

Analysis of Risk Factors and Outcome of Renal Failure in Benign Prostatic Hyperplasia

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ABSTRACT

Introduction: Benign Prostatic Hyperplasia (BPH) is one of the most common diseases of aging men, affecting 50% by 60 years of age and increasing to 90% by ninth decade of life. A small percentage of men with obstruction secondary to BPH have azotemia, some of whom progress to irreversible renal failure, while others recover remarkably well.

Aim: To assess the risk factors and outcome of renal failure in patients of BPH in comparison to those patients without renal failure.

Materials and Methods: This was a retrospective study of 60 patients with a diagnosis of BPH with and without renal failure who underwent treatment in the Department of Urology, Nizam's Institute of Medical Sciences, Hyderabad, Telangana, India, between January 2015 to December 2016. All patients were evaluated with clinical history and physical examination including Digital Rectal Examination (DRE) and appropriate laboratory examination. Uroflowmetry followed by ultrasound abdomen was done. All patients underwent transurethral resection of prostate, postoperatively uroflowmetry and Ultrasonography (USG) of abdomen for post void residual volume were done

at the time of discharge and at one, three months follow up. Results evaluated with student's t-test, fisher's-exact test and Chi-square test.

Results: Obstructive voiding symptoms mean International Prostate Symptoms (IPSS) score, comorbidity factors like diabetes and hypertension (24), Urinary retention (24), Urinary Tract Infections (UTIs) (16) and median lobe enlargement (19) were more common in patients with renal failure. Weight of the gland resected and mean operative time were similar in patients with or without renal failure. Once obstruction was relieved 23 patients had normal serum creatinine. Seven patients had renal failure at one month follow up after Transurethral Resection of the Prostate (TURP). All these patients had either diabetes mellitus (1) or hypertension (2) or both (4).

Conclusion: Men with large residual urine volumes with retention and concurrent UTIs are at higher risk for renal failure. Renal failure in the presence of comorbid illnesses, such as diabetes mellitus and hypertension, may be augmented by BPH and also have an impact on the recovery of renal function after relieving the obstruction.

Keywords: Serum creatinine, Transurethral resection of prostate, Urodynamic study, Uroflowmetry

INTRODUCTION

Benign prostatic hyperplasia is a common disease in elderly men. It is estimated that in the United States of America >70% of men aged 60-69 years are affected by BPH [1]. A small percentage of men with obstruction secondary to BPH have azotemia, some of whom progress to irreversible renal failure, while others recover remarkably well. Although, association of renal failure in patients with BPH has long been recognised, the conditions leading to renal failure, their mechanisms and the clinical course of these patients have been poorly described in the literature. It is well known that bladder outlet obstruction secondary to BPH can lead to upper urinary tract changes, hydronephrosis, and renal failure. The aetiology of renal failure is multifactorial and BPH may accelerate the progression of renal failure in older men [2]. Surgical treatment to relieve the obstruction is essential to improve the renal function and to prevent its further progression of renal failure. Older men with renal failure should have prostatic obstruction considered during evaluation and treatment as it can be easily missed, especially in men who may tolerate or only report minimal lower urinary tract symptoms [3]. With this background we retrospectively assessed the risk factors and outcome of renal failure in patients of BPH in comparison to patients not having renal failure.

MATERIALS AND METHODS

This was a retrospective study of patients with a diagnosis of BPH with and without renal failure who underwent treatment in the Department of Urology, after obtaining Ethical Committee approval from Nizam's Institute of Medical Sciences between January 2015

to December 2016. A total of 60 (sample size was not significant as all the patients who presented with renal failure, i.e., 30, to our institute during the study period were included in the study) patients with a diagnosis of BPH who underwent treatment were taken into the study. Thirty patients had renal failure at the presentation and another 30 patients with diagnosis of BPH without renal failure were also taken into the study for comparison.

All patients were evaluated with detailed clinical history about age, type and duration of voiding symptoms, IPSS score, and the comorbid illnesses were recorded. Physical examination including DRE was done and the findings were noted. Patients with urinary retention were noted and volume of urine drained from the bladder was recorded. Laboratory examination included serum electrolytes, blood urea serum creatinine, complete haemogram and urine examination, including bacterial cultures were performed. Uroflowmetry was done if the patient was not in retention and followed by ultrasound abdomen to look for upper tracts for presence and degree of hydronephrosis, bladder for any distension and wall thickening, prostate for size and echotexture and to record postvoid residual urine volumes if the patient is not on per urethral catheter. Urodynamic study was done in 15 patients with renal failure.

All patients underwent TURP and during the surgery, configuration of the prostate and bladder morphology were recorded. Postoperatively the drop in haemoglobin, any need for blood transfusions, and the time to catheter removal were recorded. Uroflowmetry and USG abdomen for postvoid residual volume were done at the time of discharge on third postoperative day and at one, three months follow up. Serum creatinine was taken as measure of renal function. Serum

creatinine at presentation, lowest value after catheterisation, one week after TURP and at one, three months follow up was recorded.

STATISTICAL ANALYSIS

Symptoms duration and IPSS scores analysed with student's t-test. Fisher's-exact test was used to analyse comorbid illness, retention of urine, urine volume drained after catheterisation and ultrasound findings. Intraoperative findings like Grade III lateral lobe and median lobe enlargement were evaluated with Chi-square test.

RESULTS

Mean age of BPH patients presenting with renal failure was 66.2 years and 63.4 years in patients without renal failure. Obstructive voiding symptoms were more common in patients with renal failure. The mean duration of symptoms in patients of BPH with renal failure was 22.3 (3-60) months and it was 19.6 (2-54) months in patients without renal failure (p=0.798) [Table/Fig-1]. Diabetes mellitus and/or hypertension were present in 80% (24) of patients with renal failure and in 63.3% (19) of patients without renal failure (p= 0.257) [Table/Fig-1].

Risk factor	Renal failure patients	Patients without renal failure	p-value
Mean age in years	66.2±3.4	63.4±3.1	-
Mean duration of symptoms	22.3±3.1 months (3-60)	19.6±2.8 months (2-54)	0.798
IPSS* score	28.6±2	24.2±2.1	0.672
Diabetes and/or Hypertension	80% (24)	63.3% (19)	0.257

[Table/Fig-1]: Patient demographics.
*International prostate symptom score.
p-value by student's t-test

Twenty four patients had retention of urine (acute/chronic/ acute or chronic) in renal failure group and in only seven patients without renal failure (p<0.001). The volume of urine drained on catheterisation was more than 1000 mL in 14 patients of BPH with renal failure (p=0.0028). Sixteen patients had UTIs in the renal failure group and in six patients without renal failure (p=0.015) [Table/Fig-2].

Risk factor	Renal failure patients	Patients without renal failure	p-value
AUR±	24 (80%)	7 (23.3%)	<0.001
> 1000 mL drained on PUC	14 (46.6%)	5 (16.6%)	0.0028
Positive urine C and S [§]	16 (53.3%)	6 (20%)	0.015
Upper tract changes (HDN)	24 (80%)	3 (10%)	<0.001
Bladder wall thickness	19 (63.3%)	11(36.6%)	0.0698

[Table/Fig-2]: Secondary changes due to benign prostatic hyperplasia.
± acute urinary retention, §culture and sensitivity, ||hydronephrosis.
**p-value by fisher's-exact test

Upper tract dilatation was seen in 24 (80%) patients of BPH with renal failure and in 3 (10%) patients without renal failure (p<0.001) [Table/Fig-2]. Uroflowmetry was done in the patients who were not catheterised in both groups and in majority of patients Qmax was less than 10 mL/second as all patients who underwent surgery were only taken into this study. Presence of poor compliance and detrusor overactivity was more common in patients of BPH with renal failure.

Median lobe enlargement was present in 19 (63.3%) patients with renal failure and in 10 (33.3%) patients without renal failure and this was statistically significant (p=0.0389) by Chi-square test [Table/Fig-3]. Weight of the gland resected (32.3 gm vs 33.6 gm) and mean operative time (62 minute vs 68 minute) were similar in patients with or without renal failure. Two patients required blood transfusion in renal failure group and one in patients without renal failure. There were no significant electrolyte abnormalities in both groups.

Majority of patients had increased urinary flow rates after surgery and two patients did not void after removal of catheter initially, one in each group and catheter was again placed and both of them voided after two days. Postvoid residual volumes were decreased to great extent after surgery. Seven had PVR more than 100 mL at

Risk factor	Renal failure patients	Patients without renal failure	p-value
Grade III lateral lobe	17	11	0.1205
Median lobe enlargement	63.3% (19)	33.3% (10)	0.0389
Hb** drop	1.2-3.6	0.6-3.2	
Hospital stay	3-7 days	3-5 days	

[Table/Fig-3]: Intra operative findings.
**haemoglobin, ±± uroflowmetry

Uroflowmetry (Q max-mL/minute)	BPH with renal failure	
	Yes	No
At the time of discharge	8-20 (16.6)	10-22 (18.3)
At 1 month follow up	14-24 (18.6)	12-23 (19.3)
Post void residual volume	BPH with renal failure	
	At discharge	1 month follow up
<50 mL	10	14
50-100 mL	13	13
>100 mL	7	3

[Table/Fig-4]: Post operative results.

discharge in patients with renal failure and only three had PVR more than 100 mL at one month follow up [Table/Fig-4].

Serum creatinine was done at the time of presentation, after one week of catheterisation in patients who were catheterised, before TURP, one week after TURP, and at one month follow up. Serum creatinine was in the range of 1.7-9.2 (mean- 3.2) mg/dL at the time of presentation in 30 patients. Nearly 17 out of 24 patients who were catheterised, serum creatinine came to normal level (<1.5 mg/dL) after one week of catheterisation and in the remaining seven patients, serum creatinine came to normal level in three patients after TURP and showed decreasing trend in other patients. None of them required dialysis either pre or postoperative period. Once obstruction was relieved 23 (76.6%) patients had normal serum creatinine. About 7 (23.3%) patients had renal failure at one month follow up after TURP. All these patients had either diabetes mellitus or hypertension or both. In 3 patients serum creatinine was more than 3.0 mg/dL and all of them had diabetes and hypertension. Four patients had serum creatinine in the range of 1.5 to 3.0 mg/dL and in these patients one had both diabetes mellitus and hypertension and two patients had hypertension alone and one had only diabetes mellitus [Table/Fig-5].

Serum creatinine (mg/dL)	BPH with renal failure		
	At presentation (n=30)	Before TURP (n=13)	After TURP (n=7)
1.5-3.0	18 (60%)	8	4
3.0-4.5	7 (23.3%)	3	2
> 4.5	5 (16.6%)	2	1

[Table/Fig-5]: Patients with renal failure before and after intervention.

DISCUSSION

A community based, epidemiological link between BPH and renal failure has only been assessed in a single study which showed 2.4% prevalence of self-reported renal failure related to a prostate condition (9% reported renal failure from any cause) [4]. Another study showed that men presenting for prostate surgery had a 7.7% prevalence of renal failure compared to 3.7% prevalence in age matched men presenting for non prostate surgery [5]. Thus, evidence of renal failure in men with advanced BPH does not simply reflect older age. A meta-analysis of men presenting to a urologist for BPH treatment showed an average of 13.6% (0.3-30%) had renal failure [6]. A recent study by Hong SR et al., shows the incidence of renal failure by 5.9% [7].

In our study, patients were divided into two groups, with one group having renal failure at presentation and other not having renal failure. The age range was similar in both groups and increasing age did not correlate with the presence of renal failure as noted by Neal DE et al., [8]. The mean duration of symptoms in patients of BPH with

renal failure was 22.3 months and it was 19.6 months in patients without renal failure.

In our study, majority of patients were severely symptomatic (IPSS score) in both groups as all patients who underwent surgery were only included in this study. 80% of patients who had renal failure had either diabetes mellitus or hypertension or both to that of 63.3% in patients who had no renal failure. However, in the seven patients who had renal failure at one month follow up after surgery, all of them had associated comorbid illnesses. The presence of diabetes mellitus and/or hypertension will have an impact on the recovery of renal function after relieving the obstruction as reported in the literature [7].

Urinary retention is thought to be the dominant mechanism by which BPH can cause renal failure. Acute urinary retention caused by BPH may be responsible for the majority of acute renal failure cases due to obstructive uropathy [9]. It is also possible that some men may present in acute renal failure with acute urinary retention but actually they have underlying chronic renal failure because of prior chronic urinary retention [3]. In our study 80% of patients of BPH with renal failure had retention of urine (acute and/or chronic) when compared to 23.3% in patients without renal failure. More than 1000 mL urine was drained in 46.6% and 16.6% in renal failure patients and patients without renal failure respectively. So retention of urine had significant impact on renal failure at the time of presentation.

Recurrent UTIs may be a contributing factor for renal failure in men with BPH [10]. The diagnosis of UTIs can be easily missed in patients with BPH since the symptoms of BPH and UTIs are similar. In our study 53.3% of patients with renal failure and 20% in patients without renal failure had concurrent UTIs.

Upper urinary tract dilatation was found in approximately 6% of men presenting for surgical treatment of BPH [11]. In our study upper tract dilatation was seen in 80% in renal failure group and in 10% in patients without renal failure, which clearly showed that the presence of upper tract dilatation on ultrasound can predict the presence of renal failure at presentation. Our study also showed presence of bladder wall thickening on ultrasound imaging was also a risk factor for the presence of renal failure at presentation. However, the mean prostate size by transabdominal imaging was similar in both groups.

Urodynamic studies can be used to identify low bladder compliance and detrusor overactivity both of which have been associated with renal failure [3,12]. In our study, urodynamic study was done in 15 patients, four had only high detrusor voiding pressures and three had acontractile/hypocontractile detrusor with poor bladder compliance and eight patients had combination of high detrusor voiding pressures, detrusor overactivity and poor compliance. So presence of detrusor overactivity and poor compliance along with obstruction is a significant risk factor for renal failure in BPH.

Effect of prostatic configuration on the presence of renal failure in patient of BPH was not mentioned in the earlier studies. In our study, median lobe along with higher grade of lateral lobar enlargement was seen in 63.3%, 56.6% of patients with renal failure when compared to 33.3%, 36.6% in patients without renal failure. Mean operative time, amount of gland resected, drop in haemoglobin, need for blood transfusion and duration of hospital stay were comparable in patients with or without renal failure. Urinary flow rates are improved after the surgery and in the follow up period in all patients and postvoid residual volumes significantly decreased in all patients of BPH with renal failure.

Until now, no prospective and thorough assessment of the efficacy of TURP on renal function at short and long-term follow up has been available in the literature [13]. In referral based cohort studies; renal function appears to improve considerably with surgical treatment for prostate obstruction [11]. In our study, resolution of the renal failure was seen in 23 (76%) patients after initial catheterisation followed by TURP. In the remaining 7 patients, serum creatinine was abnormal but showed decreasing trend.

LIMITATION

1. It was a retrospective study.
2. All the patients who underwent transurethral resection, procedure was not done by a single surgeon. As, it is a teaching institute, variations in technique and time varied between individual surgeons.

CONCLUSION

Men with large residual urine volumes with retention and concurrent UTI are at higher risk for renal failure. Upper tract dilatation, bladder wall thickening, poor compliance and detrusor overactivity can predict the presence or progression of renal failure in patients with BPH. Renal failure in the presence of comorbid illnesses, such as diabetes mellitus and hypertension, may be augmented by BPH. Renal function improves considerably after initial catheterisation followed by surgical treatment.

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