rev Urol.* 2001 Winter; 3(1): 42-51.
14. Rose BD, Black RM. *Manual of Clinical Problems in Nephrology.* Boston, Mass: Little, Brown & Co; 1988. 337-343.
15. Lameire N, Van Biesen W, Vanholder R. Acute renal failure. *Lancet.* 2005; 365(9457):417-30.
16. Rasmussen PE, Nielsen FR. Hydronephrosis during pregnancy: a literature survey. *Eur J Obstet Gynecol Reprod Biol.* 1988; 27(3):249-59.

