



CLINICAL STUDY OF BILATERAL URINARY CALCULI WITH OBSTRUCTIVE UROPATHY

Surgery

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ABSTRACT

Introduction: Kidney stone disease is the most common cause of obstructive uropathy. Its prevalence and recurrence rates are increasing, with limited options of effective drugs. This study aimed at determining the clinical profiles of patients with bilateral urinary calculi with obstructive uropathy. Obstructive uropathy is one of the most common urological emergencies with an overall incidence of 20%. Epidemiologically obstructive uropathy accounts for the 10% of the causes of acute renal failure and 4% of the cases of end stage renal failure.

Method: The present study was carried out on patients admitted in surgery units of J.A. Group of hospitals and Gajra Raja Medical College, Gwalior after obtaining approval from institutional ethical committee. The present study is a prospective study and was conducted for a period of 14 months from October 2017 - December 2018. Following admission of patients of study population underwent complete urine analysis, urine culture and sensitivity, S. creatinine and complete blood count followed by ultrasonography. The postoperative follow up was done at 7 days, <1 month, 1-3 months, >3 months -1 year and S. Creatinine, S. Urea, Urine output, Urine analysis, Culture & Sensitivity, S. haemoglobin, S. electrolytes, need of re-dialysis was assessed and performed.

Results: Amongst, 37 study subjects, male preponderance was observed in 23 (62.16%). Almost half of the population (46%) lies in between 41 to 60 years of age. The most common symptom affecting the study population was flank pain (94.50%), burning micturition (48.60%) followed by increased frequency (10.80%) and haematuria (10.80 %). UTI was present in 23 (62.16%) patients. Recovery of renal function depends primarily on the extent and duration of obstruction. Location of calculi reveals solitary kidney in 5(13.50%), bilateral renal calculi in 7(18.90%), bilateral ureteric calculi in 2(5.40%) and renal with ureteric calculi in 23(62.16%) patients. The choice of initial management was either DJ Stent (21.60%) or percutaneous nephrostomy (69.10%) or both (10.80%). These methods are equally effective in our study. Haemodialysis was required in 3 patients.

Conclusion: Patient with bilateral urinary calculi with obstructive uropathy presented with significant impaired renal function, obstructive uropathy can affect any age group. Renal function was completely recovered with early management.

KEYWORDS

Obstructive uropathy, creatinine clearance, haemodialysis, Percutaneous nephrostomy.

INTRODUCTION

Obstructive uropathy, a relatively common condition refers to the mechanical or functional changes secondary to obstruction in urinary tract leading to derangement in renal function. Obstruction of urinary tract at any point from renal pelvis to distal urethra occurs in obstructive uropathy[1].

Obstructive uropathy is one of the most common urological emergencies with an overall incidence of 20%. Epidemiologically obstructive uropathy accounts for the 10% of the causes of acute renal failure and 4% of the cases of end stage renal failure [2].

Long-standing obstructive uropathy may ultimately lead to renal damage. Obstructive nephropathy typically involves dilation of the collecting system and tubules with progressive ischemia of the cells of the renal tubules leading to atrophy and interstitial fibrosis [3].

The causes of obstructive uropathy vary with age and gender. In older men, benign prostatic hypertrophy and prostate cancer are the most common causes. In young men and women, nephrolithiasis is the most common cause. Hydronephrosis is a usual situation in the course of advanced malignancies (cervical, bladder, prostate, or colorectal cancer) in adults and the cause of obstruction may be invasive-infiltration of the ureters by tumour extrinsic compression by a retroperitoneal primary or metastatic neoplasia, and this may be aggravated by periureteral fibrosis, secondary to previous chemotherapy and radiation therapy[4,5].

Obstructive uropathy 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 [6, 7].

Obstruction is a relatively common cause of community-acquired kidney injury [8-10]. The signs of obstructive uropathy are often nonspecific and variable depending on the time interval over which the obstruction occurred, the lateralization and the severity of obstruction. The pattern of clinical presentation can be loin pain, lower urinary tract

symptoms, fever, mass effect, urine retention, anuria, nausea, vomiting and impaired renal function with uremic signs [10-12].

Regardless of the patient's age, appropriate diagnosis, and prompt surgical or interventional drainage is necessary to avoid irreversible renal damage. These procedures may be in form of PCN insertion or double J ureteral stent. It is often reversible, and the degree of renal recovery depends primarily on the extent and duration of the obstruction together with the presence or absence of any other comorbidity [13] such as diabetes, hypertension, or tuberculosis.

Globally, kidney stone disease is the most common cause of obstructive uropathy. Its prevalence and recurrence rates are increasing [14], with limited options of effective drugs. Urolithiasis affects about 12% of the world population at some stage in their lifetime [15]. It affects all ages, sexes, and races [16, 17] but occurs more frequently in men than in women within the age of 20-49 years[18].

Obstructive uropathy needs high clinical suspicion and urgent diagnostic and therapeutic workout. Therefore in this study we determined the patterns of presentation, the causes, management and outcome of patients with obstructive uropathy with bilateral urinary calculi in a tertiary centre, J.A. Group of Hospitals, Gwalior with the aim to improve the knowledge and awareness among the patients of our community.

MATERIALS AND METHOD

The present study was carried out on patients admitted in surgery units of J.A. Group of hospitals and Gajra Raja Medical College, Gwalior after obtaining approval from institutional ethical committee.

The present study is a prospective study and was conducted for a period of 14 months from October 2017 - December 2018. All the 37 cases of bilateral urinary calculi with obstructive uropathy were explained about the study and informed consent was obtained. Details of all cases were recorded including history, clinical examination, and complete investigations. It includes blood examination such as

haemoglobin, serum creatinine, blood urea, serum sodium, serum potassium and urine for routine and microscopic examination (R/M) and for culture and sensitivity (C/S).

In Imaging Plain x-ray KUB, Abdominal ultrasonography (USG) and none contrast CT (NCCT). Initial part of the treatment for stabilizing the patient included relief measures as double J ureteral stent or percutaneous nephrostomy (PCN) drainage and dialysis as required. Definitive treatment as URS, PCNL, open or laparoscopic stone removal was done later. All patients were put under strict clinical monitoring during the early postoperative period.

At the time of admission & after initial treatment (DJ stent or nephrostomy drainage and dialysis) Creatinine clearance (Ccr) was observed by Cockcroft D.W. and Gault M.H Prediction of Creatinine clearance from serum creatinine.

$$Ccr = (140 - \text{age}) (\text{wt kg}) / 72 \times \text{Scr (mg/100mL)}.$$

The postoperative follow up was done after 7 days, <1 month, 1-3 months, in between 3 months -1 year. Following investigations and parameters were evaluated- S. creatinine, S. urea, urine output, urine analysis with culture and sensitivity, haemoglobin, S. electrolytes and need of re-dialysis was assessed. Abdominal ultrasonography (USG) was performed after 2 weeks.

Evidence Of Total Recovery Was Judged By One Or More Of The Following Criteria

- Creatinine returning to normal level.
- Creatinine clearance estimation.
- Complete weaning from dialysis.
- Improvement in symptoms.

Statistical Analysis

The data obtained was continuous and was entered in excel sheet, where appropriate statistical test was applied using SPSS version 21.0.

RESULTS

In this study among 37 patients, 23 (62.16%) were males and 14 (37.83%) females. The male to female ratio was found to be 1.64:1.

Table-1: Gender Distribution

	No.	Percentage
Male	23	62.16
Female	14	37.83

Table-2: Illustrating The Distribution Of Urological Symptoms Among The Study Patients

Urological Symptoms	(N)	(%)
Flank Pain	35	94.5%
Burning Micturation	18	48.6%
Haematuria	4	10.8%
Frequency	4	10.8%
Urgency	3	8.10%
Incomplete Voiding	3	8.10%
Dysuria	1	2.70%

Table-3: The Distribution Of General Symptoms Among The Study Patients

General Symptoms	(N)	(%)
Nausea & Vomiting	17	45.9%
Generalized Weakness	17	45.9%
Fever	13	35.13%
Pedal oedema	10	27.02%

Table-5: Correlation Between Time Interval And Renal Recovery

Time interval*	Total recovery	Partial + No recovery
> 3 months	4 (10.81%)	1 (2.70%)
< 3 months	32 (86.48%)	5 (13.51%)

Time interval means time gap between disease onset and intervention or drainage (either PCN, DJ stent or both)

Table-6 A: The DJ Stent Placement

Type of Operative Intervention		Count (N)	N %
DJ stent left	N	29	78.3%
	Y	8	21.6%

DJ stent right	N	33	89.1%
	Y	4	10.8%

Table-6 B: Per Cutaneous Nephrostomy Drainage

		Count (N)	N %
Nephrostomy Left	N	20	54.05%
	Y	17	45.9%
Nephrostomy Right	N	11	29.72%
	Y	25	67.56%

Table-6 C: Per Cutaneous Nephrostomy Drainage With DJ Stent Insertion

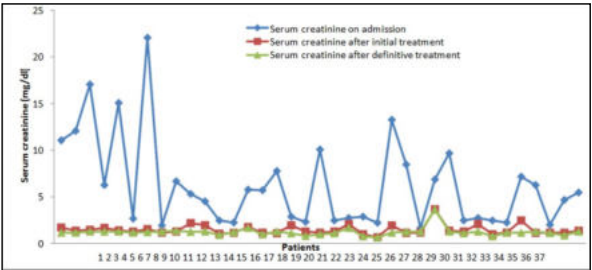
		Count (N)	N %
PCN + DJ	N	33	89.1%
	Y	4	10.81%

Table-6 D: Need of Dialysis

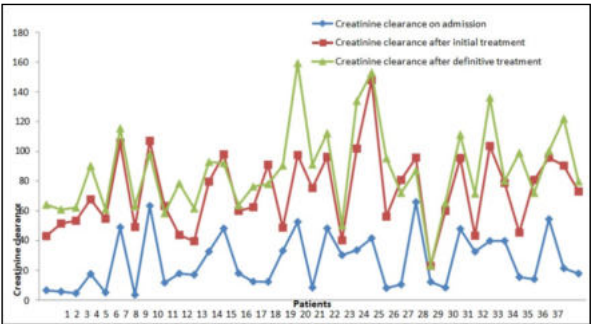
		Count (N)	N %
Dialysis is needed	N	34	1.80%
	Y	3	8.90%

Table-7: Definitive Management

		Count (N)	N %
URS Left	No	24	64.8%
	Yes	13	35.13%
URS Right	No	27	72.97%
	Yes	10	27.02%
PCNL	No	32	86.4%
	Yes	7	18.91%
Open	Left	3	8.10%
	Right	3	8.10%
	Both	16	43.24%



Graph-1: S. creatinine on admission and after initial treatment (either DJ stenting/PCN or DJ stenting + PCN) and definitive treatment



Graph-2: Creatinine Clearance On Admission, After Initial Treatment (DJ stenting/ PCN/ DJ stenting + PCN) And Definitive Treatment

DISCUSSION

Obstructive uropathy refers to the functional or anatomical obstruction of urinary flow at any level of the urinary tract. Obstructive nephropathy is present when the obstruction causes functional or anatomic renal damage. Globally, kidney stone disease is the most common cause of obstructive uropathy.

Our study has mean age of 40.21±3.57 years showing male predominance in prevalence of urinary stones, with male to female ratio 1.64:1. The prevalence of renal stones was found to be greater (86%) in age group of 20-60 years as in our study.

In this study male preponderance was found, with a male to female ratio 1.56:1. Most of the studies with renal pelvis stones and congenital

PUJ obstruction showed a ratio 1.6:1-1.2:1 in male and female respectively [19].

Hence the association of comorbid factors with renal calculi leading to the late presentation of patients with severe renal function and deterioration accompanied with obstruction is mainly due to urolithiasis in our study and cancer in other studies.

Hydronephrosis is a common situation in cases of advanced malignancies and the cause of obstruction may be invasion of the ureters by tumour, extrinsic compression by a retroperitoneal primary or metastatic neoplasia, similarly large single sized stones are also capable of causing hydronephrosis as in our study (moderate to gross hydronephrosis 65% on left side, while 70% on the right side). Those with bilateral obstruction the obstruction is frequently found on right in comparison to the left side while uretero hydronephrosis of 46.2% predominantly on left side [20].

The mean of serum creatinine on admission was 6.1, after drainage (PCN/DJ stent) 1.2 & serum creatinine fall up to 0.8 after 6 months of follow up. The mean of creatinine clearance was 25.76 on admission, post drainage 72.70 & after definitive treatment 86.78. Creatinine clearance and S. creatinine is showing significant improvement in renal recovery. During the entire follow up period only one patient does not show improvement in the serum creatinine and creatinine clearance because this patient was having comorbidities like DM, Hypertension, and very late presentation.

As ureteral stents are associated with intolerable lower urinary tract symptoms owing to due to secondary percutaneous nephrostomy. In our study 8 patients underwent DJ stent on left side of which 4 required nephrostomy and of 4 DJ stent procedures on right 2 required either PCNL or open surgery. Hence percutaneous nephrostomy is superior to ureteral stents for diversion of urine in patients with ARF or acute or chronic obstructive uropathy.

CONCLUSION

The present prospective study was conducted for a period of 14 months in which patients attending the OPD with symptoms of urinary calculi, which on subsequent investigation were found to suffer from bilateral Urinary Calculi with obstructive uropathy or solitary kidney having urinary calculi with obstructive uropathy.

Amongst, the 37-study subject, male preponderance was observed (1.64:1). Obstructive uropathy is the main feature of nephrolithiasis associated AKI. Recovery of renal function depends primarily on the extent and duration of obstruction. The initial part of the treatment was stabilizing the patient including relief measures as DJ stent or nephrostomy drainage and dialysis as per the patient requirement. Definitive treatment as PCNL, URS, and open stone removal was done later. The postoperative follow up was done at 7 days, <1 month, 1-3 months, >3 months -1 year and S. Creatinine, S. Urea, Urine output, Urine analysis, Culture & Sensitivity, S. haemoglobin, S. electrolytes, need of re- dialysis was assessed and performed.

On analysing results, it was observed that obstructive uropathy can affect any age group. Major the population lies in between 21-40 years and the major symptoms for hospital arrival in the present study are flank pain and/or burning micturition associated with vomiting and/or generalised weakness. Tobacco smoking was highly prevalent among 10(27.02%), followed by hypertension (8.10%), diabetes (5.4%) and tuberculosis (5.4%).

The values before and after operative intervention were found to be statistically highly significant as far as differences in values of Hb, S. urea, Creatinine Clearance were concerned while S. creatinine took long to return to normal levels i.e. 1- 3 months after initial drainage.

Urgent intervention is needed in a patient with obstructed, infected upper urinary tract, impending renal function, intractable pain/ vomiting/ anuria /high grade obstruction of solitary kidney. Relief of upper tract obstruction may require either antegrade (percutaneous nephrostomy) or retrograde (cystoscopy and retrograde ureteral catheterisation) approaches. These both initial measures (Percutaneous Nephrostomy/ Double J Stent) are equally effective to relieve obstructive symptoms or prevent ESRD in our study.

Close collaboration between nephrological, urological and

radiological services is required to deal with obstructive uropathy.

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