

Obstructive Uropathy

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Abstract

Background: To determine major causes of obstructive uropathy and various treatment modalities that we could offer to relieve the obstruction and to find out the outcome in terms of renal impairment and mortality.

Methods: In this prospective observational study patients who presented with obstruction in drainage of urine resulting in an elevated serum creatinine of more than 1.5 mg/dl, were included. Cause of obstruction was established with appropriate investigations and treatment was then tailored according to the diagnosis and outcomes observed.

Results: Most common etiology was found to be urolithiasis (49.8%) followed by bladder outlet obstruction (31.1%). Kidney diversion/PCN was done in 12.82% patients, double J Stenting in 12.08%, percutaneous nephrolithotomy in 5.49% patients, ureterorenoscopy, insitu lithotripsy and stenting in 16.48%. Other procedures were TURP in 14.65%, suprapubic catheterization or optical urethrotomy in 7.32% and TURBT in 8.05%. However, 6.22% patients failed to improve despite adequate management and were put on maintenance hemodialysis. Eleven (4.07%) expired during the course of management.

Conclusion: The leading cause of obstructive uropathy was urolithiasis. Ultrasound guided percutaneous nephrostomy and double J stenting were quick method of temporary urinary drainage, in cases with urolithiasis. Timely diversion of urine and subsequent skilled management can prevent the patients from progression to end stage renal disease.

Key Words: Hydronephrosis, Obstructive uropathy, Urolithiasis

Introduction

Obstructive uropathy (OU) is defined as structural obstruction to urine flow along the urinary tract, occurring anywhere from the external urethral meatus to the calyceal infundibula.¹ It can lead to dilatation of renal pelvis and calyces.² It is an urgent clinical entity, which nephrologists and urologists have to deal.³ It may be acute or chronic, complete or incomplete, unilateral or bilateral and can lead to rapid

deterioration in renal function and irreversible kidney damage if urinary drainage is not rapidly corrected.^{4,5} Obstructive uropathy accounts for 10% of the causes of acute renal failure and 4% of the cases of chronic end stage renal failure.⁶ It is classified on the basis of degree, duration, site of obstruction and whether it is bilateral or not. The degree of obstruction refers to whether the obstruction of the urine flow is partial or complete. Obstructive uropathy is categorized as acute and chronic regarding the duration of the obstruction. Acute obstruction occurs for shorter period of time, thereby renal parenchymal lesions are usually reversible. Chronic obstruction, after several weeks, causes permanent damage. In cases of chronic obstruction, the term obstructive nephropathy is also used.^{2,3}

The etiologies are diverse, which can be benign or malignant. Age is important determining factor.⁷ In our country the main etiologies in paediatric age group are uretero-pelvic junction obstruction, posterior urethral valves and meatal stenosis.⁸ In young patients calculi are the primary cause, while in older patients benign prostatic hyperplasia, calculi and malignancy are the common cause.⁹ The pattern of clinical presentation can be loin pain, lower urinary tract symptoms, fever, mass effect, urinary retention, anuria, impaired renal functions with uremic signs.¹⁰ It is a potentially life threatening condition if the obstruction is present bilaterally and immediate measures are required to drain the kidneys. Failing which, the patient's clinical conditions will deteriorate at a fast pace through uremia, water-electrolyte abnormalities and urinary infections with a consequent reduction of alertness and subsequent death.^{11,12}

Patients and Methods

It was a prospective cross-sectional study carried out at department of urology and renal transplantation, Benazir Bhutto Hospital, Rawalpindi, a public sector hospital which caters urology patients from all over Pakistan and is the sole department in entire north division. Data was collected over a period of three years (March 2013 to July 2016). All the patients presenting with obstruction in drainage of urine,

resulting in an elevated serum creatinine (> 1.5 mg/dl), were included in the study. Renal function was assessed with serum creatinine, blood urea, serum electrolytes including potassium, sodium, calcium and phosphate. Ultrasonography and DTPA renal scan were used to assess differential renal function and scarring. Radiological investigations included plain x-ray KUB, computerized tomography (CT) KUB and intravenous urogram (IVU) in selected cases. Management included percutaneous nephrostomy (PCN), emergency dialysis. Sepsis was controlled with antibiotics and finally surgery to relieve obstruction, where required.

Results

Out of the 273 patients, 171 (62.63%) were Males and 102 (37.36%) were Females. Age ranged from 16 to 86 yrs. (mean 54.1 yrs.). One hundred and fifty four (56.41%) patients were admitted through outpatient department and 119 (43.58%) through emergency. Severe derangement of creatinine (>10 mg/dl) was seen in 23.8%. It was seen that time elapsed since onset of uremic symptoms (nausea, vomiting, altered consciousness) and presentation to the hospital was greater than 2 weeks in 53.84%(Table 1). Majority(49.81%) patients had bilaterally obstructed urinary tract due to calculus. Renal calculi (28.57%) was the commonest cause (Table 2). Kidney diversion PCN was performed in 12.82%, while PCNL was performed in 5.49% (Table 3). Percutaneous Nephrolithotomy (PCNL) was done in 15 (5.49%) patients & uretero-rensoscopy (URS) with insitu lithotripsy and stenting was done in 45 (16.48%) of them. In 11 (4.76%) patients only urinary diversion or stenting was done which resulted in lowering of creatinine levels without any definitive procedure. Patients having BOO due to enlarged prostate were catheterized initially and then TURP was done in 40 (14.65%) patients, 20 (7.32%) patients had their renal profile derangement due to stricture urethra which was dealt with either suprapubiccatheterization or optical uretherotomy, 06 (2.19%) patients with neurogenic bladder were advised clean intermittent self catheterization (CISC). Patients having deranged renal profile because of upper tract obstruction due to bladder tumor, cystourethrosopy and transurethral resection of bladder tumor was done in 8.05% of them. Twenty nine (10.62%) of the patients settled with simple conservative therapy (urethral catheterization, medical therapy including supportive hemodialysis alone). However 6.22% of the patients failed to improve despite adequate management and were put

on maintenance hemodialysis. 11 (4.07%) expired during the course of management (Table 3).

Table 1: Baseline characteristics of study population

Baseline characteristics	Number(n)	Percentage(%)	
Gender	Males	171	62.6
	Females	102	37.4
	Total	273	100
	M:F	1.68:1	
Serum creatinine (mg/dl)	Mild (1.6 - 5.9)	117	42.9
	Moderate (6-10)	91	33.3
	Ssevere (> 10)	65	23.8
	Total	273	100
Patient admissions	From OPD	154	56.4
	From eemrgency	119	43.6
	Total	273	100
Time to presentation	< 2weeks	126	46.2
	> 2weeks	147	53.8
	Total	273	100

Table 2: Causes of obstructive uropathy

Aetiology	Number (n)	Percentage (%)
Renal calculi	78	28.57
Ureteric calculi	58	21.24
Enlarged prostate	51	18.68
Bladder tumor	34	12.45
Stricture urethera	20	7.32
Solitary obstructed kidney	11	4.02
Carcinoma prostate	08	2.93
Neurogenic bladder	06	2.19
Misc/medical cause	07	2.56
Total	273	100

Table 3: Treatment for obstructive uropathy in study population

Treatment	Number	Percentage
Kidney Diversion/PCN	35	12.82
DJ Stenting	33	12.08
PCNL	15	5.49
URS+Lithotripsy+Stenting	45	16.48
TURP	40	14.65
Optical Urethrotomy	20	7.32
TURBT	22	8.05
CISC	06	2.19
Conservative Management	29	10.62
Maintenance Therapy/RRT	17	6.22
Expired	11	4.07
Total	273	100

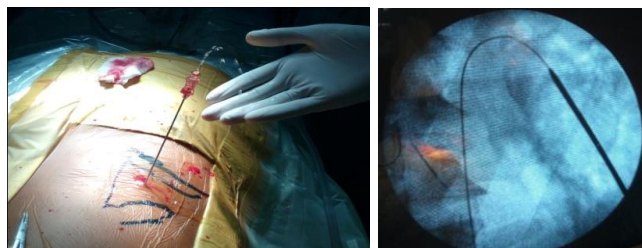


Fig.1. PCNL puncture under fluoroscopic guidance. Patient in prone position

Fig.2. fluoroscopic view showing guide wire (going into the ureter) and metallic dilator over the guide wire.

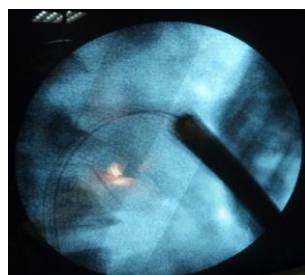


Fig. 3. Amplatz sheath over the dilators

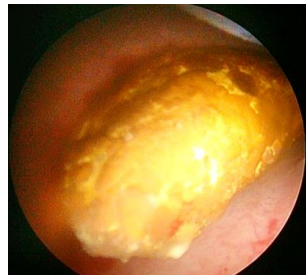


Fig.4. Endoscopic view of calculus in renal pelvis.



Fig.5. semi rigid ureterorenoscope.

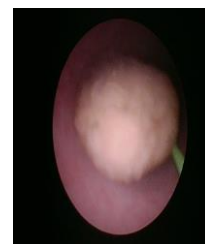


Fig.6 endoscopic view of calculus in the Rt. ureter



Fig.7.stone fragmentation in process by lithoclast.



Fig.8. stone completely fragmented into tiny pieces.

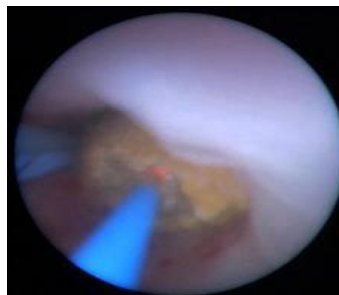


Fig. 9. Laser (Holmium Laser) induced stone fragmentation in Lt. Ureter.

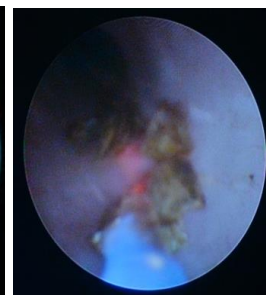


Fig.10. dusting of stone is in progress using Holmium laser.

Discussion

Obstructive uropathy, obstructive nephropathy and hydronephrosis are the terms used to describe a disease as a consequence of urinary tract obstruction, but each with different nuance. If ureteral dilatation due to impaired flow of urine is associated with renal parenchymal damage, it is described as obstructive uropathy.¹³ It is a potentially life threatening condition and immediate temporary relief of the obstruction is sometimes desirable, until definitive treatment can be undertaken. In our study, the commonest cause of

obstructive uropathy observed was stone disease . Urolithiasis has been also been reported as the main benign etiology of obstruction in others studies as well.^{14,15}

Another class of patients were those who have solitary function kidney with evidence of obstruction in their urinary tract due to calculi, the contralateral kidney being removed surgically as donar nephrectomy, non functioning kidney due to calculus and tumor nephrectomy or it was congenitally absent . For the initial management of patients with obstructive uropathy due to calculus having moderate to severe derangements in their renal profile, kidney diversion/percutaneous nephrostomy (PCN) was done in 12.28% patients and double J stenting was done in 12.08% patients with bilaterally obstructed urinary tract due to calculus, which results in lowering of serum creatinine towards normal and improvement in uremic symptoms. These patients were then observed for a period of 4 to 6 weeks and definitive treatment was planned to remove the cause of obstruction when serum creatinine was lowered towards normal. Percutaneous Nephrolithotomy (PCNL) was done in 5.49% patients removing calculus from kidney with placement of double J stent and ureterorenoscopy (URS), insitu lithotripsy was done in 16.48% patients removing calculus from ureter with the placement of double J stent for the period of 4 weeks. In several studies creating adequate urine outflow from the obstructed kidney by active surgical intervention has been reported as the method of choice for initial treatment irrespective of the disease stage and even in case of malignancy.¹⁶

The second commonest cause of obstructive uropathy in our study was bladder outlet obstruction (BOO) with impaired drainage of urine resulting in rise of serum creatinine, this class includes 31.13% patients, out of which 18.68% patients had enlarged prostate causing obstruction to the drainage of urine from bladder. Halle MP, et al also reported BPH as the second commonest cause of obstruction in their study.¹⁴ Our results are also similar to the literature were BHP accounted for 30% of obstruction in one series.¹⁸ Initially the patients having bladder outlet obstruction due to enlarged prostate were catheterized per urethra that results in drainage of urine and lowering of serum creatinine and then transurethral resection of prostate (TURP) was done in 14.65% patients.

Hydronephrosis is commonly encountered in cases of advanced malignancies, and the cause of obstruction may be the tumor invading the ureters, extrinsic

compression by a retroperitoneal primary or metastatic neoplasia. Cancer was the cause of obstruction in 32% of in the study done by Halle MP.¹⁴ This rate was very high compared to the study of El Iman in Soudan where cancer accounted only for 8% of cases.¹⁹ Our results are also comparable with other studies reported that obstruction can complicate 30% of cervical cancers.²⁰ Despite advances in early detection of prostate cancer, 10% of patients presented with locally advanced prostate cancer with upper urinary tract obstruction as their main symptoms.²¹ Initially these patients were managed by passing three way foley catheter with intermittent irrigation and then transurethral resection of bladder tumor (TURBT) was done in 22 (8.05%) patients.

In 10.62% patients renal functions settled with simple conservative therapy which includes urethral cathetrization, medical therapy and supportive hemodialysis alone without any definitive procedure. However there were 6.22% patients that failed to improve despite adequate management and were put on maintenance hemodialysis and renal replacementtherapy. There were 11 (4.07%) patients that expired during the course of management. Halle MP reported mortality rate of 22% in their study that was mostly associated to cancer of cervix and prostate and radiotherapy.¹⁴ These results are similar with other reports in which a malignant cause of obstructive uropathy is considered as a prognostic indicator of morbidity and reduced survival.²²⁻²⁴

Conclusion

- 1.Urolithiasis is the commonest cause of obstructive uropathy.For which ultrasound guided percutaneous nephrostomy and double J stenting is quick method of temporary relief of obstruction.
- 2.PCN is a suitable modality for drainage of pyonephrosis and ureteric obstruction due to distal ureteric calculus or malignant disease of pelvic origin which can otherwise be highly fatal.
- 3.Timely diversion of urine and subsequent skilled management can prevent the patients from sufferings of end stage renal disease.

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