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# Evaluation of the impaction of surgical intervention and its predictive factors in patients with chronic obstructive renal failure.

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## ABSTRACT

Objective: To evaluate results of surgical intervention in patients with chronic obstructive renal failure with assessment of some of the factors that may predict favorable outcomes. Patients and methods: Eighty-six patients diagnosed clinically with chronic obstructive renal failure (53 men and 33 women ranging in age between 25 and 69 years) included in this study from July 2022 to September 2025. The patients were divided according to history of renal impairment and/or regular dialysis into two groups: Group (A): Patients with no regular dialysis (46 patients) (28 males & 18 females. Group (B): Patients with regular dialysis (40 patients) (25 males & 15 females. All patients have been evaluated according to the protocol of obstructive uropathy preoperatively and followed up for 6 months post operatively. Results: Patients of group

A, showed improvement in 33 patients (71.74%), equivocal improvement in7 patients (15.22%) and did not improve in 6 patients (13.04). In patients of group B, renal functions showed different degrees of improvement as follow: In 14 patients (35%) good improvement and subsequent complete weaning from dialysis occurred, while in 16 patients (40%) there was a decrease in weekly dialysis sessions from 3 to 2 sessions/week. In the remaining 10 patients (25%) there was no improvement and patients continued to have regular dialysis as preintervention. The overall complications in this series were (12.79%). The incidence was much more in the chronic cases group B. Conclusion: There is evidence of reversibility of renal function after long standing obstruction which provides justification for efforts to identify and treat urinary tract obstruction even if a patient with an obstruction requires dialysis to avoid the dialysis or kidney transplantation or helping patients under dialysis for complete weaning form dialysis or decrease their number of weekly sessions, and in all cases the risk of the procedures should be weighed against the chances of improvement.

**Keywords**: Chronic obstructive renal failure, dialysis, surgical intervention.

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## 1. INTRODUCTION

Renal insufficiency describes a measurable reduction in renal function with normal serum biochemical values. Renal failure is an advanced stage of renal insufficiency in which renal function deteriorates to the extent that homeostatic mechanisms are impaired and serum biochemical parameters are disturbed [1]. Obstructive uropathy refers to the functional or anatomic obstruction of urinary flow at any level of the urinary tract. Obstructive nephropathy is present when the obstruction causes functional or anatomic renal damage [2]. The diagnosis of obstruction as the cause of renal failure is important, as it is correctable. Relief of such obstruction may cure acute renal failure due to post-renal etiology or convert the situation in cases of chronic renal failure from advancing progressive disease to stable renal insufficiency compatible with comfortable life [3]. Having preoperative predictors of renal recovery may ensure optimal patients selection, reducing the number of procedures and economic burden on the patient who does not require intervention [4].

## 2. PATIENTS AND METHODS

This prospective observational study included 86 patients clinically diagnosed as having chronic obstructive renal failure (53 men 61.63% and 33women 38.37% ranging in age between 25 and 69years, Mean ± SD47 years) in the period from July 2022 to September 2025. The patients in this study were divided into two groups as follow: Group (A): Patients with chronic renal failure with no regular dialysis (46 patients) Males: 28(60.86%) Females: 18 (39.14%). Group (B): Patients with chronic renal failure with regular dialysis (40 patients) Males: 25(62.5%) Females: 15 (37.5%). All patients were evaluated by full medical history, complete general and urologic examination, complete urine analysis, urine culture and sensitivity, creatinine clearance, fluid input /24 hours, urine output /24 hours, blood chemistry with special request for: serum creatinine, serum sodium (Na), potassium (K) and bicarbonate (HCO3). Imaging studies included a Plain X-ray urinary tract (PUT): PUT was done to all the patients, abdominal ultrasonography (US), Diuretic renography: Technetium-99m diethylenetriaminepenataaceticacid (99mTc DTPA) was used for diuretic renography according to the standard protocol with 40 mg of furosemide injected 20 minutes after injection of the radiotracer, Magnetic resonance urography (MRU): MRU was done to some patients who had nuclear cause of hydronephrosis to diagnose the possible cause of obstruction.

**Preliminary Procedures**: Eighteen patients (20.93%) 10 cases (21.74%) of group A and 8 patients (20%) of group B underwent preliminary ultrasonic guided percutaneous nephrostomy (PCN). Preintervention dialysis was performed urgently to 10 patients of group A and all patients of group B to improve the general condition and physical fitness of those patients for anesthesia and surgery.

**Definitive treatment:** Some patients receive one type of surgical intervention, but others receive two or more types of surgical intervention together as follow: Ureterolithotomy was performed to 36patients {19 group A (41.3%) and 17 group B (42.5%)}. Pyelolithotomy was performed to 24 patients {14 group A (30.43%) and 10 group B (25%)}. Ureteroscopy (URS) was performed to 18patients {10 group A (21.74%) and 8 group B (20%)}. Endoscopic endodilatation of the lower ureter was performed to 8 patients {5 group A (10.87%) and 3 group B (7.5%)}.Postoperative **follow up**: All patients were put under strict clinical surveillance during the early postoperative days with the following assessments performed on day +1 and+3; urine output, serum creatinine, serum electrolytes (K, Na & HCO3) and blood gases. In addition to PUT and creatinine clearance were performed on day +3. Late follow up: The duration of follow up ranged from two weeks to six

months after definitive procedures. All patients were followed after a period of two weeks and six months by the following: urine analysis with culture and sensitivity test (when indicated), serum creatinine, serum electrolytes (K, Na & HCO3), creatinine clearance, abdominal ultrasonography (US), diuretic renography and state of redialysis to evaluate the results of our surgical intervention.

**Improvement evaluation:** Evident improvement was judged if one or more of the following criteria were fulfilled: Creatinine returned to the normal as matched to the patient's age and gender, creatinine clearance increased by 20ml/min or more or complete weaning from dialysis occurred. Equivocal improvement was judged if one or more of the following criteria were fulfilled: Creatinine decreased but still above the normal as matched to the patient's age and gender or the number of weekly dialysis sessions decreased. Otherwise, patients were considered as having no improvement.

## 3. RESULTS

In our series patients with chronic obstructive renal failure (group A), showed improvement in 33 patients (71.74%), equivocal improvement in7 patients (15.22%) and did not improve in 6 patients (13.04). Out of the 6 patients who did not improve after management 2 patients (4.35%) remained unchanged and 4 patients (8.68%) continued to have progressive renal failure up to regular dialysis. In patients with chronic obstructive renal failure (group B), renal functions showed different degrees of improvement as follow: In 14 patients (35%) good improvement and subsequent complete weaning from dialysis occurred, while in 16 patients (40%) there was a decrease in weekly dialysis sessions from 3 to 2 sessions/week. In the remaining 10 patients (25%) there was no improvement and patients continued to have regular dialysis as preintervention. The overall complications in this series were (12.79%). The incidence was much more in the chronic cases group B. The mortality rate in our series is (2.33%) which is not high if compared with other series dealing with corrective surgery in obstructive renal failure.

Our study revealed no statistically difference noted between post-operative improvement and preoperative creatinine, creatinine clearance, serum k, serum sodium (P value > 0.05) (Table 1), serum bicarbonate, pre-operative etiologies of obstruction, types of intervention and the presence of pre-operative urinary tract infection (P value > 0.05) (Table 2).

On the other hand, this study revealed high significant correlation between post-operative improvement and preoperative parenchymal thickness, corticomedullary differentiation, parenchymal echogenicity (P < 0.01) (Table 3) and pre-operative radioisotope glomerular filtration rate (P < 0.01) (Table 4). In this series septic shock occurred in 1 patient (1.16%) and myocardial infarction occurred in 1patient (1.16%) after direct surgery in group B. The mortality rate in our series is (2.32%).

**Table 1: Correlation between preoperative creatinine, creatinine clearance, K+, Na+, and improvement among studied groups.**

| **Groups** | **Mean preoperative creatinine (mg/dl)** | **No of patients** | **Improvement** | **No Improvement** | **P value** |
|---|---|---|---|---|---|
| Group A (n = 46) | Cr < 4 | 22 | 19 (86.36%) | 3 (13.63%) | > 0.05 NS |
| | Cr > 4 | 24 | 21 (87.5%) | 3 (12.5%) | |
| Group B (n = 40) | Cr < 4 | 19 | 15 (78.95%) | 4 (21.05%) | > 0.05 NS |
| | Cr > 4 | 21 | 11 (71.43%) | 6 (28.57%) | |
| **Groups** | **Mean preoperative CcR (ml/min** | **No of patients** | **Improvement** | **No Improvement** | **P value** |
| Group A (n = 46) | CcR < 30 | 28 | 24 (82.14%) | 4 (17.86%) | > 0.05 NS |
| | CcR > 30 | 18 | 16 (88.89%) | 2 (11.11%) | |
| Group B (n = 40) | CcR < 30 | 23 | 17 (73.91%) | 6 (26.09%) | > 0.05 NS |
| | CcR > 30 | 17 | 13 (76.47%) | 4 (23.53%) | |
| **Groups** | **Mean preoperative K+** | **No of patients** | **Improvement** | **No Improvement** | **P value** |
| Group A (n = 46) | K+ < 5 | 19 | 17 (89.47%) | 2 (10.53%) | > 0.05 NS |
| | K+ > 5 | 27 | 22 (85.19%) | 4 (14.81%) | |
| Group B (n = 40) | K+ < 5 | 14 | 10 (71.43%) | 4 (28.57%) | > 0.05 NS |
| | K+ > 5 | 26 | 20 (76.92%) | 6 (23.08% | |
| **Groups** | **Mean preoperative Na+** | **No of patients** | **Improvement** | **No Improvement** | **P value** |

| | | | | | |
|---|---|---|---|---|---|
| Group A (n = 46) | Na+ < 135 | 22 | 20 (90.91%) | 2 (9.09%) | > 0.05 NS |
| | Na+ > 135 | 24 | 20 (83.33%) | 4 (16.67%) | |
| Group B (n = 40) | Na+ < 135 | 19 | 15 (78.95%) | 4 (21.05%) | > 0.05 NS |
| | Na+ > 135 | 21 | 11 (71.43%) | 6 (28.57%) | |

**Table 2: Correlation between preoperative HCO3, UTI, etiology of obstruction, types of intervention and improvement among studied groups.**

| **Groups** | **Mean preoperative HCO3** | **No of patients** | **Improvement** | **No Improvement** | **P value** |
|---|---|---|---|---|---|
| Group A (n = 46) | HCO3 < 15 | 28 | 24 (82.14%) | 4 (17.86%) | > 0.05 NS |
| | HCO3 > 15 | 18 | 16 (88.89%) | 2 (11.11%) | |
| Group B (n = 40) | HCO3 < 15 | 23 | 18 (78.26%) | 5 (21.74%) | > 0.05 NS |
| | HCO3 > 15 | 17 | 12 (70.59%) | 5 (29.41%) | |
| **Groups** | **preoperative UTI** | **No of patients** | **Improvement** | **No Improvement** | **P value** |
| Group A (n = 46) | Positive UTI | 22 | 19 (86.36%) | 3 (13.64%) | > 0.05 NS |
| | Negative UTI | 24 | 21 (87.5%) | 3(12.5%) | |
| Group B (n = 40) | Positive UTI | 20 | 15 (75%) | 5 (25%) | > 0.05 NS |
| | Negative UTI | 20 | 15 (75%) | 5(25%) | |
| **Groups** | **Cause of obstruction** | **No of patients** | **Improvement** | **No Improvement** | **P value** |
| Group A (n = 46) | Calcular obstruction | 27 | 24 (88.89%) | 3 (11.11%) | > 0.05 NS |
| | Stricture | 19 | 11 (57.89%) | 3 (42.11%) | |
| Group B (n = 40) | Calcular obstruction | 24 | 19 (79.17%) | 5 (20.83%) | > 0.05 NS |
| | Stricture | 16 | 11 (68.75%) | 5 (31.25%) | |
| **Groups** | **Types of intervention** | **No of patients** | **Improvement** | **No Improvement** | **P value** |
| Group A (n = 46) | Direct | 26 | 22 (84.62%) | 4 (15.38%) | > 0.05 NS |
| | Staged | 20 | 18 (90%) | 2 (10%) | |
| Group B (n = 40) | Direct | 32 | 24 (75%) | 8 (25%) | > 0.05 NS |
| | Staged | 8 | 6 (75%) | 2 (25%) | |

**Table 3: Correlation between preoperative HCO3, UTI, etiology of obstruction, types of intervention and improvement among studied groups.**

| **Groups** | **Mean preoperative Parenchymal thickness (mm)** | **No of patients** | **Improvement** | **No Improvement** | **P value** |
|---|---|---|---|---|---|
| Group A (n = 46) | P. thickness < 10 | 18 | 12 (66.67%) | 6 (33.33%) | < 0.01 HS |
| | P. thickness > 10 | 28 | 28 (100%) | 0 | |
| Group B (n = 40) | P. thickness < 10 | 29 | 19 (65.52%) | 10 (34.48%) | < 0.01 HS |
| | P. thickness > 10 | 11 | 11 (100%) | 0 | |
| **Groups** | **preoperative Corticomedullary differentiation** | **No of patients** | **Improvement** | **No Improvement** | **P value** |
| Group A (n = 46) | Good | 30 | 30 (100%) | 0 | < 0.01 HS |
| | Poor | 16 | 10 (62.5%) | 6 (37.5%) | |
| Group B (n = 40) | Good | 14 | 14 (100%) | 0 | < 0.01 HS |
| | Poor | 26 | 16 (61.54) | 10 (38.46%) | |
| **Groups** | **preoperative Parenchymal echogenicity** | **No of patients** | **Improvement** | **No Improvement** | **P value** |
| Group A (n = 46) | Normal | 19 | 19 (100%) | 0 | < 0.01 HS |
| | Grade I | 20 | 20 (100%) | 0 | |
| | Grade II | 7 | 1 (14.28%) | 6 (85.72%) | |
| Group B (n = 40) | Normal | 0 | 0 | 0 | < 0.01 HS |
| | Grade I | 21 | 21 (100%) | 0 | |
| | Grade II | 19 | 9 (47.37%) | 10 (52.63%) | |

**Table 4: Correlation between preoperative isotopic GFR and improvement among studied groups.**

| Groups | preoperative isotopic GFR | No of patients | Improvement | No Improvement | P value |
|---|---|---|---|---|---|
| Group A (n = 46) | GFR< 30 | 17 | 11 (58.3%) | 6 (41.7%) | < 0.01 HS |
| | GFR > 30 | 29 | 29 (100%) | 0 | |
| Group B (n = 40) | GFR< 30 | 15 | 5 (33.33%) | 10 (66.67%) | < 0.01 HS |
| | GFR > 30 | 25 | 25 (100%) | 0 | |

## 4. DISCUSSION

The main step in the treatment of obstructive renal failure is drainage. Drainage of the obstructed tract could be as simple as catheter drainage of the bladder or a definitive operation to remove the cause of obstruction. Intermediate steps as by passing ureteric obstruction by a catheter or proximal diversion by percutaneous nephrostomy (PCN) have their indications. However, an initial medical treatment may be required particularly in cases of advanced degrees of renal failure where hypervolemia, hyperkalemia and acidosis may necessitate appropriate treatment. In severely affected patients (urgent cases) we tried to relief obstruction by simple short procedure as many patients in this group were had poor general conditions and this agree with Mokhmalji et al.[5] who recommended that before any procedure patients must be euhydrated, controlled electrolytes and acid base balance. The replacement therapy with fluids, electrolyte and acid base monitoring after stenting are very essential for uremic patients to compensate post obstructive diuresis and Gulmi et al. [6] recommended this. In patients with chronic obstructive renal failure, the major goals were to establish euvolemia, to correct hypertension, hyperkalemia and acidosis to minimize the uremic bleeding tendency. Dialysis could be utilized to prepare the patient for definitive treatment. In this work, dialysis was performed urgently preoperative to 10 patients of group A and all patients of group B to improve the general condition and physical fitness of those patients for anesthesia and surgery. Direct definitive intervention in this work was applicable in 58 (67.44%) patients 26 (44.83%) of group A and 32 (80%) patients of group B. Staged treatment was done in 28 (32.56%) patients 20 cases(43.48%) of group A and 8 patients (20%) of group B. We tried to compare the results of direct intervention with staged intervention as regards recovery of renal function. No significant difference was noticed between both types of intervention either in patients with chronic obstructive renal failure.

Singh et al. [7] reported renal function improvement in 86%, while 6% showed no improvement and they were given regular dialysis after surgical management of 50 patients with renal and ureteric calculi and renal failure (31 acute renal failures and 19 chronic renal failures). Gupta et al. [8] reported renal function improvement in 40 patients (67.8%), 8 cases (13.6%) showed no improvement and 11 cases (18.6%)continued to have progressive renal failure in management of 59 patients with renal and ureteric calculi presented with chronic renal failure. Cohen et al. [9] reported that relief of obstruction in 3 patients with end stage renal disease led to discontinuation of dialysis. Gharbi et al. [10] reported improvement of renal function in 16 (58%) cases with acute obstructive renal failure, remained unchanged in 6 (21%) and 3 cases (10.5%) continued to have progressive renal failure. Witheraw and Wickham [11] reported different degrees of improvement in 17 cases (89.5%),2 cases (10.5%) remained stable, while no patient required long term dialysis after nephrolithotomy on19 patients with chronic renal failure. Goel et al. [12] reported improvement of renal function in 18 (90%) cases with chronic renal failure, and nephrolithiasis, remained unchanged in 1(5%) and 1 case (5%) continued to have progressive renal failure. In our series patients with chronic obstructive renal failure (group A), showed improvement in 33patients (71.74%), equivocal improvement in7patients (15.21%) and did not improve in 6 patients (13.04). Out of the 6 patients who did not improve after management 2 patients (4.35%) remained unchanged and 4 patients (8.68%) continued to have progressive renal failure up to regular dialysis. In patients with chronic obstructive renal failure (group B), renal functions showed different degrees of improvement as follow: In 14 patients (35%) good improvement and subsequent complete weaning from dialysis occurred, while in 16 patients (40%) there was a decrease in weekly dialysis sessions from 3 to2 sessions/week. In the remaining 10 patients (25%) there was no improvement and patients continued to have regular dialysis as preintervention. The overall complications in this series were (13.79%) There was significant difference between the incidences of morbidity in patients with chronic renal failure. The incidence was much more in the chronic cases group B. Bleeding from nephrostomy in this series occurred in 2 patients (2%), while Singh et al. [7] sighted 3 cases (6%) of operative hemorrhage that need blood transfusion. Perinephric collection occurred in 2 patients (2%). Bedair [13] reported 4 (5%) cases of septicemia in his series. Catheter problems (obstruction or dislodgement) are the most frequent minor complication met with (Bedair [13] and Stables [14]). Stables [14] reported that bacteremic reaction occurred in 1.9% after placement of percutaneous nephrostomy. In this study, wound gaping occurred in 1 patient(1.16%) and wound infection in 3 patients (3.48%).Witheraw and Wickham [11] reported 2patients (4%) with delayed wound healing and 4 with wound infection. Delayed wound healing and infection are probably seen more in patients with renal failure. This may result in part from uremic immunosuppression. Pyelonephritis in this series occurred in 2 patients (2.32%) and perinephric abscess occurred in1 patient (1.16%). Gupta et al. [8] reported 12 cases (24%) with positive urine culture postoperatively. The

mortality rate in our series is (2.32%) which is not high if compared with other series dealing with corrective surgery in obstructive renal failure. Singh et al. [7] reported (8%), Gupta et al. [8] reported overall mortality rate of (17%), while Witheraw and Wickham [11] reported (10.5%). The urologist must have a high index of suspicion to detect septicemia in patients with obstructive renal failure because uremic patients usually do not have the classic signs of this condition [15]. In this series septic shock occurred in 1 patient (1.16%) and myocardial infarction occurred in 1patient (1.16%) after direct surgery in group B. While in group A, no mortality occurs. This figure is lesser than the figure reported by Stables [14] which was (1.9%) after replacement of percutaneous nephrostomy. However, Bedair [13] reported 4 cases (5%), a figure higher than ours because of the low incidence of infected obstructed systems in our series. Finally, there is evidence of reversibility of renal function after long standing obstruction which provides justification for efforts to identify and treat urinary tract obstruction even if a patient with an obstruction requires dialysis to avoid the dialysis or kidney transplantation or helping patients under dialysis for complete weaning form dialysis or decrease their number of weekly sessions, and in all cases the risk of the procedures should be weighed against the chances of improvement as renal dysfunction due to chronic obstructive uropathy is not always reversible.

## 5. CONCLUSIONS

No significant difference was noticed between both types of intervention (direct or staged) as regarding renal improvement in patients with chronic obstructive renal failure under regular dialysis or not. There was no correlation between the degree of improvement of renal function and the degree of renal failure according to preoperative creatinine clearance, preoperative urinary tract infection, methods of intervention, age, sex, biochemical state of the patient, or to etiology of obstruction in patients with chronic obstructive renal failure under regular dialysis or not. The degree of improvement of renal function found to be correlated to preoperative residual parenchymal thickness, parenchymal echogenicity, corticomedullary differentiation, and radioisotope GFR.

**Declarations**

1. **Data Availability Statement:** The data that support the findings of this study are available on request from the corresponding author.
2. **Ethics Committee Approval**: Ethical committee approval was received from the Institutional Review Board of Burjeel Royal Hospital, UAE. (BURJ/RERC/2025/038).
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