

DOI: <https://doi.org/10.22141/2307-1257.14.2.2025.517>Montadhar Hameed Nima¹ , Mohammed Ghanim Alwan² , Thaeer Saleh Al-Omary³ ¹College of Medicine, Baghdad University, Baghdad, Iraq²Ibn Sina University for Medical and Pharmaceutical Sciences, Baghdad, Iraq³College of Medicine, University of Misan, Misan, Iraq

Effect of transurethral resection of the prostate on renal function in patients with renal insufficiency not needing dialysis

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Abstract. Background. The most popular surgical procedure for benign prostatic hyperplasia (BPH) is still transurethral resection of the prostate (TURP), which is also the "gold standard" by which other surgical (and even medicinal) interventions are evaluated. In many cases of renal failure caused by restriction of the bladder outflow, it restores normal voiding patterns. The purpose: to assess the effect of TURP on renal function in patients with renal insufficiency secondary to BPH. **Materials and methods.** A clinical trial study was carried out in the Urology Unit at Al-Yarmouk Teaching Hospital during a period of 18 months from April 1, 2023, till the end of September 2024. It included 71 patients diagnosed with renal dysfunction, which didn't require renal dialysis and was associated with bladder outlet obstruction due to BPH, who were prepared to TURP. All patients were sent for serum creatinine evaluation before surgery, then after two weeks from removal of Foley catheter, checking for creatinine was done again. Symptom score was assessed by the International Prostate Symptom Score. **Results.** After 14 days of surgery, serum creatinine level was significantly decreased compared to that at presentation. The cut point of preoperative creatinine value was 3.1 mmol/L, so creatinine < 3.1 mmol/L before surgery is predictive for improvement of renal function after transurethral resection of the prostate. Bleeding was noticed postoperatively in 7 % of cases. **Conclusions.** The outcome for renal function following TURP is better for patients with renal insufficiency, whose serum creatinine levels are lower at presentation. BPH may hasten the evolution of chronic kidney disease in different disease processes, and the etiology of chronic kidney disease is frequently complex. **Keyword:** renal insufficiency; transurethral resection of the prostate; creatinine; prostate; hyperplasia

Introduction

Among elderly men, benign prostatic hyperplasia (BPH) is a prevalent urological condition. Autopsy studies have estimated that the age-specific prevalence of benign prostatic hyperplasia is 8 % in the fourth decade of life, 50 % in the sixth decade, and 80 % in the ninth decade [1]. In younger adult men, the average prostate is typically reported to patients as being the size of a walnut and weighing an average of 11 grams. The average weight ranges from 7 to 16 grams. The mean doubling period for prostatic volume is 32.6 years, with an average growth rate of roughly 2.2 % each year [2]. Obstructive uropathy brought on by BPH's obstruction of the bladder outlet causes renal insufficiency [3]. In older men 50 years of age and older, BPH and a decrease in glomerular filtration rate have emerged

as prevalent comorbidities and significant public health issues [4, 5]. Older people's declining nephrons are linked to a drop in renal blood flow, which causes the glomerular filtration rate to reduce with age [6]. Although there are numerous potential causes of obstructive uropathy, BPH was the most frequent cause across all individuals in investigations of older adults with acute renal failure. BPH (38 %), neurogenic bladder (19 %), and obstructive pyelonephritis (15 %) were the causes of acute renal failure in patients with obstructive uropathy [7]. If instances are identified early, late or end-stage renal failure caused by prostatic or bladder outflow obstruction should be preventable; nevertheless, it is still challenging to identify which men with BPH are at risk of renal failure and require careful monitoring [8]. The most popular surgical procedure for BPH is still transure-

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thral resection of the prostate (TURP), which is also the “gold standard” by which other surgical (and even medical) procedures are evaluated [9]. In the typical TURP, electrocautery is performed using endoscopic tools that are inserted into the bladder and urethra [10]. Depending on the size of the gland, bleeding can range from minor to severe even with electrocautery. Nonetheless, the majority of patients report a satisfactory cure of their micturition symptoms, transfusions are rarely required, and the treatment carries a low risk of fatal consequences [11]. Failure to void (6 %), transfusion-requiring hemorrhage (1–4 %), clot retention (3 %), infection (2 %), bladder neck contraction or urethral stricture (6 %), transurethral resection syndrome (2 %), and infrequently incontinence are among the complications of TURP [12]. In many situations, TURP restores normal voiding patterns in patients who arrive with renal failure because of bladder outflow obstruction. However, renal failure brought on by restriction of the bladder’s outflow is more likely to be resistant, and 57 % of patients required dialysis following surgery. After TURP, only 21 % of patients saw a return to normal renal function [13].

The aim of this study is to assess the effect of TURP on renal function in patients with renal insufficiency secondary to BPH.

Materials and methods

Study design, setting, and time

A clinical trial study was carried out in the Urology Unit at Al-Yarmouk Teaching Hospital during a period of 18 months from April 1, 2023 till the end of September 2024.

Study population and sample size

Initially, the study included 93 patients who were diagnosed with renal dysfunction, but it didn’t require renal dialysis and was associated with bladder outlet obstruction due to benign enlargement of prostate and prepared to undergo TURP. Patients with obstructive uropathy due to causes other than prostatic enlargement, those with neurogenic bladder, who underwent open prostatectomy, and patients with end stage renal disease requiring hemodialysis were excluded from this study.

Diagnosis of prostatic enlargement was done after asking detailed questions about the symptoms and doing a physical exam. This initial exam is likely to include the following:

- digital rectal examination;
- urine test analysis: analyzing a sample of patients’ urine can help rule out an infection or other conditions that can cause similar symptoms;
- blood test: to check for renal indices. Serum creatinine value was assessed to check patients who had associated renal failure. Serum creatinine level of greater than 0.077 mmol/L was taken as criteria to determine the presence of renal failure. After two weeks catheterization, all patients should have serum creatinine ≤ 0.111 mmol/L;
- unless required by particular circumstances, such as recurrent hematuria, pelvic pain, or urinary retention, non-invasive urine flow rates, post-void residual measurement, pressure-flow studies, cystoscopy, and renal or transrectal ultrasound (TRUS) are optional.

Classification of chronic kidney disease (CKD) is based on eGFR. The eGFR was calculated according to the Modification of Diet in Renal Disease (MDRD) study formula which is used to estimate the glomerular filtration rate (GFR) based on serum creatinine levels, age, sex, and race. The most used version of this formula is as follows [14–16]:

$$eGFR\ (mL/min/1.73\ m^2) = 175 \times (serum\ creatinine - 1.154) \times (age - 0.203) \times (0.742\ if\ female) \times (1.212\ if\ Black).$$

So, the stages of CKD are as follows:

1. Stage I: eGFR ≥ 90 mL/min/1.73 m².
2. Stage II: eGFR 60–89 mL/min/1.73 m².
3. Stage III: eGFR 30–59 mL/min/1.73 m².
4. Stage IV: eGFR 15–29 mL/min/1.73 m².
5. Stage V: eGFR < 15 mL/min/1.73 m² (end-stage renal disease).

Table 1 illustrated the relationship between creatinine variations and CKD stages.

Table 1. The impact of creatinine variations in this study on CKD staging before intervention

Serum creatinine (mmol/L)	CKD stages		
	I	II	III
< 0.09	7 (9.9)	8 (11.2)	3 (4.2)
0.09–0.111	1 (1.4)	11 (15.5)	41 (57.7)

Ethical issue

The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Administrative approvals were granted from the Scientific Committee of the College of Medicine/Ibn-Sina University for Medical and Pharmaceutical Sciences.

Workup

A questionnaire has been applied to all study patients to collect needed information such as age, occupation, smoking, past medical and surgical history, and information about the signs and symptoms.

All patients were sent routinely for laboratory investigation of CBC and ESR, RBS, renal and liver function tests, virology study, ECG and CXR as preparation before surgery.

A catheter was introduced two weeks before surgery for stabilization of renal function. Lowering of renal function failed in 22 patients after catheter introduction, so they were excluded from the study. The final number of patients included in this study was 71.

The International Prostate Symptom Score (I-PSS), which is based on responses to seven questions on urine symptoms (incomplete emptying, frequency, intermittency, urgency, weak urinary stream, hesitancy, and nocturia), was used to calculate the symptom score (Table 1). The patient is given the option to select one of six responses for each question pertaining to urinary symptoms, each of which indicates the symptom’s growing intensity. Points ranging

from 0 to 5 are given for the responses. As a result, the overall score may vary between 0 and 35 (asymptomatic to severely symptomatic). After that, symptoms are divided into three categories based on their overall [17]. The International Prostate Symptom Score (I-PSS) is shown in supplementary file.

In general, the steps for practicing physicians when managing BPH in patients with CKD are illustrated in the following algorithm (Fig. 1).

Surgical procedure

- TURP was performed using a 26 French Storz continuous irrigation resect scope and 1.5% glycine solution.
- Monopolar resection was carried on until the prostatic capsule was seen.
- Either general or regional anesthesia was applied.
- The catheters of the patients were removed in 4–5 days after the urine became clear.
- Patients who went for retention after catheter removal were re-catheterized and then checked later by cystoscopy to rule out the possible obstructive causes of retention.
- Patients who voided successfully were discharged.
- Histological examination of the resected prostate confirmed BPH in all cases.

Follow up

Two weeks after the removal of Foley catheter, checking for serum creatinine was done on the 14th day after operation

to assess the renal function of patients as they decided either with non-dialysis requiring renal insufficiency or normal patients.

We compared the preoperative serum creatinine between the two groups and exploration of the cutoff value for prediction of postoperative normal renal function and we will search for the possible associated factor for postoperative elevation of serum creatinine level.

Statistical analysis

Version 26 of the Statistical Package for Social Sciences (SPSS) was used to analyze the data. The data was displayed as ranges, means, and standard deviations, percentages and frequencies used to display categorical data. Serum creatinine means before and after surgery were compared using the paired t-test. Preoperative serum creatinine was predicted to be a predictor of postoperative normal renal function using receiver operating characteristic (ROC) curve analysis. A P-value of less than 0.05 was regarded as significant.

Results

In this study, mean of age was 63.51 ± 7.90 years and 67.6 % of patients were age ≥ 60 years, 80.3 % of them were retired; 25.4 % had positive family history; 53.5 % were hypertensive; 59.2 % were current smokers; 18.3 % were alcohol drinkers; the chief complaint was nocturia in 62 % of patients; 78.9 % had severe symptoms; postoperative serum

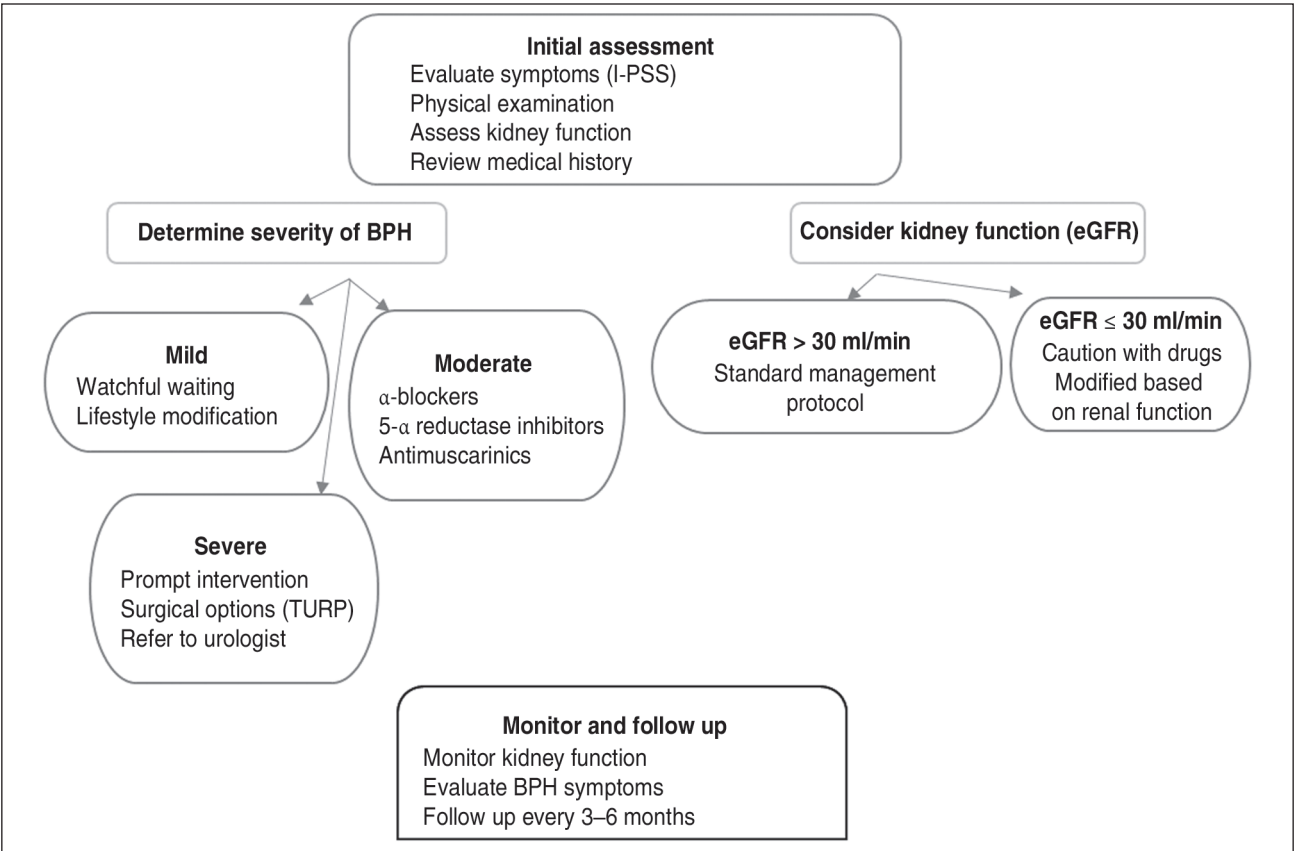


Figure 1. Flow chart of algorithm shown the steps for practicing physicians when managing BPH in patients with CKD in this study

creatinine level (after 14 days) was normal in 54.9 %; 7 % complain from bleeding after TURP (Table 2).

Serum creatinine level was significantly decreased postoperatively compared to that at presentation (0.079 versus 0.157 mmol/L, P = 0.001) as shown in Table 3.

Table 2. Distribution of study patients by clinical characteristics

Variable	n	%
Age (years)		
< 60	23	32.4
≥ 60	48	67.6
Occupation		
Employee	14	19.7
Retired	57	80.3
Family history		
Positive	18	25.4
Negative	53	74.6
Medical history		
No chronic disease	12	16.9
Hypertension	38	53.5
Diabetes	21	29.6
Smoking		
Current smoker	42	59.2
Nonsmoker	29	40.8
Alcohol drinking		
Yes	13	18.3
No	58	81.7
Chief complaint		
Nocturia	44	62.0
Hesitancy	17	23.9
Intermittency	31	43.7
Symptom severity (by I-PSS)		
Severe	56	78.9
Moderate	15	21.1
Postoperative serum creatinine level (after 14 days)		
Normal	39	54.9
High	32	45.1
Complication after TURP		
No	64	90.1
Bleeding	5	7.0
Infection	2	2.9

Table 4. Diagnostic accuracy for preoperative serum creatinine in predicting renal improvement after TURP

Cut-off value	Sensitivity	Specificity	PPV	NPV	Accuracy
3.1	90.6 %	92.3 %	84.2 %	92.3 %	91.5 %

Receiver operating characteristic (ROC) curve analysis was constructed for preoperative serum creatinine as a prediction of improvement of renal function after TURP. As shown in Table 4, the cut point of preoperative serum creatinine value was 0.172 mmol/L, so preoperative serum creatinine < 0.172 mmol/L is predictive for improvement of renal function after TURP. Serum creatinine was 90.6 % sensitive, 92.3 % specific, and 91.5 % accurate as a marker for prediction of improvement of renal function after TURP.

Discussion

Five to thirteen percent of men over fifty have both symptomatic BPH and renal failure, two prevalent health issues [18]. Prerenal, intrinsic, and postrenal causes are some of the variables that might lead to the development of renal failure. The most common postrenal cause is bladder outlet obstruction brought on by BPH, and individuals with this condition usually have upper urinary tract dilatation and degradation [19].

In our study, since the pathology was due to bladder neck obstruction secondary to BPH, we proceeded with TURP, a definitive treatment. Patients who have acquired acute urinary retention or other BPH-related problems, such as bladder neck obstruction, or who have moderate-to-severe lower urinary tract symptoms, may benefit from surgical surgery [20]. The 2021 American Urological Association Guideline acknowledged that TURP continued to be the standard for treatment in cases of complex BPH [21].

In this study, serum creatinine level was significantly decreased by 14 days postoperatively compared to that at presentation and 54.9 % of patients showed normal serum creatinine level after TURP. These results are agreed with that found in Ganesan AN. et al study in 2015 when it concluded that serum creatinine level is improved in the post TURP period [22]. This implies that TURP played a crucial part in modifying factors that impacted on the renal function. Improved peak flow rate, decreased urine residual volume, and general relief from genitourinary symptoms were all statistically linked to TURP [19].

In this study, most patients were free from complication (90.1 %) and only 7 % were developed bleeding and treated by blood transfusion. Kusljic et al. study in 2017 noticed that most common complications postoperatively were hematuria, occurring in 85 % of patients and hematuria with clot retention, occurring in 50 % of them [23]. The small sample size may be the cause of the multiple discrepancies in the results. Furthermore, advancements in tools like con-

Table 3. Comparison in serum creatinine level before and 14 days after TURP, mean ± SD, mmol/L

Preoperatively	14 days after TURP	P-value
0.157 ± 0.039	0.079 ± 0.026	0.001

tinuous flow resectoscopes, non-hemolytic irrigation solutions, bipolar resection, and improved anesthetic care may have contributed to a decrease in the rate of complications, particularly bleeding that necessitated transfusion. Furthermore, due to physiological changes brought on by ageing and higher rates of morbidity than their younger counterparts, patients 65 and older are more vulnerable to problems [24, 25].

Catheterization's postoperative duration may cause problems down the road. During the first postoperative period following catheter removal, several patients experienced urinary retention as a result of incomplete TURP, clot, chips, and detrusor muscle impact [26].

In conclusion, the lower serum creatinine level at the time of presentation of patients with renal insufficiency, the better the outcome regarding renal function following TURP. The etiology of chronic kidney disease is frequently multifactorial, and BPH may accelerate the progression of chronic kidney disease in other disease processes. Older men with BPH frequently tolerate and ignore lower urinary tract symptoms and may not seek medical attention until they develop azotemia.

Since this diagnosis can be easily overlooked in cases of unreported LUTS, prostate blockage should be taken into consideration during screening and treatment for patients who disregard their lower urinary tract symptoms. Thorough follow up is required. We stress that BPH-related chronic kidney disease is preventable and that significant financial, medical, and societal benefits can be realized through the cost-effective treatment of chronic kidney disease, including hemodialysis, if caught early. It is advised that men with untreated BPH get adequate screening of their renal function if they have progressive nephropathy brought on by prostatic or bladder outflow obstruction, which may be preventable.

Conclusions

The outcome for renal function following TURP is better for patients with renal insufficiency, whose serum creatinine levels are lower at presentation. BPH may hasten the evolution of chronic kidney disease in different disease processes, and the etiology of chronic kidney disease is frequently complex.

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Conflicts of interests. Authors declare the absence of any conflicts of interests and own financial interest that might be construed to influence the results or interpretation of the manuscript.

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Вплив трансуретральної резекції простати на функцію нирок у пацієнтів із нирковою недостатністю, які не потребують діалізу

Резюме. Актуальність. Найпопулярнішою хірургічною процедурою при доброякісній гіперплазії передміхурової залози (ДГПЗ) залишається трансуретральна резекція передміхурової залози (ТУРПЗ), що також є золотим стандартом, за яким оцінюються інші хірургічні (і навіть медикаментозні) втручання. У багатьох випадках ниркової недостатності, спричиненої обмеженням відтоку сечового міхура, ТУРПЗ відновлює нормальний режим сечовивипускання. **Мета:** оцінити вплив цієї процедури на функцію нирок у пацієнтів із нирковою недостатністю, що виникла внаслідок ДГПЗ. **Матеріали та методи.** Клінічне дослідження було проведено в урологічному відділенні навчальної лікарні Аль-Ярмук протягом 18 місяців з 1 квітня 2023 року до кінця вересня 2024 року. До нього було включено 71 пацієнта з діагнозом дисфункції нирок, що не потребувала діалізу та була зумовлена обструкцією вихідного отвору сечового міхура внаслідок ДГПЗ, яким планувалося провести ТУРПЗ. В усіх них рівень креатиніну

проаналізовано перед операцією, а потім через два тижні після видалення катетера Фолея. Клінічні прояви оцінювали за Міжнародною шкалою симптомів простати. **Результати.** Через 14 днів після процедури рівень сироваткового креатиніну значно знизився порівняно з показником на момент звернення. Граничне доопераційне значення становило 3,1 ммоль/л, тому рівень сироваткового креатиніну < 3,1 ммоль/л перед втручанням є предиктором поліпшення функції нирок після ТУРПЗ. Кровотеча після операції спостерігалася в 7 % випадків. **Висновки.** Функція нирок після ТУРПЗ виявилася ліпшою в пацієнтів із нирковою недостатністю, у яких рівень креатиніну в сироватці крові був нижчий на момент звернення. ДГПЗ може прискорити розвиток хронічної хвороби нирок при різних станах, а етіологія хронічної хвороби нирок часто є складною.

Ключові слова: ниркова недостатність; трансуретральна резекція передміхурової залози; креатинін; простата; гіперплазія