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SERUM SODIUM AND POTASSIUM LEVELS DURING TURP FOR BHP PATIENTS UNDER GENERAL ANESTHESIA AT TERTIARY CARE HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY

Medical Science

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ABSTRACT

Background: Prostate is most commonly affected by BHP above 40 years of age and needs TURP. During TURP the irrigational fluid used may get absorbed and results hemodilution that affects serum sodium and potassium levels and may result TURP syndrome. **Study design:** A prospective, randomized, observational study including 30 male patients between 40 years to 80 years of age belonging to ASA classification I-III scheduled for TURP under general anesthesia were selected for our study. Patients were put in group A(<45 minutes taken) and B(>45 minutes taken), depending upon time taken during surgery. Serum sodium, serum potassium, time taken during the resection of gland (resectoscope insertion until the end of procedure),volume of resected prostatic gland tissue and volume of irrigation fluid were recorded during the surgery. **Results:** In our study, we found serum sodium level didn't show any significant change between the two groups A and B in pre-operative, intra-operative and post-operative periods. But, serum potassium level increased significantly in post operative period in group B patients, who had surgical time more than 45 minute. Resection time, amount of resected gland and volume of irrigation fluid used had impact over serum potassium level in group B patients. **Conclusion:** In our prospective observational study, serum potassium level increased significantly in post-operative period. There was no effect over serum sodium levels in our study. The more time utilized during resection was associated with more gland resected and hence more irrigant used.

KEYWORDS

INTRODUCTION

Prostate is most commonly affected by benign and malignant neoplasms. BPH is most common benign condition of prostate usually affects males over 40 years of age.[1,2] It is characterized by increase in urinary frequency, urgency, incontinence and decrease in urinary flow.[3] The exact etiology remains unclear. But, some believe effect of testosterone and others incriminate heredity as main predisposing factors.[4] The standard treatment for symptomatic BHP is endoscopic procedure i.e. TURP.[5] The procedure remains the gold standard for it being simple in nature, associated with low mortality as well as morbidity and shorter hospital stay.[6] The procedure involves introduction of resectoscope and electrode which results coagulation and cutting of prostatic tissue.[7] Irrigation is continuously maintained with 1.5% glycine or other fluids to remove the dissected tissue and making the field clear for visibility. During the procedure, the irrigating fluid may enter the vascular system through sinuses opened up during resection resulting TURP syndrome.

Patients with BHP are mostly elderly. Hence, the anesthetic method which has little effect over cardiovascular, respiratory and CNS is chosen.[8] So, sub-arachnoid block is technique of choice for the same.[9] Patients who have contraindications to spinal anesthesia undergo general anesthesia.

The present study is aimed to study the changes of serum sodium and potassium in TURP for BHP under general anesthesia.

AIM:

To study the patients undergoing TURP for BHP under general anesthesia at tertiary care hospital.

OBJECTIVE:

1. To determine serum sodium and potassium levels during TURP for BHP at tertiary care hospital.
2. To determine the effect of other factors like time taken during the resection of gland (resectoscope insertion until the end of procedure), volume of resected prostatic gland tissue and volume of irrigation fluid over serum sodium and potassium during TURP for BHP at tertiary care hospital.

Study design

This prospective, randomized, observational study was carried out after clearance from institutional review board. A total 30 male patients between 40 years to 80 years of age belonging to ASA classification I-III scheduled for TURP under general anesthesia were selected for our study. Written informed consent was taken from all the patients participating in the study. All those patients having contraindications to sub-arachnoid block for TURP were included in the study. Patients with low platelet count (<60,000), deranged coaglogram, deranged LFT, skin infection in the lumber region, patient refusal and spine deformity were included in the study. Patients with severe coronary artery disease, severe obstructive and restrictive pulmonary disease, severe cardio-vascular diseases, severe cerebrovascular diseases, renal failure, patients on diuretic therapy and chronic diarrhea were excluded from the study. All patients were seen preoperatively with detailed examination and complete investigations like CBC, KFT, LFT, coaglogram, blood sugar random, ECG, Chest X ray, pulmonary function test and tripple serology.

Patients were assigned in to two groups on the basis of duration of resection. Group A with resection time less than 45 minutes and group B with resection time more than 45 minutes.

On arrival to operating room, standard multi-channel monitor with ECG, NIBP, oxygen saturation probe and temperature probe were attached. All baseline vitals HR, BP, SPO_2 and temperature were recorded. 18 G IV canula was placed. Blood sample for baseline serum sodium and serum potassium was taken before institution of intra-venous fluid. Second sample was taken after 30 minutes from the start of resection of gland. Another sample was taken after 30 minutes at the end of procedure. Patients were induced with general anesthesia with fentanyl, propafol and atracurium. The airway was secured with PVC endotracheal tube and connected with workstation. Patients were reversed with Neostigmine after regaining full consciousness. Patients were monitored for serum sodium and potassium, time taken during the resection of gland (resectoscope insertion until the end of procedure), volume of resected prostatic gland tissue and volume of irrigation fluid.

Post-operatively patients were monitored for any sign of TURP syndrome for one hour in the recovery room.

RESULTS

The difference between the two groups in terms of age and weight were

statistically insignificant as depicted in table 1. Out of the two groups, none of the patients who underwent TURP developed TURP syndrome. Serum sodium level too didn't show any significant change between the two groups in pre-operative, intra-operative and post-operative periods. But, serum potassium level rose significantly in post operative period in group B patients, who had surgical time more than 45 minute as shown in table 1. Resection time, amount of resected gland and volume of irrigation fluid used between the group A and group B showed statistically significant difference with p value < 0.05 as shown in table 1. Moreover, both the groups A and B showed no significant changes in blood pressure (SBP and DBP), heart rate and oxygen saturation as depicted in table 2.

Table 1: Comparison of variables between group A and group B

Variable	Group A (Mean±SD)	GroupB(Mean± SD)	P value
Age	61.5±5	59.8±6.5	>0.05
Weight	66±4.3	67.5±5.8	>0.05
Resection time(minutes)	39.5±5.5	56.9±6.3	<0.05
Amount of resected gland (grams)	26.2±5.6	45.4±7.2	<0.05
Volume of irrigation fluid (liters)	11.3±1.6	17.1±1.8	<0.05
Irrigant volume absorbed (ml)	67±6.2	68.1±6.9	>0.05
Serum sodium			
Pre-op.	139.6 ±2.72	139.4±1.81	>0.05
Intra-op	138.1 ± 2.42	138.6±2.20	>0.05
Post-op	137.8 ± 2.80	137±1.11	>0.05
Serum potassium			
Pre-op	3.9 ±0.28	3.87 ±0.18	>0.05
Intra-op	4.0 ± 0.28	4.04 ±0.20	>0.05
Post-op	4.15 ±0.21	4.46 ±0.26	<0.05

Table 2: Hemodynamic and respiratory parameters of patient

Variables	Group A (MeanS±D)	Group B (Mean±SD)	P value
Heart rate			
(beats/min.) Pre-op.	84 ±8.32	82.5 ±7.70	>0.05
Intra-op.	73 ±6.40	72.9 ±6.24	>0.05
Post-op.	81 ± 6.81	83.2 ±5.46	>0.05
Systolic BP (mmHg)			
Pre-op.	131.22 ±8.10	130.70 ±9.42	>0.05
Intra-op.	126.33 ±6.72	127 ±7.10	>0.05
Post-op.	129.41 ±6.23	128.61±6.12	>0.05
Diastolic BP (mmHg)			
Pre-op.	83.22 ±7.32	82.34 ±7.28	>0.05
Intra-op.	78.60 ±6.32	77.86 ±6.65	>0.05
Post-op.	80.72 ±4.13	79.88 ±5.68	>0.05
Oxygen saturation			
Pre-op.	94.38±1.77	94.66 ±2.10	>0.05
Intra-op.	98.48 ±0.59	98.50 ±0.60	>0.05
Post-op.	96.34 ±0.98	96.54 ±0.66	>0.05

DISCUSSION

The two groups A and B in the present study are comparable with respective to age and weight. Both the groups have comparable baseline parameters like HR, SBP, DBP, SPO_2 and temperature in the pre-operative period.

The present study showed that the serum sodium levels between group A and group B were statistically insignificant in pre-operative(group A-139.6 ±2.72; group B-139.4±1.81), intra-operative (group A-138.1 ± 2.42; group B- 138.6±2.20) and post-operative (group A-137.8 ± 2.80; group B-137±1.11) periods. Our results are consistent with the study of Patel SN et al(2014).[1] The absorption of large amount of irrigational fluid results dilutional hyponatremia and metabolic acidosis. Which has been postulated as the reason for TURP syndrome. But, in our study, sodium level didn't show any significant change both in intra and post-operative periods.

The serum potassium level changes in our study remained statistically insignificant in pre-operative (group A-3.9 ±0.28 ; group B-3.87 ±0.18) and intra-operative (group A-4.0 ± 0.28; group B-4.04 ±0.20) periods between group A and group B. However, the values showed significant difference in post-operative period (group A-4.15 ±0.21; group B-4.46 ±0.26). Our results are in accordance with the study of Patel SN et al(2014).[1]Similar results were found in the study of Gupta k et al[2] and Petrusheva AP et al[10]. Krishna Moorthy and Shobha Philip demonstrated in their study the hyperkalemia during TURP and PCNL, which was more linked with the duration of the procedure.[11] Rise in potassium level after TURP can be explained by the cell lysis during the procedure. The fluid absorption resulting hemodilution during irrigation of TURP is another explanation for hyperkalemia.[11] The ECG changes occur with the K^+ level >6 meq/l . But, we did not encounter with any such case in the post-operative period. May be we used 1.5% glycine as irrigant, which is associated with minimal hemolysis.

The mean duration of resection time between group A (39.5±5.5) and B (56.9±6.3) showed significant difference. The amount of the gland resected too implied significant difference between group A(26.2±5.6) and group B(45.4±7.2). Results of both duration of resection and amount of resected gland are in accordance with the study of Patel SN et al (2014)[1] Our study found patients with increased resection time (group B) had more volume of the prostatic tissue resected and hence hyperkalemia in the post-operative period at constant height of irrigation column. The fluid absorbed during TURP depends not only on resection time, but also on number of venous sinuses opened and hydrostatic pressure at which irrigant is applied at the prostatic bed.[12] Volume of irrigant used in our study also demonstrated significant difference between group A (11.3±1.6) and group B(17.1±1.8). Similar results were elucidated by Gupta k et al[2]. The more volume of irrigant is associated with longer duration of procedure. Which results more volume of fluid absorption. That causes hemodilution and hence rise in K^+ level.[2]

Heart rate, systolic blood pressure, diastolic blood pressure and oxygen saturation didn't show any statistical significance between group A and group B in the pre-operative, intra-operative and post-operative periods. Which is in accordance with the study of Patel SN et al(2014).[1]

CONCLUSION

In our prospective observational study, serum sodium level didn't change in TURP under general anesthesia during intra-operative and post-operative periods. But, serum potassium levels increased significantly in the post-operative period. The more time of resection was associated with more volume of resection of gland and hence more irrigant used.

REFERENCES

1. Patel S.N, Patel N.D, Serum sodium and serum potassium changes during transurethral resection of prostate gland in patients under subarachnoid block. National Journal Of Medical Research.
2. Gupta K, Rastogi B, Jain M, Gupta P, Sharma D (2010) Electrolyte changes: An indirect method to assess irrigation fluid absorption complications during transurethral resection of prostate: A prospective study. Saudi J Anesth. 2010 Sept;4(3):142-6.
3. Thorpe A, Neal D. Benign prostatic hyperplasia. The Lancet. 2003; 361(9366): 1359–67.
4. Nickel J. C. Inflammation and Benign Prostatic Hyperplasia. Urol Clin North Am. 2008; 35(1): 109–15.
5. Rassweiler J, Teber D, Kuntz R, Hofman R. Complications of Transurethral Resection of the Prostate (TURP) – Incidence, Management, and Prevention. Eur Urol 2006; 50(5): 969–80.
6. Ho H. S, Cheng C. W. Bipolar transurethral resection of the prostate : A new reference standard? Curr Opion Urol. 2008; 18: 50–55.
7. Altaf J, Arain AH, Devrajani BR, Baloch S. Serum electrolyte disturbances in benign prostate hyperplasia after transurethral resection of the prostate. J Nephrol Her 2016; 6:238.
8. Chung F, Meier R, Lautenschlager E, Carmichael FJ,. Chung A. General or spinal anesthesia: which is better in the elderly? Anesthesiology 1987; 67: 422–7.
9. Lynch M, Anson K. Time to rebrand transurethral resection of the prostate? Curr Opin Urol 2006;16:20-24.
10. Petrusheva AP, Kuzmanovaska B, Mojsova M, et al. Evaluation of changes in serum sodium concentration in transurethral resection of prostate. Pril (Makedon Akad Nauk Umet Odd Med Nauki). 2015;36(1):117-27.
11. Moorthy. H . Krishna and Philip shobha. Serum electrolytes in TURF syndrome is the role of potassium underestimated? Indian. J. Anesthesia. 2002: 46(6) page 441-444.
12. Madsen P. O., Naber K. G. The importance of the pressure in the prostatic fossa and absorption of irrigating fluid during transurethral resection of the prostate. *The Journal of Urology.* 1973;109(3):446–452.