

Calculus Related Acute Renal Failure; Management Strategies

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Background. Urolithiasis is one of the most common and oldest disease of urinary tract. It is endemic in Pakistan and the incidence of calculus renal failure is high. This is due to poor initial management.

Methods. It is an observational study conducted at the Department of Urology, Services Hospital, Lahore from April 2001 to March 2003. In this study we evaluated the patients with calculus renal failure regarding their preoperative, operative, postoperative management and improvement in renal function after the removal of stones. Twenty patients, 13 male and 7 female were included in this study. The chief presenting symptom was anuria in 20 (100%) of patients. Ultrasonography, X-ray KUB and Ante-grade pyelography were the main investigations regarding the site, size of stone, degree of hydronephrosis and echogenicity of the kidneys. Percutaneous Nephrostomy alone, Acute Peritoneal Dialysis alone and Percutaneous Nephrostomy with Acute Peritoneal Dialysis were the emergency procedures performed to save the life of the patients and to plan for a definite surgical procedure. After the stabilization of the renal function, definite surgical procedure in the form of pyelo-lithotomy and ureterolithotomy were performed.

Results. Results were analyzed by considering the duration of anuria, degree of obstruction (hydronephrosis) and duration of maximum improvement. Overall thirteen (65%) patients had good result, five (25%) patients had satisfactory results and two (10%) patients had poor results. Anuria due to stones in the urinary tract is a urological emergency.

Conclusion. Prompt and early interventions can save the patient from developing irreversible renal damage.

Keywords. Urolithiasis, pyelolithotomy and ureterolithotomy.

Introduction

Urolithiasis is one of the most common and oldest diseases of urinary tract. A very high incidence is reported in Pakistan, Northern India, Thailand, Afghanistan, Turkey, Egypt, Japan, Indonesia, Middle East, Europe, Netherlands and Scandinavian countries^{1,2}.

Urolithiasis is endemic in Pakistan, the arid middle third of Pakistan having the high incidence³ Patient with stone disease may present with renal colic, florid pyelonephritis, gram-negative septicemia, haematuria or renal failure⁴. In western countries the stone as a cause of renal failure is uncommon⁵. In Pakistan the incidence of calculus renal failure is high⁶. This is due to poor initial management of this disease. Obstructive uropathy with resultant hydronephrosis is the eventual outcome of stone disease in most cases. Obstruction to the flow of urine whether complete or partial, leads to functional and later on structural changes in the kidney. Broadly speaking the extent of renal damage is related to the duration and magnitude of obstruction. In experimental animals it has been seen that extent of the renal damage is directly related to the duration and degree of the

obstruction. In the early stages of acute obstruction damage is reversible and is limited to the impairment in urinary concentration without structural damage. Pathological changes were noted as early as one week. In human kidney the reversal of renal function was noted after release of obstruction of longer duration than experimental animals. Some reversal of function was noted after 69 days of relief of complete obstruction⁷. In this study we will evaluate the patients with calculus renal failure regarding their pre operative, operative, postoperative management and improvement in renal function after the removal of stone.

Aims and objectives

- ◆ To evaluate renal impairment and its relationship to the duration of ureteric obstruction in patients with stone disease.
- ◆ To evaluate improvement in renal functions after removal of stones in-patients with acute renal failure.

Material and Methods

This study was conducted at the Urology Department, Services Hospital, Lahore. (Teaching

hospital attached with Postgraduate Medical Institute, Lahore) from April 2001- March 2003. Twenty patients were included with anuria of two days duration and serum creatinine more than 2 mg/dl. Patients with acute tubular necrosis, and acute glomerulonephritis were excluded from the study. On admission detailed history of pain, fever, haematuria, and uremic symptoms with durations were recorded. Urine output between 0-100 ml/24 hours was regarded as anuria.

General and systemic examination was done and positive findings were recorded. On admission blood complete examination, blood urea, serum creatinine, serum electrolytes and urine examination were recorded with date. Plain X-ray abdomen and pelvis was taken for size and site of stone in the urinary tract. Renal ultrasonography was performed in all cases for (1) size of stone (2) site of stone (3) degree of hydronephrosis, (4) echogenicity and (5) renal cortical thickness (Table 1). With plain X-ray a b d o m e n , p e l v i s

Table 1. Renal ultrasound in calculus Acute renal failure: N=20

Findings	Number of Patients
Bilateral marked hydronephrosis	1
Moderate hydronephrosis on one Side and other kidney absent.	7
Moderate hydronephrosis on one side and other kidney echogenic.	10
Moderate hydronephrosis on one side and other with marked hydronephrosis.	1
Marked hydronephrosis on one Side and other kidney was echogenic.	1

and renal ultrasonography there was no difficulty regarding localization of stones. In patients with radiolucent ureteric stone, antegrade pyelography were performed, to determine the level of obstruction.

Percutaneous nephrostomy under ultrasound guidance was performed, if the patient had not developed uremic symptoms but was anuric, in patients with symptoms of uraemia when dialysis was not indicated and in patients with severe symptoms of uraemia along with dialysis. Acute peritoneal dialysis was done when there was fluid overload with pulmonary edema, raised blood urea more than 200mg/dl,

hyperkalemia with serum potassium > 6.5 mEq/l and when patient was confused or stuporosed. Suitable operative procedure was performed to remove the stone. Condition of the kidney at operation was recorded when possible. Postoperative urine output was recorded daily during hospital stay of the patient. Blood urea, serum creatinine and serum electrolytes were recorded weekly or when required during hospital stay. Renal ultrasound examination was performed for checking residual stone, degree of hydronephrosis and echogenicity. Percutaneous nephrostomy, haemo-dialysis, peritoneal dialysis or renal scan was performed where required.

Results were analyzed by considering the duration of anuria / oliguria, degree of hydronephrosis and duration of maximum improvement after removal of stone. Results were considered good, when the serum creatinine returned to normal range i.e. 0.7-1.5mg/dl, satisfactory when serum creatinine was 1.5 - 3 mg/dl, and poor when serum creatinine was more than 3mg/dl. Patients were followed monthly for three months to see the improvement in renal function by recording (1) blood urea (2) serum creatinine (3) blood complete (4) albuminuria (5) renal ultrasound (6) control of hypertension and (7) general condition of the patient.

Results and Observations

Among 20 patients, 13 were male and 7 were female. The age range of the patients was between 27-64 years. Mean age was 45 years. The duration of anuria varied between 12 hours to 16 days. The chief presenting symptom in 20 (100%) patients was anuria associated with renal colic. Fifteen (75%) patients presented with anuria of 0-5 days duration. Twelve (60%) patients had associated uremic symptoms. Three (15%) patients had associated haematuria; two (10%) had pyuria. In eight (40%) patients there was obstruction in the solitary kidney while two (10%) had bilateral obstruction. In ten (50%) patients, one kidney was obstructed while the other was non-functioning. Eleven (55%) patients had previous history of stone disease, three (15%) patients had history of passage of stone, six (30%) patient had history of nephrectomy, and two (10%) patients had history of pyelolithotomy. Family history of urinary tract stone disease was present in three (15%) patients. The plain X-ray abdomen and pelvis visualized stones in 11 patients and in remaining 9 patients stones were not visualized. Ultrasonography had shown hydronephrosis on the affected site.

Percutaneous Nephrostomy was done in thirteen (65%). In five patients along with percutaneous

one patient only A.P.D (acute peritoneal dialysis) was done. In one patient retrograde catheterization was done. (Table 2). Left pyelolithotomy was done in three (15%) patient. Right pyelolithotomy was done in two (10%) Bilateral pyelolithotomy was done in one patient. Right ureterolithotomy was done in nine (45%) patients and left ureterolithotomy in five (25%).

Table 2. Emergency management in calculus Acute renal failure. N =20

	No of Patients
Percutaneous Nephrostomy.	13
Right.	7
Left.	4
Bilateral.	2
PCN and acute peritoneal dialysis.	5
Acute peritoneal dialysis.	1
Right retrograde catheterization.	1

Analysis of Results:

Results were analyzed according to the duration of anuria and degree of hydronephrosis.

• Duration of Anuria:

Fifteen (75 %) patients came within 5 days of anuria. Out of which eleven (73.3%) had good result and four (26.6%) had satisfactory result.

Four (20%) patients came with history of anuria of 6-10 days. Out of which two (50%) patients had good results, one (25%) had satisfactory results and one (25%) had poor results. One (5%) patient came with the history of 15 days of anuria and had poor results.

• Degree of Hydronephrosis:

Eighteen patients had moderate hydronephrosis on one side while the other kidney was diseased or absent. Among them thirteen patients (65%) had good results, five patients (25%) had satisfactory results.

One patient with bilateral marked hydronephrosis had poor result.

One patient with unilateral marked hydronephrosis and other kidney was echogenic also had poor results.

Discussion

Urolithiasis is common in the subcontinent with high incidence in Punjab. This disease is responsible for much of the morbidity by causing severe symptoms leading to loss of work time and economic resources. In Pakistan the incidence of calculus renal failure is high. This may be due to initial mismanagement, ignorance, illiteracy, poverty or fear of surgery. The personal history of most of these patients revealed that they seek help from hakims, quacks and homeopaths, which not only misguide them but also were responsible in the delay of treatment.

Anuria is a common presentation and is classified into three groups, pre-renal, renal, and post-renal. Anuria occurs in patients with ureteric obstruction in a solitary kidney, obstruction in the only functioning kidney and in bilateral obstructed kidneys. 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. In one experimental study where there was severe partial obstruction of the ureters for 60 days the reversibility of renal function was only 8% over a period of one month after the relief of obstruction⁸. In a clinical study it was proved that prolonged obstruction caused irreversible renal damage⁹. 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 kidneys¹⁰.

In this study we have analyzed that patients who came within five days of anuria had better results than those who came late. Results in patients above ten days of anuria were poor. This is due to prolong obstruction-causing irreversible damage to the renal parenchyma. Patients with marked hydronephrosis and poor renal substance had poor results as compared to those with moderate hydronephrosis and good renal substance. It was also observed that maximum improvement in serum creatinine was achieved within two weeks after release of obstruction. These results are comparable with results of Tataranni et al (1987). He reported maximum improvement in serum creatinine between 9-26 days after the release of obstruction of 2-14 days duration.

Acute renal failure due to calculus disease is a urological emergency. Management in form of urinary diversion (Percutaneous Nephrostomy), Acute Peritoneal Dialysis, Haemodialysis and definite surgical treatment can save the patient from developing chronic renal failure^{11,12}

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Medical News

Reduction in cardiovascular mortality in type 1 Diabetes Mellitus with tighter control: New scientific evidence.

New research gives people with type 1 diabetes another reason to keep their blood sugar levels under control. It could cut their risk of heart disease in half. Previous studies have linked tight blood sugar control to lower risk of retinopathy, nephropathy and neuropathy. Now, the new findings send a very important message on the entire cardiovascular front. Still, there are substantial numbers who are not reaching the glucose levels that would benefit them.

Nathan and his colleagues followed 1,441 volunteers with type 1 diabetes who were enrolled in a study between 1983 and 1989. The patients were 13 to 39 years old when they took part in the study. Some of the patients were told to intensively control their diabetes to keep their hemoglobin A1c (HbA1c) levels as close as possible to the normal value of 6 percent or less. Other continued conventional therapy. Those who had intensively controlled their diabetes were less than half as likely as the others to have had heart attacks, strokes, angina, angioplasties or coronary bypass operations.