Factors Predicting Outcome in Patients with Obstructive Anuria

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Abstract: *Our aim was to study factors predicting outcome of patients with obstructive anuria. 95 patients with obstructive anuria were evaluated over 10 years for following factors: Age, duration of anuria, co-morbid conditions, Hemoglobin<12g%, Serum creatinine, WBC count>12000, urine culture, hyperkalemia, acidosis, previous history of calculus disease, presence of sepsis, need for dialysis and post obstructive diuresis. Patients known to have CKD were excluded from the study. Commonest cause was Ureteric/PUJ calculi (69/95) followed by pelvic malignancies (24/95). 65/95 patients were between 40-60 years. 52 patients presented after 48 hours of anuria. 41/95 were diabetic. 6 patients had previous history of calculus disease. 50 patients presented with sepsis. 55 patients presented with uremia and acidosis, while 23 patients had hyperkalemia. All patients with uremia were dialysed prior to intervention. 51 patients had WBC count of >12000 & 45 patients had positive urine culture. DJ stenting was done in 135 renal units while percutaneous nephrostomy (PCN) was done in the 47 renal units. 73 patients had post obstructive diuresis with 63 of them showing normal creatinine level on 10th post intervention day. 29/95 developed CKD of which 7 required maintenance dialysis. Statistical significance was found by univariate and multivariate analysis. Age, duration of anuria, Hemoglobin level, hyperkalemia and positive urine culture were found to be poor prognostic factors. On multivariate analysis age was found to be the only significant independent prognostic factor. In patients with post obstructive diuresis, there is 86.3% possibility of patient not developing CKD.*
Key Word*: Anuria, Predictive factors, DJ stenting, nephrostomy*

I. Introduction

Anuria is defined as urine output of < 100ml over 24hrs. Obstructive Anuria is due to upper urinary tract obstruction. Anuria is a urological emergency and can be due to bilateral ureteric obstruction or unilateral ureteric obstruction of solitary kidney or the only functioning kidney. After the onset of obstruction, there is increased intrapelvic pressure, resulting in pyelolymphatic and pyelovenous urine back flow as well as fornix rupture and urine extravasation.[1] Therefore, the obstruction of the urinary tract causes significant kidney damage. Prompt and early intervention can save the patient from developing irreversible renal damage. Patient presentation varies with primary cause or complications. Management includes resuscitation and urgent relief of obstruction. After relief of obstruction, kidney and life of the patient can be saved, results are better if obstruction is relieved earlier. After relieving the obstruction there is improvement in concentrating and acidifying ability of the kidney[2]. Our aim was to study factors predicting outcome of patients with obstructive anuria.

II. Material And Methods

95 patients with obstructive anuria were evaluated over 10 years from April 2009 to April 2019 for following factors: Age, duration of anuria, co-morbid conditions, Hemoglobin<12, Serum creatinine, WBC count>12000, urine culture, hyperkalemia, acidosis, previous history of calculus disease, presence of sepsis, need for dialysis and post operative diuresis. All patients were evaluated with history, clinical examination, blood investigations (Complete blood counts, Renal function tests, Arterial blood gas analysis) and radiological investigations (Ultrasonography and non contrast CT scan). Patients known to have CKD were excluded from the study. Need for Dialysis was decided by clinical status and blood chemistry.Urinary drainage was done by ureteric stenting or percutaneous nephrostomy.

III. Result

Most of the patients were between the age of 41-60 years (43/95), with female preponderance. Out of 95 patients 44 patients presented within 48 hours while 52 presented after 48 hours. Patients were divided into three groups based on the etiological factors. Table 1.1, Table 1.2 & Table 1.3 shows the distribution of patients according to the etiology.

Table 1. 1 Etiological Factors

Etiology	No. of Patients	Percentage
Calculus disease	69/95	72.63%
Malignancy	24/95	25.26%
Retroperitoneal Fibrosis	2/95	2.10%

Table 1.2 Types of calculus

Calculus disease	No. of Patients
Bilateral ureteric calculi	37/69
Bilateral PUJ calculi	13/69
PUJ with ureteric calculi	11/69
Solitary kidney with ureteric calculus	8/69

Table 1.3 Types of pelvic malignancies

Pelvic Malignancy	No. of Patients
Ca Cervix	14/24
Ca Rectum	7/24
Ca Endometrium	3/24

DJ stenting was done in 135 renal units while percutaneous nephrostomy was done in 47 renal units. Table 2 shows distribution of patients based on the etiology.

Table 2. Treatment based on etiology

Etiology	No. Of Patients	Renal Units	No. of renal units treated by DJ Stentings	No. of renal units treated by PCNs
Bilateral Ureteric calculi	37	74	63	11
Bilateral PUJ Calculi	13	26	15	11
PUJ with Ureteric Calculus	11	22	17	5
Solitary Kidney with Ureteric calculus	8	8	7	1
Ca Cervix	14	28	17	11
Ca Rectum	7	14	10	4
Ca Endometrium	3	6	2	4
Retroperitoneal fibrosis	2	4	4	0

We studied the correlation of all the factors with outcome of the patient. The development of CKD increased as the age progressed and it was found that there is significant association of increasing age with development of CKD (p= 0.00001 by Chi square test). The risk of developing CKD is 12 times more when the age is > 60 years (By Odds ratio). Association of duration of anuria and development of CKD despite of intervention was studied as shown in Table 3.

Table 3. Association of duration of anuria and development of CKD despite of intervention

Duration Of Anuria	Total Patients	Patients developing CKD
≤ 48 hours	43	6/43
> 48 hours	52	23/52

43 patients presented within 48 hours of anuria, out of which 6 patients developed CKD despite of stenting. However 23 out of 52 patients developed CKD despite of stenting who presented after 48 hours of anuria. There is significant association between duration of anuria with development of CKD (p= 0.001424 by Chi square test). 6 patients had previous history of calculus disease, out of which 4 developed CKD. However there was no significant association of previous history of calculus disease with outcome. We also studied if

there is association of co-morbid conditions (Diabetes, Hypertension) with the outcome. We found that there is no significant association of either of the two co-morbid conditions with the outcome.

Association of haemoglobin level and development of CKD was studied as shown in Table 4.

Table 4. Association of Hemoglobin level and development of CKD despite of intervention

Hemoglobin level	Total Patients	Patients developing CKD
> 12 g %	78	15/78
≤ 12 g %	17	14/17

Out of 95 patients, 17 patients had haemoglobin level less than 12g%, of which 14 patient's creatinine value did not come to normal level despite of stenting. While 78 patients had haemoglobin level more than 12g %, of which only 15 patients creatinine remained high post intervention. We found that there is significant association of haemoglobin level with the development of CKD (p=0.00001 by chi square test). Leucocytosis (WBC count >12000) was also studied in relation to the outcome. 51 out of 95 patients had leucocytosis, of which 19 patients developed CKD, while 10 patients out of 44 having normal WBC count developed CKD post procedure. On statistical analysis WBC count had no significant association with the outcome of patient. The presence of hyperkalemia and acidosis was also studied. We had 23 patients with hyperkalemia of which 12 patients developed CKD despite intervention, while 17 out of 72 patients without hyperkalemia were seen to develop CKD despite of intervention. It was seen that there was a significant association of hyperkalemia with the outcome of patient (p=0.009611 by chi square test). Similarly the presence of acidosis was also taken into consideration in respect to outcome and it was found to be a non significant factor (p=0.4193 by chi square test). Pre-intervention dialysis and post-op diuresis were studied and the results found are shown in table 5.

Table 5. Co-relation of pre-intervention dialysis and post-op dieresis with the outcome.

		High Se. Creatinine (despite of intervention)	P value (chi square test)	Statistical significance
Dialysis	Required (n=52)	23/52	0.001424	Significant
	Not required (n=43)	6/43		
Post-op Diuresis	Present (n=73)	10/73	0.00001	Significant
	Absent (n=22)	19/22		

It was found that there is 86.3% chance of patient not developing CKD when there is post-op diuresis.

Urine culture was done post intervention and the presence of UTI was found to be significantly associated with the patients creatinine level remaining high even after intervention (p=0.001192 by chi square test). Similarly the presence of sepsis was found to be significant prognostic factor (p=0.000556 by chi square test). Among all the factors studied, age was found to be statistically significant by multivariate analysis.

IV. Discussion
Anuria is an urological emergency and can be due to bilateral ureteric obstruction or unilateral ureteric obstruction in a solitary kidney. It leads to increase in intrapelvic pressure, resulting in pyelolymphatic and pyelovenous urine back flow and causes significant kidney damage. The mechanism of renal damage in obstruction is not well understood. However possible mechanism is high intrapelvic pressure and decrease renal blood flow. Reversibility of renal function depends upon the duration and degree of obstruction. Return of renal function depends upon many factors other than the duration and degree of obstruction, such as absence of infection, presence of intra-renal or extra renal pelvis in obstructed kidneys[3].

Obstructive uropathy accounts for 10% of community acquired acute kidney injury[4] and urolithiasis is responsible for 10–20% of obstructive uropathy. Emergency treatment of obstructive anuria depends on urinary diversion either by DJ stenting or percutaneous nephrostomy. Definitive treatment to be carried out depending on the etiology. Management of post obstructive diuresis to maintain fluid electrolyte balance is extremely important for better outcome. The pathogenesis of post-obstructive diuresis, a syndrome in which an exaggerated and inappropriate excretion of water and electrolytes follows release of urinary tract obstruction, is not completely clear. PCN is preferred over DJ stenting in pelvic malignancies and critically ill patients. Ahmed Harraz, Mohamed Zahran, et. al.[5] in their study said that higher serum creatinine and hemoglobin levels at presentation are associated with rapid recovery of renal function while previous episodes of obstructive uropathy and positive urine culture slow down the recovery process. Rashid Naseem Khan, Ejaz Ahmed Vohra et. al.[6] concluded that oliguria, levels of urea, creatinine and potassium were found significant poor prognostic predictors determining outcome of acute renal failure patients on univariate analysis as far as outcome of treatment modality is concerned, however the multivariate analysis revealed that the presence of oliguria is the only significant independent predictor (P<0.001) for good outcome with dialysis. Calculus anuria is a urological

emergency. Prompt and early intervention can save the life of patient and prevent to develop chronic renal failure.[7] Renal recovery in bilateral obstructive urolithiasis with renal failure is facilitated by timely urological intervention. A symptom duration of 625 days made renal recovery 22-times more likely[8].

V. Conclusion

Age, duration of anuria, Hemoglobin level, hyperkalemia and positive urine culture were found to be poor prognostic factors. On multivariate analysis age was found to be the only significant independent prognostic factor. In patients with post op diuresis, there is 86.3% possibility of patient not developing CKD. The risk of developing CKD is 12 times more when the age is > 60 years.

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