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Original Research Article

Unilateral hydronephrosis in adults: etiology, clinical presentations and management

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ABSTRACT

Background: Hydronephrosis is dilatation of renal pelvis and calyces resulting from intermittent and incomplete obstruction to the urine outflow with incidence of 1:100. This study aims to evaluate etiological factors, clinical presentations, diagnostic modalities and management options of unilateral hydronephrosis.
Methods: In a tertiary care based observational study, patients more than 18 years age of either gender with unilateral loin pain with or without lump in loin were clinically diagnosed as unilateral hydronephrosis and confirmed on imaging studies were enrolled as subjects. Pregnant patients and patients not consenting were excluded. Patients with mild unilateral hydronephrosis were managed conservatively. Those of moderate to severe grade were investigated with CT urography and those with no excretion of dye in affected kidney were further investigated with DTPA scan. In patients with function of less than 10% on DTPA scan were subjected for nephrectomy.
Results: Of the total 72 patients of unilateral hydronephrosis enrolled, 50 (69.44%) were due to ureteric calculi, 18 (25%) were PUJ obstruction and 4 (5.56%) were renal calculi. Highest incidence was seen in third and fourth decade with Males to female ratio of 1.25:1. Commonest symptom was pain in abdomen followed by hematuria. Ureteric calculi of size less than 7 mm were given conservative trial and rests were managed surgically. Out of total 72 patients 43 patients were managed conservatively and rest 29 were treated surgically.
Conclusions: Ureteric calculus, pelviureteric junction obstruction and renal calculus were the etiological factors causing unilateral hydronephrosis and management was as per etiology.

Keywords: PUJ obstruction, Renal calculi, Unilateral hydronephrosis, Ureteric calculi

INTRODUCTION

Hydronephrosis is generally defined as dilatation of the renal pelvis and calyces resulting from intermittent and incomplete obstruction to the flow of urine.[1] Depending on the site of obstruction to the urinary flow the hydronephrosis may be unilateral or bilateral. A unilateral hydronephrosis occurs when the obstruction is above the level of the bladder. The incidence of unilateral hydronephrosis was found to be 1:100 ranging in an age from birth to 80 years. The female to male ratio of unilateral hydronephrosis most commonly caused by idiopathic pelviureteric junction (PUJ) obstruction or calculus is 2:1 and the right side is more commonly affected.[2] It may results from abnormal development of smooth muscle at PUJ.[3] It is now possible to diagnose the cause of stone disease in more than 95% of patients with a variety of treatment programs, stone formation can be halted or retarded in most patients with recurrent calculi. A most dramatic and miraculous achievement has resulted from the recent introduction of percutaneous lithotripsy and extracorporeal shock wave lithotripsy

(ESWL).[4] This study was undertaken to gain insight into various etiologies, clinical presentations and management modalities of unilateral hydronephrosis.

METHODS

This study was a hospital based prospective observational study carried out from September 2016 - October 2018 in NKPSIMS Lata Mangeshkar Hospital and Research centre, Nagpur.

Patients presenting with unilateral loin pain with or without associated urinary symptoms attending surgery OPD or getting admitted to surgical ward. Study subjects were evaluated based on inclusion criteria with patients of age >18 years of either gender, presenting with or without unilateral loin pain and urinary complaints, clinically diagnosed as renal or ureteric pain and on ultrasonography abdomen showing unilateral hydronephrosis were enrolled as subjects. Patients not willing to join the study or undergo ultrasonography for confirmation of diagnosis, pregnant patients and previously operated patients for renal or ureteric or bladder surgery were excluded. USG abdomen and pelvis was done in all cases for the diagnosis of unilateral hydronephrosis. According to the findings on USG patients were diagnosed as unilateral hydronephrosis and categorized according to the various etiologies. IVP was done in patients with ureteric calculus of size >7 mm, PUJ obstruction and renal calculus. Plain CT was done in patients allergic to contrast material, elevated serum creatinine and BUN. CT urography was done in patients with palpable renal lump. Radionuclide scan (DTPA) was done in patients not showing any excretion of dye in affected kidney on IVP or CT urography. Kidney with function less than 10 % on DTPA were subjected for nephrectomy. Ureteric calculus of size less than or equal to 7 mm were given 0.4 mg of Tamsulosin daily, antispasmodic, analgesic and urinary antibiotics for a month. If stone does not pass then they were subjected for surgical intervention. Also patients diagnosed as mild unilateral hydronephrosis due to PUJ obstruction were also managed conservatively with antispasmodic, analgesics, and urinary antibiotics with advice for follow up fortnightly.

All patients of ureteric calculus of size more than 7mm in mid and lower third of ureter were subjected for URSL. Patients with larger calculi (>1 cm) in upper third of ureter were considered for open ureterolithotomy. Patients with moderate to severe grade hydronephrosis due to PUJ obstruction were investigated with IVP/CT urography. Those patients who showed poor or non function on IVP/CT urography were subjected for DTPA scan. On DTPA scan those with renal function of more than 10 % were subjected to Anderson Hynes pyeloplasty and those with renal function less than 10 % were subjected for nephrectomy. The patients with renal calculus causing hydronephrosis were treated by open pyelolithotomy. Statistical analysis was done by ETI INFO software version 7.

RESULTS

Total 72 patients were enrolled based on inclusion exclusion criteria. The mean age of presentation was 34.57±13.73 years with range of 18 to 74 years (Table 1). More than half of the patients (51.4%) were in the age group of 18 to 30 years. The male to female ratio was 1.25: 1. On inquiring about dietary habits almost three fourth of the patients (73.6%) had mixed diet while the remaining (26.4%) had a pure vegetarian diet. Unilateral loin pain was seen in all patients. In three fourth of the patients it was colicky in nature. Other symptoms recorded were burning micturition (43.1%), fever (29.2%), vomiting (27.8%), hematuria (25%) and lump in abdomen (13.9%) (Table 2). On clinical examination 14 (19.45%) patients had a palpable abdominal lump. Thirteen of these patients were diagnosed to have PUJ obstruction while the remaining patient was diagnosed to have an obstructing renal calculus.

Table 1: Age distribution.

Age group (in years)	Frequency (N)	Percentage (%)
18-30	37	51.38
>30-40	18	25.00
>40-50	8	11.11
>50-60	3	4.17
>60-70	4	5.56
>70-80	2	2.78
Total	72	100
Mean age 34.57±13.73 years		

Table 2: Symptomatology.

Symptoms	No. of patients (N)	Percentage (%)
Unilateral pain in abdomen		
Colicky in loin	54	75
Dull aching	18	25
Burning micturition	31	43.1
Fever	21	29.2
Vomiting	20	27.8
Hematuria	18	25.0
Lump in abdomen	10	13.9

Imaging investigations revealed more than two third (69.44%) of the patients had ureteric calculi causing unilateral hydronephrosis. Pelviureteric junction obstruction in 18 (25%) patients and renal calculi in the remaining 4 (5.56%) patients (Table 3). On X ray KUB, radio-opaque calculi were seen in 26 (52%) patients of ureteric calculi. All renal calculi were radio-opaque on X-ray KUB. On urine analysis only pus cells were found in

23 (31.94%) patients, only microscopic hematuria was observed in 18 (25%) patients and 5 (6.95%) patients had both pus cells and microscopic hematuria. The remaining 26 (36.11%) patients had normal urine microscopy. On urine culture more than half (61.11%) of the patients showed no organism growth. *E. coli* was the most common organism isolated in 19 (26.39%) patients. One patient showed AFB and was later histopathologically proven to have tuberculuspyonephrosis (Table 4).

Table 3: Etiology of unilateral hydronephrosis.

Etiology	Frequency	Percentage (%)
Ureteric calculi	50	69.44
PUJ obstruction	18	25
Renal calculi	4	5.56
Total	72	100

Table 4: Distribution of urine cultured organism.

Organism grown	Frequency	Percentage (%)
No growth	44	61.11
E. coli	19	26.39
Klebsiella	5	6.93
Proteus	3	4.17
AFB	1	1.39
Total	72	100

Patients having ureteric calculi less than or equal to 7 mm were given conservative trial. Expulsion of calculi was seen in 81.8% of upper ureteric calculi and 92.6% of lower ureteric calculi (Table 5). Eight patients with lower ureteric calculi more than 7 mm and 4 patients who failed conservative trial underwent URSL. The remaining 4 patients of upper ureteric calculi of more than 10mm underwent open ureterolithotomy. Four (5.56%) patients had renal calculi and underwent open pyelolithotomy (Table 6).

Table 5: Expulsion of calculi size less than or equal to 7 mm after conservative management.

Site of calculus	N	Patients with Expulsion of calculus	Expulsion rate
Upper ureter	11	9	81.8
Lower ureter	27	25	92.6
Total	38	34	89.5

Eighteen patients were found to have PUJ obstruction of which 5 (27.78%) had mild hydronephrosis and were managed conservatively. Seven patients (38.89%) were found to have renal function less than 10% on DTPA scan and underwent nephrectomy. The remaining 6 (33.33%) patients had moderate or severe hydronephrosis with normal dye excretion underwent Anderson Hynes pyeloplasty. On histopathological examination of the seven patients who underwent nephrectomy four patients were found to have hydronephrosis with diffuse cortical atrophy, 2 patients were found to have hydronephrosis with chronic pyelonephritis and one patient was found to have tubercular pyonephrosis. Postoperatively hematuria was seen in 2 (16.67%) patients who underwent URSL and 1 (25%) patient who underwent open uretero-lithotomy. Surgical site infection was seen in one patient of nephrectomy, open ureterolithotomy and open pyelolithotomy each. Urinary tract infection was seen post operatively in 2 patients who underwent URSL.

Table 6: Distribution of surgery performed.

Etiology	Surgery	Frequency	%
Ureteric Calculi	URSL	12	36.36
	Ureterolithotomy	4	12.12
PUJ Obstruction	Nephrectomy	7	21.21
	Anderson-Hynes pyeloplasty	6	18.19
Renal calculi	Open pyelolithotomy	4	12.12
Total		33	100

DISCUSSION

Unilateral hydronephrosis occurs when obstruction is above the level of the bladder and causes maybe either outside the ureter, in the wall of ureter or in its lumen. Hydronephrosis occurs in the age ranging from birth to old age.

In the present study, third and fourth decade of life was the commonest age of presentation with mean age of 34.67 years of unilateral hydronephrosis which is quite consistent with studies by Ravi et al, Prasanna et al and Ingle et al.[5-7] Males were predominantly affected in the study with male to female ratio of 1.25:1 while other studies showed male to female ratio of 2:1.[5,6] The side affected in the present study was right side with right to left ratio of 1.57:1. The results are consistent with review of Prasanna et al, while literature shows right to left ratio ranging from 1:1 to 1.31:1. Pain in the loin was the most common symptom present in all the patients followed by burning micturition accounting for 43.1% of the patients, which is quite consistent with the literature.[5-7] Urine routine microscopic examination was carried out to look for microscopic hematuria and presence of significant amount of pus cells for diagnosing UTI. Isolated pus cell were found in 31.94% of the patients and only microscopic hematuria was found in 25% of the patients while Ravi et al and Prasanna et al showed pus cells in 30% and microscopic hematuria 50% and 26.67% in respective studies. *E. coli* was the commonest organism cultured. This result was quite consistent with the literature.[5, 6] Ureteric calculus was the commonest cause of unilateral hydronephrosis accounting for almost 2/3rd of the patients followed by PUJ obstruction in 25% of the patients. The similar results were seen in other Indian studies.[5-7] Patients with ureteric calculus ≤7 mm were offered medical expulsion therapy and the expulsion rate

was 92.6% for lower ureteric calculi and 81.8% for upper ureteric calculi. The overall expulsion rate was 89.5% which quite consistent with the literature. This is similar to the expulsion rate observed in Autorine et al, Al-Ansari et al and Pickart et al.[8-10] One fourth of the patients presenting with unilateral hydronephrosis had PUJ obstruction as the cause and amongst them 13 patients underwent surgery and rest 5 patients with mild hydronephrosis were managed conservatively. Conservative management of patients with PUJ obstruction was also supported by Pinter et al as it potentially reduces the number of early or unnecessary intervention.[11] Out of 13 patients of moderate to severe unilateral hydronephrosis, Andersons-Hynes Pyeloplasty was done in 6 patients and nephrectomy was done in 7 patients. O'Reilly et al, carry out Andersons pyeloplasty in 56 cases over a period of 13 years and came to conclusion that the procedure is an excellent for PUJ obstruction and produces a lasting improvement in function and drainage.[12] Patients who underwent Andersons-Hynes pyeloplasty, none of them had any complications. Renal calculus producing obstruction and leading to hydronephrosis accounted to 5.56% of all the patients. All of them underwent open pyelolithotomy and SSI was the only complication seen in one patient.

CONCLUSION

Ureteric calculus is the most common cause for unilateral hydronephrosis with males being more commonly affected with peak incidence at third to fourth decade of life. USG abdomen was the main diagnostic modality. Depending upon the etiology and grade of hydronephrosis either conservative or surgical management intervention is done.

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