

# The Effects of Surgical Intervention on Renal Function in Patients Having Advanced Renal Failure due to Obstructive Nephropathy

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## SUMMARY

*During the period from March 1990 to November 1992, 52 patients were admitted in nephrology unit with uremia due to obstructive nephropathy. Mean initial serum creatinine was  $16.3 \text{ mg/dl} \pm 6.7$ . Nephro, or ureterolithiasis was the most common cause of obstruction to urine flow, i.e. 38 out of 52 patients. Forty two patients were subjected to various forms of surgical intervention after having dialysis. Serial blood urea and serum creatinine measurements were used to evaluate the renal status as a follow-up during hospital stay and later as out patient. Thirty two of these 42 patients (76%) showed improvement in renal functions after surgery. Improvement was shown in patients having decreased cortical thickness on ultrasound and markedly impaired renal function on DTPA renal scanning and renography. It is concluded that uremic features, markedly raised urea and creatinine decreased cortical thickness on ultrasound and markedly impaired function on DTPA renal scanning are not contra indications for surgery. Surgery should be attempted in every case to improve renal function.*

## INTRODUCTION

Obstructive nephropathy is one of the common causes of renal impairment. It effects both the glomerular and tubular functions<sup>1</sup>. There is a decrease in GFR, which is due to both decreased SNGFR and decreased number of functioning nephrons. If there is bilateral obstruction or obstruction of the single functioning kidney, renal failure may occur, which may be both acute or chronic. The condition is important to clinicians, because it is potentially reversible, if obstruction is relieved<sup>2</sup>.

The study was carried out to see the effects of relief of obstruction in patients with advanced renal failure.

## PATIENTS AND METHODS

This study includes all the patients who were admitted in nephrology unit of Shaikh Zayed

Hospital from March 1990 to November, 1992 with renal failure and after baseline investigations were found to have features of obstructive nephropathy. These patients had only obstructive nephropathy or, there was deterioration of already compromised renal functions (from other diseases) due to obstruction.

A thorough clinical assessment was done, keeping in mind features pointing to possible obstruction, e.g., history of renal/ureteric colics, anuria, finding of palpable kidney, bladder etc. Severity of impairment of renal function was evaluated by repeated urea (or BUN) and creatinine measurements. Investigations like CBC, x-ray chest, ECG, urine examination including culture arterial blood gases, serum electrolytes were done, for proper management.

Plain x-ray abdomen, and ultrasound were done in all cases. Ultrasound was done to note kidney size, echotexture, cortical thickness, hydronephrosis, hydroureter, pre and post-void bladder size, prostate

size, presence of stones and any other feature. I.V.P. was avoided, as all of the patients had renal failure, and radiocontrasts are known to be more nephrotoxic in this situation<sup>3</sup>. When feasible renography (with <sup>99m</sup>Tc-DTPA) was done, to assess renal functions. CT scan, retrograde pyelography and micturating cystourethrogram, and other tests were performed, if indicated to make diagnosis.

Various forms of relief measures, depending upon cause and availability were carried out. These included, catheterization of bladder and ureter, placement of double-pigtail stents, nephrostomy and uretero or pyelolithotomy. Depending upon clinical assessment and laboratory data, patients were dialyzed, before surgery.

After surgery renal functions were evaluated by means of serial estimation of urea (or bun) and creatinine. The patients were followed up as out patients. Last available creatinine was compared to pre-surgery levels (post-dialytic values, in patients having dialysis) and improvement in renal function was quantitated by following criteria.

1. Mild improvement - creatinine dropped by less than 25%.
2. Good improvement - creatinine dropped by 26-50%.
3. Very good improvement - creatinine dropped by 51-75%.
4. Excellent improvement - creatinine dropped by more than 75%.
5. No improvement if serum creatinine did not drop after surgery and patient needed chronic dialysis.

## RESULTS

There were 52 patients who were found to have obstructive nephropathy. Out of these 41 were males and eleven females (Table 1). Ages ranged from 19-80 years. Most of them were above 40 years of age, mean age being  $53.0 \pm 14.6$  years (Table 1).

Table 2 shows causes of obstruction. 38 patients were having obstruction because of calculi (renal or ureter).

Forty two patients underwent surgical intervention. Eight patients refused surgery and in two patients, surgery was not feasible. Thirty nine patients were subjected to acute peritoneal dialysis (APD) to stabilize for any type of surgical intervention. Number of two liter exchanges required for each APD ranged from 20-50. Out of remaining thirteen patients 5 patients were fit enough to have minor surgical intervention without prior dialysis, 6 patients refused dialysis and two refused both dialysis and surgery.

Table 3 shows biochemical data in the patients.

Initial serum creatinine ranged from 5.8-37.6 mg/dl. The mean initial serum creatinine was  $16.3 \pm 4.56$ .

Out of 42 patients who were subjected to surgery, 32 (76%) showed improvement in renal function (Table 4). Mean last creatinine in these patients was  $4.80 \pm 3.0$ . The improvement in serum creatinine ranged from 12-92% of the pre-surgical values. When the improvement in serum creatinine was quantitated according to criteria given previously, 11 patients showed excellent improvement, 12, very good, 6, good and 1 showed mild improvement.

**Table 1: Age and sex distribution.**

Total number of patients	52
Males	41
Females	11
Mean age of the patients	$53.0 \pm 14.6$

**Table 2: Causes of obstruction.**

Calculi	38
Papillary necrosis (in diabetics)	3
Neurogenic bladder	2
Enlarged prostate	2
Carcinoma urinary bladder	2
Stricture urethra	2
Reflux nephropathy	1
Lymphoma	1
Carcinoma cervix	1

**Table 3: Biochemical data.**

Mean initial serum creatinine	$16.3 \pm 67$
Mean last serum creatinine	$7.12 \pm 4.56$
Mean last creatinine of the patients, showing improvement	$4.80 \pm 3.0$

Seventeen patients showed signs of marked renal damage on ultrasound (decrease cortical thickness). Out of these 15 had surgical intervention and 11 (73%) improved. Three patients had excellent improvement, 5 very good, 2 good and 1 had mild improvement (Table 5).

Eight patients and <sup>99m</sup>Tc-DTPA scan to assess their renal functions. All of them had poor renal functions on renal scan. The results among these

patients are given in Table 6. One refused surgery and of remaining, 1 showed excellent improvement and 3 each, very good and good improvement.

**Table 4: Results of surgical intervention.**

Total number of patients	52
Surgical intervention done	42
No improvement	10 (24%)
Improvement after intervention	32 (76)
Mild improvement	3
Good improvement	6
Very good improvement	12
Excellent improvement	11

**Table 5: Results of surgical intervention in patients with signs of marked renal damage on ultrasound e.g. decrease cortical thickness.**

Number of patients with such findings	17
Surgical intervention done	15
No improvement	4
Improvement after intervention	11 (73%)
Mild improvement	1
Good improvement	2
Very good improvement	5
Excellent improvement	3

**Table 6: Results of surgical intervention in patient in whom radionuclide ( $^{99m}\text{Tc}$ -DTPA) studies were done.**

Number of patients	8
Patients with markedly impaired renal functions on scan	8
Surgical intervention done	7
Improvement after intervention	7
Mild improvement	0
Good improvement	3
Very good improvement	3
Excellent improvement	1

## DISCUSSION

Obstruction causes renal damage by various means. These include pressure atrophy, ischemic damage and damage due to fibroblastic proliferation<sup>2</sup>. The basic stimulus for all these, is high pyelocalyceal pressure<sup>1</sup>. The greater the severity and duration of obstruction, the greater will be the damage<sup>4</sup>. The important aspect in the

management of obstructive nephropathy is to release the obstruction. This study shows the impressive effects of relief of obstruction on renal function. Results of this study are comparable to that of Kumar et al.<sup>4</sup> but in that study only patients with pelviureteric junction were studied, whereas in this study patients with obstruction of diverse etiologies have been studied. There have been reports in the literature about acceptable renal function recovery after release of hydronephrosis<sup>5-9</sup>. These reports mostly include single or a few patients and dealt with unilateral hydronephrosis. Tubular functions were also studied and it was found that residual defect in ability of kidney in acidification of urine, conservation of bicarbonate and sodium reabsorption persisted after release of obstruction<sup>5-9</sup>. It is important to note that even patients with echogenic kidney and decreased cortical thickness on abdominal ultrasound and patients with poor functions on  $^{99m}\text{Tc}$ -DTPA scan showed improvement in renal function after release of obstruction in our study. The results of various renal scans like  $^{99m}\text{Tc}$ -DTPA,  $^{131}\text{I}$  hipurate and  $^{99m}\text{Tc}$ -DMSK are conflicting on superficial examination<sup>10-14</sup>. These discrepancies may be explain on the basis of method of examination. Scans evaluated by orbitary methmathatical analysis could predict accurately the chances of recovery of renal function<sup>15</sup>. Thompson and co-workers<sup>16</sup> have shown that patients in home DMSA uptake was more than 10% or greater than hipuran uptake, chances of recovery were greater as compared to those patients in home there was no difference between uptakes of these two radionuclides. Temporary nephrostomy and measurement of renal function after this is the only certain way to predict recovery<sup>17</sup>.

Various experimental and clinical studies had shown that recovery after relief of obstruction depends on factors like duration of obstruction<sup>4,18,19</sup>. Degree of obstruction, age of patients<sup>20</sup>, presence and absence of infection<sup>4,21</sup> and location of pelvis<sup>7</sup>, intra-renal and extra renal. Children and patients with infection, intra renal pelvis, complete obstruction and long duration of obstruction are likely to get more severe damage and less recovery of renal function after release of obstruction.

It is important to relieve obstruction in every case, even if there is evidence of marked renal damage. Improvement in renal functions may avoid or postpone the need of chronic renal replacement therapy.

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