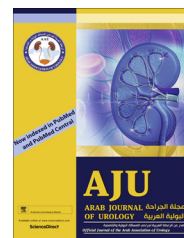




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# Predictors of renal recovery in renal failure secondary to bilateral obstructive urolithiasis



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## KEYWORDS

Calculus anuria;  
Obstructive  
urolithiasis;  
Renal failure

## ABBREVIATIONS

AUC, area under the  
ROC curve;  
CKD, chronic kidney  
disease;  
HR, hazard ratio;  
KUB, kidney, ureter,

**Abstract Objectives:** To identify factors predicting renal recovery in patients presenting with renal failure secondary to bilateral obstructing urolithiasis.

**Patients and methods:** Data from electronic records of consecutive adult patients presenting with bilateral obstructing urolithiasis between January 2007 and April 2011 were retrieved. Ultrasonography of the abdomen, and kidney, ureter, bladder (KUB study) X-ray or abdominal non-contrast computed tomography confirmed the diagnosis. Interventional radiologists placed bilateral nephrostomies. Definitive intervention was planned after reaching nadir creatinine. Renal recovery was defined as nadir creatinine of  $\leq 2$  mg/dL.

**Results:** In all, 53 patients were assessed, 50 (94.3%) were male, and 18 (33.9%) were aged  $\leq 40$  years. Renal recovery was achieved in 20 patients (37.7%). A symptom duration of  $\leq 25$  days ( $P < 0.01$ ), absence of hypertension ( $P = 0.018$ ), maximum renal parenchymal thickness of  $> 16.5$  mm ( $P = 0.001$ ), and haemoglobin  $> 9.85$  g/dL ( $P < 0.01$ ) were significant on unadjusted analysis. Symptom duration

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bladder;  
PCN, percutaneous  
nephrostomy;  
ROC, receiver operat-  
ing characteristic;  
US, ultrasonography

of  $\leq 25$  days alone remained significant after adjusted analysis. Symptom duration of  $\leq 25$  days (hazard ratio (HR) 13.83, 95% confidence interval (CI) 4.52–42.26;  $P < 0.01$ ), parenchymal thickness of  $\geq 16.5$  mm (HR 5.91, 95% CI 1.94–17.99;  $P = 0.002$ ), and absence of hypertension (HR 9.99, CI 95% 1.32–75.37;  $P = 0.026$ ) were significantly related to time to nadir creatinine. Symptom duration of  $\leq 25$  days (HR 17.44, 95% CI 2.48–122.79;  $P = 0.004$ ) alone remained significant after adjusted analysis. A symptom duration of  $\leq 25$  days ( $P = 0.007$ ) was 22-times more likely to indicate renal recovery.

**Conclusions:** Shorter symptom duration ( $\leq 25$  days) is predictive of renal recovery in renal failure secondary to bilateral obstructive urolithiasis.

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## Introduction

Renal failure secondary to bilateral obstructive urolithiasis has variable clinical outcomes, which are often dependent on the timing and nature of surgical intervention. The prevalence rate for urinary stones ranges from 1% to 20% and the incidence of hospitalisation for calculus disease ranges from 0.03% to 0.1% [1]. The estimated lifetime risk for urolithiasis is 11% in men and 7% in women with recurrence rates for renal stones reported as 14%, 35%, 52% at 1, 5 and 10 years, respectively [2]. The incidence of bilateral calculus disease varies between 6% and 20% amongst those presenting with urolithiasis [3]. Ureterolithiasis is the most common cause of obstructive uropathy, presenting with urosepsis [4]. Obstructing urinary calculus with urosepsis is an emergency and surgical decompression in the form of percutaneous nephrostomy (PCN) or ureteric stenting has been shown to reduce mortality from 19.2% to 8.8% [5].

Obstructive uropathy accounts for 10% of community acquired acute kidney injury [6] and urolithiasis is responsible for 10–20% of obstructive uropathy. Delay in relieving ureteric obstruction has been shown to worsen renal function and hypertension [7]. There are published studies on predictors of renal recovery in the subset of patients with renal insufficiency undergoing treatment for nephrolithiasis and in the subgroup of patients with bilateral obstructive urolithiasis and chronic kidney disease (CKD) [8,9]. There is a need for studies, which look at factors predicting renal recovery as well as investigate the pattern of renal recovery. Thus in the present study, we investigated the factors associated with renal recovery in bilateral obstructive urolithiasis and the pattern of renal recovery.

## Patients and methods

Electronic medical records at the Department of Urology, Christian Medical College, Vellore, India,

was retrieved from January 2007 to April 2011. Consecutive adult patients presenting with bilateral obstructing urolithiasis were included in the analysis. Institutional Review Board clearance was obtained. The clinical presentation comprised decreased urine output associated with flank pain, vomiting, fever, or pedal oedema.

Ultrasonography (US) of the abdomen with kidney, ureter, bladder (KUB study) X-ray or non-contrast CT scan was used to confirm the diagnosis. The interventional radiologists placed bilateral PCNs under US guidance; fluoroscopy was used to confirm the location. Local anaesthesia and sedation were used to perform the procedure under aseptic conditions. Broad-spectrum antibiotics were administered, which was later modified based on the urine culture report.

Patients who presented with severe metabolic acidosis, persistent hyperkalemia, or fluid overload underwent emergency haemodialysis before PCN placement. A urine sample obtained at initial puncture was sent for culture. Patients were admitted for at least 48–72 h, to monitor post-obstructive diuresis, and correct fluid and electrolyte imbalance. Serum electrolytes and renal function tests were monitored on a regular basis. Maximum renal parenchymal thickness was noted on US. Maximum parenchymal thickness refers to the parenchymal thickness on the healthier kidney. The time taken to reach nadir creatinine was documented. Nadir creatinine was defined as the lowest serum creatinine recorded during the recovery period. Patients were educated on the importance of PCN care, close medical supervision until nadir creatinine and definitive management of obstructing urolithiasis.

The variables studied included age, gender, duration of presenting symptoms, stone location and number and size, infection, maximum renal parenchymal thickness, time to nadir creatinine, and presence of co-morbid factors. Renal recovery was defined as nadir creatinine of  $\leq 2$  mg/dL. Several studies in the past have defined renal recovery as serum creatinine of  $< 2$  mg/dL or within 20% of the baseline value, partial renal

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