

Serum Electrolyte Disturbances in Benign Prostate Hyperplasia after Transurethral Resection of the Prostate

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Abstract

Objectives: The objective of this study was to determine the frequency of serum electrolyte disturbances in patients with benign prostate hyperplasia after transurethral resection of the prostate.

Material and Methods: The cross sectional and descriptive study was carried out at the department of urology, Liaquat university hospital Jamshoro/Hyderabad. An informed consent was taken from all patients who were diagnosed as benign prostate hyperplasia in the department of urology by consultant urologist. All such patients were assessed for their serum electrolytes postoperatively (on the first postoperative day) by taking 3cc venous blood sample in a sterilized disposable syringe and send to laboratory for analysis. The data were collected on pre-designed proforma.

Results: The mean age \pm SD (range) was 61.25 years \pm 8.86 (50 to 90 years). Most of the patients i.e. 44 (29.3%, n=150) were between were seen in the age group 61 to 65 years. 57(38.0%) patients had the frequency of electrolyte disturbance. Mean preoperative and postoperative Hyponatremia was (129.29 \pm 1.94) mmol/L and (132.05 \pm 2.41) mmol/L ($P>0.0001$) whereas mean preoperative and postoperative Hypernatremia was (149.8 \pm 0.3) mmol/L and (147.2 \pm 1.1) mmol/L ($P>0.02$). Mean preoperative and postoperative Hypochloremia was (2.82 \pm 0.5) mmol/L and (3.8 \pm 1.6) mmol/L ($P>0.03$) whereas mean preoperative and postoperative Hyperkalemia was (110 \pm 12.5) mmol/L and (106 \pm 9.5) mmol/L ($P>0.04$). Mean preoperative and postoperative Hypochloremia was (80.0 \pm 10.6) mmol/L and (95.0 \pm 11.2) mmol/L ($P>0.0001$) whereas mean preoperative and postoperative Hyperchloremia was (130 \pm 7.6) mmol/L and (110 \pm 9.6) mmol/L ($P>0.05$). Mean preoperative and postoperative sodium bicarbonate (HCO₃) at lower was (20.0 \pm 1.4) mmol/L and (29.0 \pm 2.1) mmol/L ($P>0.002$) and mean preoperative and postoperative Hyperchloremia was (38.1 \pm 2.5) mmol/L and (31.02 \pm 3.6) mmol/L ($P>0.006$).

Conclusion: The further research should be required in advance and extended phase at different and wide clinical setting to gives more and better knowledge related to electrolyte disturbances in transurethral resection of prostate.

Keywords: Serum electrolyte disturbances; Benign prostate hyperplasia; Transurethral resection; Prostate

Introduction

Benign prostatic hyperplasia (BPH) is a highly prevalent condition in the adult male, with more than 50% of the males over 60 having histologically proven prostatic hyperplasia and at least half reporting moderate to severe. transurethral resection of the prostate (TURP) remains the surgical gold standard for the treatment of benign prostatic hyperplasia (BPH), which causes urinary obstruction and increases the risk of urinary tract infection [1-3]. Ranges of preoperative morbidity for this procedure between 18% and 26% and the mortality rate may high as 1% [1,2,4] Transurethral resection of the prostate (TURP) is a urological operation that is used to treat BPH. It is performed by visualizing the prostate through the urethra and removing tissue by electrocautery or sharp dissection [5]. It is considered the most effective treatment for BPH [6-14]. Significant hyponatremia during TURP occurs in 11-41% of patients. The incidence of plasma sodium level less than 125 mmol.L⁻¹ after TURP may reach up to 15% with mortality rate of 40% [15]. Severe hyponatremia results in hemolytic and renal failure, respiratory compromise, electrocardiogram changing and cardiovascular depression, seizure, coma, and death. ¹⁶ Several mechanisms seem to be involved in the development and progression of BPH. Although ageing represents the central mechanism implicated, recent novel findings also highlighted the key role of hormonal alterations, metabolic syndrome, and inflammation [16-20]. No such study was conducted at Liaquat university hospital Jamshoro/Hyderabad there by considering great need, the present study was conducted at the same, a tertiary care, 1500 bedded teaching hospital that cover both the urban as well as rural population and provide all the health related elective surgical facilities. This study has been conducted

that that provides appropriate measures and protocol for the patients with BPH in relation to serum electrolyte changes after TURP. The careful assessment for serum electrolytes after TURP can prevent the patients to acquire life threatening complications.

Material and Methods

Cross sectional and descriptive study was carried out at the department of Urology, Liaquat university hospital Jamshoro/Hyderabad. All the patients who were present with history/symptoms of urinary frequency, urgency, urgency incontinence, voiding at night, weak urinary stream, hesitancy, intermittency, diagnosed as BPH and were included for TURP while the patients who are already on diuretic therapy, Uncooperative patients or the patients who refuse to give consent, the patients with diarrhea or vomiting, the patients already have any electrolyte disturbance (preoperatively) and known cases of renal failure, congestive cardiac failure and liver cirrhosis were excluded from the study. An informed consent was taken from all patients who were diagnosed as BPH in the department of urology by consultant

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urologist (had clinical experience for more than 5 years). Patients were undergoing TURP procedure after getting fitness from anesthesiology department. All such patients were assessed for their serum electrolytes postoperatively (on the first postoperative day) by taking 3cc venous blood sample in a sterilized disposable syringe and send to laboratory for analysis. The fluctuations in the values of serum electrolytes were assessed according to their references ranged/out off value mentioned in the operational definition [21-25]. The bias and confounding factors were controlled strictly following the inclusion and exclusion criteria of all the maneuvers were carried out under the supervision of senior consultant anesthesiologist and urologist with mutual communication and collaboration between both departments. The data were collected on pre-designed proforma.

Data Analysis

SPSS: 16 were used for data analysis. Descriptive statistics for quantitative variables such as age (in years), serum electrolytes etc. were expressed as mean ± standard deviation and student t test was applied to compare the means between the groups (pre and post operative) while qualitative data such as frequency of electrolytes disturbance, age (in groups) etc were presented as n (%). All the data was calculated on 95% confidence interval. A p value <0.05 was considered as statistical significant level.

Results

Total of 150 men with BPH fulfilling inclusion criteria were included and analyzed. The mean age ± SD (range) was 61.25 years ± 8.86 (50 to 90 years) (Table 1). In this study, most of the patients i.e. 44 (29.3%, n=150) were between were seen in the age group 61 to 65 years whereas 36 (24.0%, n=150) patients were ranged from 56 to 60 year and 24 (16.0%, n=150) were between age group 50 to 55 years, 20 (13.3%, n=150) were observed in the age group 66 to 70 years, 16 (10.6%, n=150) were from 71 to 75 years of age, 10(6.6%, n=150) were between age group 76 to 80 years and only 4(2.8%, n=150) were seen in the age group >80 years (Table 1). In this study, out of 150 men, 57 (38.0%) had the electrolyte disturbance and 93 (62.0%) patients were not disturbed (Table 2). In this series, out of 57 patients with electrolyte disturbance, mean preoperative and postoperative hyponatremia was (129.29 ± 1.94) mmol/L and (132.05 ± 2.41) mmol/L (P>0.0001) whereas mean preoperative and postoperative hypernatremia was (149.8 ± 0.3) mmol/L and (147.2 ± 1.1) mmol/L (P>0.02) [26-29]. Mean preoperative and postoperative Hypochloremia was (2.82 ± 0.5) mmol/L and (3.8 ± 1.6) mmol/L (P>0.03) whereas mean preoperative and postoperative hyperkalemia was (110 ± 12.5) mmol/L and (106 ± 9.5) mmol/L (P>0.04). In this series, out of 55 patients with electrolyte disturbance, mean preoperative and postoperative Hypochloremia was (80.0 ± 10.6) mmol/L and (95.0 ± 11.2) mmol/L (P>0.0001) whereas

	Frequency	Percentage
Mean age±SD (Range)	61.25 years+8.86 (50-90)	-
Age (in groups)		
50 to 55 years	24	16.00%
56 to 60 years	36	24.00%
61 to 65 years	44	29.30%
66 to 70 years	20	13.30%
71 to 75 years	16	10.60%
76 to 80 years	10	6.60%
> 80 years	4	2.80%

Table 1: Baseline characteristics of the patients (n=150).

Electrolyte Disturbances	Frequency	Percentage
Disturbed	57	38.00%
Not disturbed	93	62.00%

Table 2: Frequency of electrolyte disturbances (n=150).

mean preoperative and postoperative Hyperchloremia was (130 ± 7.6) mmol/L and (110 ± 9.6) mmol/L (P>0.05) (Table 3). In this series, out of 55 patients with electrolyte disturbance, mean preoperative and postoperative sodium bicarbonate (HCO₃) at lower was (20.0± 1.4) mmol/L and (29.0 ± 2.1) mmol/L (P>0.002) and mean preoperative and postoperative Hyperchloremia was (38.1 ± 2.5)mmol/L and (31.02 ± 3.6) mmol/L (P>0.006) (Table 3).

Discussion

The results of this study showed significant changes of serum electrolytes between the pre operative and post operative procedure, these results were similar to the study of Moorthy et al. [11]. In this study the changes of serum sodium level were statistically highly significant between pre operative and post operative procedures i.e. mean preoperative and postoperative hyponatremia was (129.29 ± 1.94) mmol/L and (132.05 ± 2.41) mmol/L (P>0.0001) whereas mean preoperative and postoperative hypernatremia was (149.8 ± 0.3) mmol/L and (147.2 ± 1.1) mmol/L (P>0.02). This observation is comparable with the local study of Muhammad et al. [29] who presented the same results in his study. It is also similar with the study by Miyao et al. [30] Water intoxication with hyponatremia has been assumed as the main cause for the beginning of TURP syndrome. Another local study conducted by Suhail et al. [31] reported that the mean serum sodium level difference was statistical significant between the groups (pre and post-operative treatment) the subject at P<0.01. While Bachmann et al. [32] also reported same results of sodium level. Gupta et al. [33] demonstrated the significant changes in serum sodium levels (hyponatremia) and the mean level of serum sodium showed statistically significant reduction (hyponatremia) post-operatively during surgical procedure. These results correlate well to this study. Present study also showed that significant hyperkalemia occurred after TURF procedure [34]. Mean preoperative and postoperative hypochloremia was (2.82 ± 0.5) mmol/L and (3.8 ± 1.6) mmol/L (P>0.03) whereas mean preoperative and postoperative Hyperkalemia was (110 ± 12.5) mmol/L and (106 ± 9.5) mmol/L (P>0.04). Hahn et al. also found significant elevation of serum potassium. Whereas Gupta Kumar et al. also found similar results in his study. Norlen et al. [35] have reported significant changes in potassium levels (mainly in the form of dilutional hypokalemia) in the skeletal muscles post operatively when distilled water was used as irrigant. Moorthy et al. [11] showed significant hyperkalemia occurred in patients undergoing TURP. These observations are same to this study. Hyperkalemic cardiotoxicity is increased by hyponatremia and acidosis. Therefore it is possible that the cardiovascular changes occurring in TURP syndrome can be due to a combination of both hyponatemia and hyperkalemia. The exact cause of this change in potassium levels is not known. It is probably due to haemolysis during absorption of fluid into circulation.

Conclusion

It was concluded that the present study provide us a platform of discussion and an immediate review with changes observed during TURP. So that further research should be required in advance and extended phase

Serum electrolytes	Pre-Operative	Post-Operative	P value
Serum Sodium (mmol/L)			
Hyponatremia	129.29 ± 1.94	132.05 ± 2.41	< 0.0001
Hypernatremia	149.8 ± 0.3	147.2 ± 1.1	0.02
Potassium (K⁺)			
Hypochloremia	2.82±0.5	3.8±1.6	0.03
Hyperkalemia	110±12.5	106±9.5	0.04
Chloride (Cl⁻) mmol/L			
Hypochloremia	80.0±10.6	95.0±11.2	0.0001
Hyperchloremia	130±7.6	110±9.6	0.005
Sodium bicarbonate (HCO₃⁻)			
Low	20.0±1.4	29.0±2.1	0.002
Raised	38.1±2.5	31.02±3.6	0.006

Table 3: Serum electrolytes after the procedure TURP (n=57).

at different and wide clinical setting to gives more and better knowledge related to electrolytes disturbances in transurethral resection of prostate.

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