Original Article

Frequency Of Electrolytes Derangement In Patients Who Underwent Turp For Enlarged Prostate

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Abstract

Objectives: To find out the frequency of Electrolytes derangement (increase or decrease in serum sodium, potassium and chloride level) in patients who underwent TURP for enlarged prostate.
Materials and Methods: This was a cross sectional descriptive study from 11-02-2020 to 11-08-2020 on 142 patients. After taking approval from ethical committee of the hospital. Informed consent was taken from the patients by explaining the patients. Detail physical examinations were performed and all necessary investigation was done. Preoperatively serum electrolyte levels were noted.
Results: In this study, 142 patients with patient's benign prostate enlargement undergoing TURP had observed, in which 83(58.5%) patients have prostate volume have less than or equal to 15gm and 59(41.5%) patients have more than 15gm. Electrolyte derangement among patients presenting with benign prostatic enlargement after TURP was 69(48.59%).
Conclusion: Electrolyte serum levels were decreased after TURP procedure. Pre and post-surgery electrolyte should be fully monitored to prevent TURP complications.

KEYWORDS: Electrolytes Derangement, Transurethral Resection, Prostate Specimen, Benign Prostatic Enlargement.

INTRODUCTION

Benign Prostatic enlargement (BPE) is most common worldwide urological disorder in men over 40 years of age(1). According to postmortem research, benign prostatic hyperplasia affects men most frequently in their fourth decade of life (8%), sixth decade (50%) and ninth decade (80%) of their lives [2, 3]. Benign prostatic hyperplasia is a multifocal, non-cancerous, hyperplastic, and progressive histopathological change in the stromal and epithelial cells of the transitional zone of the prostate that causes distinct prostatic nodules, inflammation, fibrosis, and modifications in smooth muscle activity, which may partially or completely obstruct the urethra (4, 5).

The surgical options for men with obstructive symptoms have traditionally included open prostatectomy and transurethral resection of prostate (TURP)(6). The second most frequent type of surgery for males is TURP. The mucosal gaps must be gently dilated, blood, tissue, and debris must be removed from the operating field, and irrigating fluid must be used to improve visibility. One of the most concerning side effects of TURP is electrolyte imbalance, especially given the possibility of developing overt TUR syndrome (7). TURP5 has employed a number of irrigating liquids. Hypotonic irrigating fluid systemic absorption is a potential complication of such a therapy. The TURP syndrome is the collective name for the various clinical manifestations brought on by the ingestion of a significant amount of irrigating fluid during transurethral resection of the prostate (most electrolyte derangement is brought on by circulatory fluid overload, water toxicity, or solute toxicity in irrigating fluid). Up to 10% of TURP6 patients have been reported to have the syndrome(8). Electrolyte derangement following TURP occurred in 66 individuals (23.6%) (9). The present study was conducted to find out the frequency of Electrolytes derangement (increase or decrease in serum sodium, potassium and chloride level) in patients who underwent TURP for BP.

Objective: To find out the frequency of Electrolytes derangement (increase or decrease in serum sodium, potassium and chloride level) in patients who underwent TURP for enlarged prostate.

MATERIALS AND METHODS:

Study Design and setting:

This Cross-sectional study, was done at the MTI, Hayatabad Medical Complex Peshawar from 11-02-2020 to 11-08-2020.

Sample Size: Taking prevalence of Electrolyte derangement as 23.6% [9], absolute precision 7%, confidence level 95% the sample size was 142 patients undergoing TURP.

Selection criteria:

Inclusion Criteria:

- All patients undergoing TURP for BPE
- ASA status I and II
- Male patient
- Age 40 years to 70 years

Exclusion Criteria:

- All those patients having documented medical condition which disturb serum electrolyte like, SIADH, Diabetes insipidus, CRF etc.
- All those who are on diuretics like frusemide etc.

Methods

Ethical approval for this study was taken from the institute and was sent to REU CPSP Karachi. After approval this study was conducted in the urology department of Institute of Kidney Disease, Peshawar. All patients presenting to urology department according to inclusion and exclusion criteria were included in the study. Consent for the study was taken from all patients. Prior to informed consent pros and cons of the study will be explained. Detail physical examination were performed and all necessary investigation including CBC, urine R/E, viral profile, ECG and chest X. ray were done. Demographic data like, age, address were noted. The TURP was perform by consultant urologist of having a minimum of 5years experience in urology. Preoperatively serum electrolyte level were noted in the proforma, duration of the surgery, and amount of prostrate resected and the amount of irrigated fluid uses (irrigation fluid was 1.5% glycine). The serum electrolyte was noted preoperatively, 45 mint after surgery and 90 minute after surgery. All the data were collected by the researcher himself and were noted in designated proforma.

Data analysis

Data entry and analyses were done using Statistical Package for Social Sciences (version 23). Mean ± SD were calculated for age, volume of prostrate, the duration of surgery, amount of fluid uses, values of s/electrolyte. Frequency and percentages were calculated for electrolyte derangements like hyponatremia, hypernatremia, hypokalemia, hyperkalemia, hypochloremia and hyperchloremia on 45 minutes and 90 minutes postoperatively. Effect modifiers like duration of surgeries, amount of fluid uses and amount of prostate resected were controlled through stratification. Frequency of s/electrolytes derangement were stratified with regard to age, prostrate volume, duration of surgery and amount of fluid used intraoperative to see the effect. Post stratification Chi square test was applied and significance level was set at ≤0.05. All the data were presented in tables and graphs.

RESULTS

In this study, 142 patients with patient's benign prostate enlargement undergoing TURP had observed, in which 83(58.5%) patients have prostate volume have less than or equal to 15gm and 59(41.5%) patients have more than 15gm. Similarly, majority of the patients have duration of TURP less than 50 mints by using fluid with more than 15 liter (Figure 2). Patients age was divided in four categories, out of which most presented in 56-65 years which were 80(56.3%) while 9(6.3%) patients were in the age range of less than 45 years, 25(17.6%) were of age range 46-55 years and 28(19.7%) presented at age more than 65 years. The study included age ranged from 40 up to 70 years. Average age was 59.55 years + 7.26SD. (Table 1) Electrolyte derangement among patients presenting with benign prostatic enlargement after TURP which was measured in term of Increase or decrease level from the normal values of at least one of these electrolytes (sodium, Potassium, Chloride) was 69(48.59%) while 73(51.41%) were found non-Electrolyte derangement. (Figure 3). Age wise distribution of electrolyte derangement shows that it increases as the age increase.

There were 13(46.4%) patients were found in more than 66 years of age while 15(60%) were non electrolyte derangement, 4(44.4%) patients have age groups of less than 45 years were electrolyte derangement while 5(55.6%) were non electrolyte derangement, 10(40%) have age range of 46-55 years were electrolyte derangement while 15(60%) were non electrolyte derangement and 42(52.5%) cases have age range of 56-65 years of age were electrolyte derangement while 38(47.5%) were non electrolyte derangement. Although statistically it was insignificant with p-value=0.719 (Table 2)

The majority of patients having electrolyte derangement having more than 16gm prostate volume and longer duration of TURP although it was statistically insignificant. (Table 3)

Fig: Distribution of Parameters

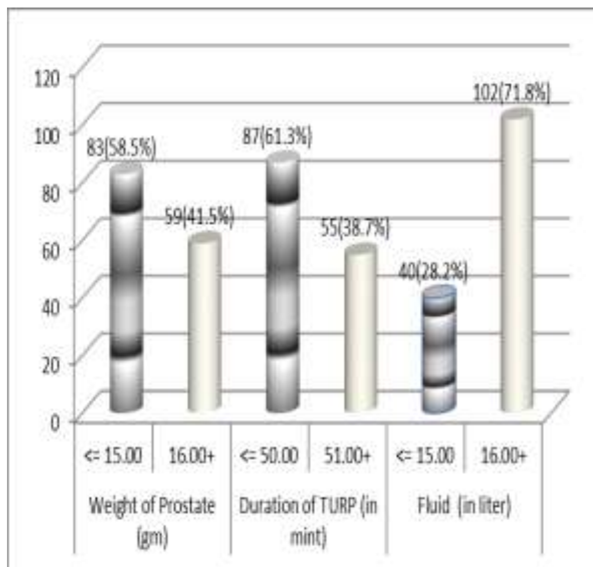

Table 1-0: Age wise Distribution of the Patients

Age group (years)	Frequency	Percentage
<= 45.0	**9**	**6.3**
46.00 - 55.00	**25**	**17.6**
56.00 - 65.00	**80**	**56.3**
66.00+	**28**	**19.7**
Total	**142**	**100.0**
Mean±SD of age	**59.55±7.26**	

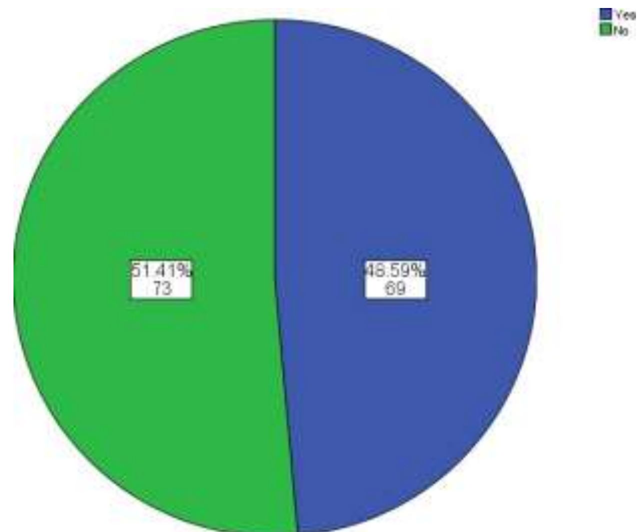

Fig 3: Distribution of electrolytes derangement

Table 2-0: Age Wise Distribution of Electrolytes Derangement

Age (inyears)	Serum Electrolyte Derangement		Total	p-value
	Yes	No		
<= 45.00	4 44.4%	5 55.6%	9 100.0%	0.719
46.00 - 55.00	10 40.0%	15 60.0%	25 100.0%	
56.00 - 65.00	42 52.5%	38 47.5%	80 100.0%	
66.00+	13 46.4%	15 53.6%	28 100.0%	
Total	69 48.6%	73 51.4%	142 100.0%	

Table 3-0: Stratification of Serum Electrolyte Derangement

Weight of Prostate		Serum Electrolyte Derangement		p-value
		Yes	No	
	<= 15.00	37 44.6%	46 55.4%	
	16.00+	32 54.2%	27 45.8%	0.256
Duration of TURP	<= 50.00	40 46.0%	47 54.0%	
	51.00+	29 52.7%	26 47.3%	0.433
Fluid (in liter)	<= 15.00	18 47.4%	20 52.6%	
	16.00+	51 49.0%	53 51%	0.833
	Total	69 48.6%	73 51.4%	

DISCUSSION

The most effective treatment for BPH is currently trans urethral resection of the prostate (TURP), particularly when the prostate volume is between 40 and 60 mL. TURP is carried out by resecting or cutting the prostate tissue with an electrocautery through the urethra while viewing the prostate area using a cystoscope (10). Due to irrigation fluid absorption, TURP syndrome which is characterised by mental disorientation, nausea, vomiting, hyper/hypotension, bradycardia, and visual disturbance is the most lethal post-TURP complication. After the tissue has been removed and the venous sinus has been opened, fluid is directly absorbed into the vascular system (11). When fluid pressure is higher than 2 kPa (15 mmHg), volume absorption is greatly increased. When too much fluid was absorbed during TURP, electrolyte imbalances such hyponatremia, hypo/hyperkalemia, and hypochloremia frequently occurred (12, 13). Our study has similar results with Gupta, et al,(13) who found higher incidence of hyponatremia; may be caused by irrigation. Distilled water used as irrigation fluid may be less effective and safe compared to glysin or mannitol sorbitol(13, 14). 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.(15) who presented the same results in his study. 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(16). Norlen et al.(17) 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.(18) showed significant hyperkalemia occurred in patients undergoing TURP. These observations are same to this study. Hyperkalemia following TURP is partly explained by cell lysis as happened during resection of tissue. Absorption of fluid into circulation is an alternate mechanism that can cause hyperkalemia after TURP(18).

ECG changes and cardiac toxicity caused by hyperkalemia usually occur at serum levels above 6mEq/L. We did not encounter significant rise of serum potassium postoperatively in our series. This is partially explained by hemodilution caused by fluid absorption to offset any changes caused by hemolysis. Also, with 1.5% glycine as irrigant, hemolysis is minimal as compared to other hypo osmolar irrigants like water. Patients with electrolyte derangement were high in older than those without electrolyte derangement. Uchida et al. found age of the patient undergoing TURP as a significant risk factor for perioperative blood transfusion and attributed it to more rigid vasculature in elderly, which allows for persistent opening of venous channels (19).

Mean weight of tissue resected was found to be higher in those patients undergoing TURP. The amount of fluid absorption depends mainly on the number and size of venous sinuses opened81. Volume of irrigant used was found to be higher in patients with deranged electrolytes. We used 1.5% glycine in all patients undergoing TURP. So, the type of irrigant used is not a factor in determining fluid absorption in our patients. Volume of irrigant used is consistently found to correlate with the risk of postoperative electrolyte derangement in previous studies(13).

CONCLUSION

Electrolyte derangement after TURP is not uncommon. The need for monitoring electrolyte following TURP should be individualized, taking into account the weight of resected tissue, volume of irrigation used, resection time, increasing age, and hypertension. Low normal values of serum sodium should alert the surgeon to the possibility of postoperative electrolyte derangement.

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