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

Javed Altaf[1*], Adeel Hyder Arain[1], Bikha Ram Devrajani[2] and Saira Baloch[2]

[1]Department of Urology, Liaquat University of Medical and Health Sciences, Jamshoro, Pakistan
[2]Medical Research Center, Liaquat University of Medical and Health Sciences, Jamshoro, Pakistan

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 plstoperatively (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 ± SD (range) was 61.25 years ± 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 ± 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). 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). Mean preoperative and postoperative Hypochloremia was (80.0 ± 10.6) mmol/L and (95.0 ± 11.2) mmol/L (P>0.0001) whereas mean preoperative and postoperative Hyperchloremia was (130 ± 7.6) mmol/L and (110 ± 9.6) mmol/L (P>0.05). Mean preoperative and postoperative sodium bicarbonate (HCO_3) 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).

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

***Corresponding author:** Dr. Javed Altaf, Assistant Professor, Department of Urology, Liaquat University of Medical and Health Sciences, Jamshoro, Pakistan, Tel: 92-229213333; E-mail: javedaltafdr@yahoo.com

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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 plstoperatively (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 (HCO_3) 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 (HCO_3)			
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.

References

1. Madersbacher S, Alivizatos G, Nordling J, Sanz CR, Emberton M, et al. (2004) EAU 2004 guidelines on assessment, therapy and follow-up of men with lower urinary tract symptoms suggestive of benign prostatic obstruction (BPH guidelines). Eur Urol 46: 547-554.
2. Zhao Z, Zeng G, Zhong W, Mai Z, Zeng S, et al. (2010) A prospective, randomised trial comparing plasmakinetic enucleation to standard transurethral resection of the prostate for symptomatic benign prostatic hyperplasia: three-year follow-up results. Eur Urol 58: 752-758.
3. Hahn RG (2006) Fluid absorption in endoscopic surgery. Br J Anaesth 96: 8-20.
4. Rassweiler J, Teber D, Kuntz R, Hofmann R (2006) Complications of transurethral resection of the prostate (TURP)--incidence, management, and prevention. Eur Urol 50: 969-979.
5. Ali MN (2001) The outcome of Transurethral Resection of the Prostate. J Coll Physicians Surg Pak Dec 11: 743-746.
6. Nadu A, Mabjeesh NJ, Ben-Chaim J, Kaver I, Matzkin H, et al. (2004) Are indications for prostatectomy in octogenarians the same as for younger men? Int Urol Nephrol 36: 47-50.
7. Kluger MT, Szekely SM, Singleton RJ, Helps SC (2005) Crisis management during anaesthesia: water intoxication. Qual Saf Health Care 14: e23.
8. Schober P, Meuleman EJ, Boer C, Loer SA, Schwarte LA (2008) Transurethral resection syndrome detected and managed using transesophageal Doppler. Anesth Analg 107: 921-925.
9. Thorpe A, Neal D (2003) Benign prostatic hyperplasia. Lancet 361: 1359-1367.
10. Nickel JC (2008) Inflammation and benign prostatic hyperplasia. Urol Clin North Am 35: 109-115.
11. Moorthy HK, Philip S (2002) Serum electrolytes in turp syndrome-is the role of potassium under estimated?. Indian J Anaesth 46: 441-444.
12. Rassweiler J, Teber D, Kuntz R, Hofmann R (2006) Complications of transurethral resection of the prostate (TURP)--incidence, management, and prevention. Eur Urol 50: 969-979.
13. Anson K, Nawrocki J, Buckley J, Fowler C, Kirby R, et al. (1995) A multicenter, randomized, prospective study of endoscopic laser ablation versus transurethral resection of the prostate. Urology 46: 305-310.
14. Maulana D, Redjeki IS, Bisri T (2009) Efficacy and Safety of Preoperative Administration of Half Molar Hypertonic Sodium Lactate during Transurethral Resection of Prostate (TURP). Crit Care & Shock 12: 35-42.
15. Untergasser G, Madersbacher S, Berger P (2005) Benign prostatic hyperplasia: age-related tissue-remodeling. Exp Gerontol 40: 121-128.
16. Bartoletti R, Gavazzi A, Cai T, Mondaini N, Morelli A, et al. (2009) Prostate growth and prevalence of prostate diseases in early onset spinal cord injuries. Eur Urol 56: 142-148.
17. Kok ET, Schouten BW, Bohnen AM, Groeneveld FP, Thomas S, et al. (2009) Risk factors for lower urinary tract symptoms suggestive of benign prostatic hyperplasia in a community based population of healthy aging men: the Krimpen Study. J Urol 181: 710-716.
18. Chapple C (2009) Words of wisdom. Re: Age and bladder outlet obstruction are independently associated with detrusor overactivity in patients with benign prostatic hyperplasia. Eur Urol 55: 748.
19. Liu CC, Huang SP, Li WM, Wang CJ, Chou YH, et al. (2007) Relationship between serum testosterone and measures of benign prostatic hyperplasia in aging men. Urology 70: 677-680.
20. Issa MM, Young MR, Bullock AR, Bouet R, Petros JA (2004) Dilutional hyponatremia of TURP syndrome: a historical event in the 21st century. Urology 64: 298-301.
21. Boyle P, Maisonneuve P, Napalkov P (1995) Geographical and temporal patterns of incidence and mortality from prostate cancer. Urology 46: 47-55.
22. Stephenson WP, Chute CG, Guess HA, Schwartz S, Lieber M (1991) Incidence and outcome of surgery for benign prostatic hyperplasia among residents of Rochester, Minnesota: 1980-87. A population-based study. Urology 38: 32-42.
23. Wei JT, Calhoun E, Jacobsen SJ (2005) Urologic diseases in America project: benign prostatic hyperplasia. J Urol 173: 1256-1261.
24. Chute CG, Panser LA, Girman CJ, Oesterling JE, Guess HA, et al. (1993) The prevalence of prostatism: a population-based survey of urinary symptoms. J Urol 150: 85-89.
25. Garraway WM, Collins GN, Lee RJ (1991) High prevalence of benign prostatic hypertrophy in the community. Lancet 338: 469-471.
26. Tsukamoto T, Kumamoto Y, Masumori N, Miyake H, Rhodes T, et al. (1995) Prevalence of prostatism in Japanese men in a community-based study with comparison to a similar American study. J Urol 154: 391-395.
27. Tan HY, Choo WC, Archibald C, Esuvaranathan K (1997) A community based study of prostatic symptoms in Singapore. J Urol 157: 890-893.
28. Chicharro-Molero JA, Burgos-Rodriguez R, Sanchez-Cruz JJ, del Rosal-Samaniego JM, Rodero-Carcia P, et al. (1998) Prevalence of benign prostatic hyperplasia in Spanish men 40 years old or older. J Urol 159: 878-882.
29. Muhammad AT, Shaikh AA, Devrajani BR, Shah ZA, Thanwar Das, et al. (2010) Serum sodium level in transurethral resection of the prostate (TURP) (a cross sectional descriptive study at two hospitals). Med Channel 16: 318-320.
30. Miyao H, Tanaka K, Kotake Y, Kawazoe T, Fujioka T (1996) Distribution of irrigating fluid in intracellular and extracellular spaces during transurethral prostatectomy II--TUR syndrome and hyponatremia. Masui 45: 948-954.
31. Suhail MA, Pirzada AJ, Khaskeli MS (2010) Comparison of effectiveness of irrigation fluid mannitol 5% with that of glycine 1.5% in preventing post TURP hyponatremia. Med Channel 16: 321-325.
32. Bachmann A, Schürch L, Ruszat R, Wyler SF, Seifert HH, et al. (2005) Photoselective vaporization (PVP) versus transurethral resection of the prostate (TURP): a prospective bi-centre study of perioperative morbidity and early functional outcome. Eur Urol 48: 965-971.
33. Gupta K, Rastogi B, Jain M, Gupta PK, Sharma D (2010) Electrolyte changes: An indirect method to assess irrigation fluid absorption complications during transurethral resection of prostate: A prospective study. Saudi J Anaesth 4: 142-146.
34. Hahn RG (2001) Smoking increases the risk of large scale fluid absorption during transurethral prostatic resection. J Urol 166: 162-165.
35. Norlen H, Dimberg M, Vinnars E, Aligen LG, Brandt LG (1990) Water and electrolytes in muscle tissue and free amino acids in muscle and plasma in connection with transurethral resection of the prostate using distilled water as an irrigating fluid. Scand J Urol Nephrol 24: 21-26.

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