

ORIGINAL ARTICLE

SERUM SODIUM AND SERUM POTASSIUM CHANGES DURING TRANSURETHRAL RESECTION OF PROSTATE GLAND IN PATIENTS UNDER SUBARACHNOID BLOCKSunaina N Patel¹, Nidhi D Patel²**Authors Affiliation:** ¹Assistant Professor, Department of Anaesthesiology, GMC, Surat, Gujarat**Correspondence:** Dr. Sunaina N Patel, Email: patel_sunaina@yahoo.com**ABSTRACT**

Objective: This prospective study was design to study the changes occurring in serum level of Na & k during TURP in Spinal anaesthesia & also other factor like amount of irrigating fluid absorbed, resection time, height of irrigation, amount of gland resected & concurrent hemodynamic changes occurring during procedure.

Method: This study was conducted in 50 male patients at JJ hospital, MUMBAI undergoing TURP under spinal anaesthesia. The changes in serum Na & K were studied by taking blood samples in preoperative period (in preop room), intraoperative period(20 min after start of resection),post operative period(30 min after end of surgery).Then patient were divided into two groups ,group 1 resection time ≤ 30 min & group 2 resection time > 30 min.

Result: The serum Na⁺ did not changed significantly in either of the groups. The serum K⁺ did changed significantly. There was significant rise in serum K⁺ level in post operative period in group II as compared to preoperative level. The changes in serum K⁺ were related to duration of resection.

Conclusion: Perioperative monitoring of the serum electrolytes Na & k is important for safety of patient.

Keywords: Serum sodium, serum potassium, transurethral, prostate gland, subarachnoid block

INTRODUCTION

The prostate is a male organ, most commonly affected by benign or malignant neoplasm. Benign prostatic hypertrophy (BPH) is the most common benign tumor and its incidence is age related. Transurethral Resection of Prostate (TURP) is the method of choice of endoscopic resection of symptomatic BPH. TURP remains a gold standard procedure because of its lower morbidity and mortality and shorter duration of time of hospitalization then in those treated by open surgery. This procedure commences with a specialized instrument i.e. resectoscope and electrode capable of both cutting and coagulating. Continuous irrigation is required to maintain the visibility, distend the operative site and remove dissected tissue and blood. During this procedure, irrigation fluid enters the vascular system through the opened venous sinuses. TURP syndrome (i.e. water intoxication syndrome) is a general term used to describe a wide range of neurological and cardiopulmonary symptoms that occurs when irrigating fluid is absorbed during Transurethral Resection (TUR) pro-

cedures especially Transurethral Resection of Prostate (TURP). The syndrome has also been reported after endometrial ablation and ureteroscopic procedures with irrigating fluid.

In this study serum electrolyte and other changes associated with TURP has been studied. Serum Na and K levels, hemodynamic and respiratory parameters, irrigation fluid used and absorbed, amount of gland resected is essential for safe practice and management of TURP under spinal anesthesia.

METHOD

Total numbers of patients included were 50. All patients of ASA grade I,II and III in the age group of 41 to 80 were included for the study. All the patients were undergoing elective surgical resection of prostate (TURP) for which regional anesthesia was carried out routinely. All the patients were evaluated preoperatively in detail. The baseline investigations and specific investigations i.e. complete hemogram, body weight urine analysis, blood sug-

ar, blood group, blood urea, serum creatinine, liver function test, serum electrolytes, chest X-Ray, ECG, were done. Informed consent was taken from the patient for the study. Preoperative baseline pulse rate, blood pressure were noted in all. With intravenous (IV) cannula of 18 gauge, preoperative blood sample for serum Na^{++} and K^+ was taken and then IV infusion of lactated Ringer's solution was started for preloading. Pulse oximeter and cardioscope were attached, then the patient was given sitting position for spinal anesthesia. Spinal anaesthesia was given at L3-L4/L4-L5 interspace with 23G quincke's spinal needle. Space confirmed by aspiration of free flow of clear CSF & then inj. Bupivacaine (0.5% heavy) 3 to 3.5 ml.

Level achieved was T10 after injecting the drug, patient was made to lie down supine position and every minute BP and Pulse changes were noted. Fall in blood pressure occurring due to subarachnoid block was treated by IV fluid (RL) and if needed by IV Mephenteramine (vasopressor) given. Once the achievement of level (T10) was confirmed (approximately 10-15 minutes after the subarachnoid block), patient was given lithotomy position. In view of old age patient's were oxygenated by ventimask (4L/min). Non invasive blood pressure, SPO₂, heart rate, ECG, respiration were monitored on multipara monitor. The main variables assessed in those patients were heart rate, systolic blood pressure, diastolic blood pressure, respiratory rate, height of the irrigating column as measured from pubic tubercle, cystoscopy duration, resection time, weight of the resected gland, total irrigating fluid used and serum electrolytes. In our study boiled cool water was used for continuous irrigation. Patients were monitored for any prodromal symptoms of TURP syndrome.

SERUM ELECTROLYTE ASSESMENT

Blood samples (2ml) were collected in plain bulb. Preoperative blood sample was taken preoperatively before IV infusion was started. Intraoperative sample was taken at 20 minutes from the start of resection of gland from opposite arm. Postoperative sample was taken 30 minutes after the end of the procedure in the postoperative care room.

Patients were shifted in recovery room. Pulse oximeter and cardioscope were attached. Patients were oxygenated by ventimask at 4L/min. Pulse, blood pressure, SPO₂ and respiration were monitored. Patient was observed in recovery room till they were hemodynamically stable and action of local anaesthetic agent was worn off. They were watched for signs and symptoms of TURP.

Depending on the total duration of resection patients were subdivided into 2 groups:

Group I - resection time \leq than 30 minutes (number of patients=25)

Group II- resection time $>$ than 30 minutes (number of patients=25)

The volume of irrigating fluid absorbed during TURP was calculated from formula

Volume absorbed = (preop Na^{++} - ECF) / (postop Na^{++} \times ECF)

Preop Na^{++} = Preoperative Na^{++} level

Postop Na^{++} = Postoperative Na^{++} level

ECF -Extracellular fluid-20% of body weight)

In this study group for each parameter, average and variation of each group were calculated. To find out the significant difference between the 2 groups unpaired students t test and chi square test were used.

RESULT

None of the patients in either of the groups developed TURP syndrome. The serum Na^{++} levels did not changed significantly in either of the groups. The serum K^+ levels did changed significantly. There was significant rise in serum K^+ level in post operative period in group II as compared to preoperative level. The changes in serum K^+ were related to duration of resection i.e showing significant rise in group II (resection time $>$ 30 minutes) p value of 0.013. The changes in serum electrolytes were not related to height of irrigating column, volume of irrigant used. There was no significant changes in pulse, blood pressure and respiratory rate both the groups.

In group I out of 25 patients, intraoperatively, 2 patients had heart rate $<$ 50/min but there were no changes in serum Na^{++} and K^+ level. Out of 25 patients, in postoperative period, 2 patients who were known hypertensive had fall in blood pressure, of these 2 patients one patient had serum K^+ level of 5.1meq/L in post operative period and, whereas another did not had significant change in serum electrolyte level.

In group II Out of 25 patients, 3 patients showed following changes. One patient had heart rate $<$ 60/min and another patient had incidence of occasional Ventricular premature beats, intra and post operatively, & Third patient, who was cotton mill worker had post operative sweating and dizziness but there was no significant serum electrolyte changes in any of above patients.

Table 1: Comparison of Serological values in both groups

	Group I (mean \pm SD)	Group II (mean \pm SD)	p value
Age	65.48 \pm 11.233	64.16 \pm 9.397	0.654
Weight	54.36 \pm 8.286	56.16 \pm 12.140	0.543
Duration of TURP procedure	42.40 \pm 14.514	60.80 \pm 8.622	0.000
Duration of resection	22.20 \pm 8.670	48.60 \pm 7.147	0.000
Amount of Gland resected	9.52 \pm 4.179	16 \pm 8.231	0.002
Irrigant solution used	10.60 \pm 3.851	18.60 \pm 6.325	0.000
Irrigant absorbed	0.08540 \pm 0.141	0.08620 \pm 0.215	0.877
Height of irrigation column	58.56 \pm 5.679	57 \pm 1.000	0.183
Serum Na ⁺⁺			
Preop	138.52 \pm 3.393	139.80 \pm 4.907	0.289
Intra op	139.92 \pm 3.278	140.64 \pm 5.041	0.522
Post op	139.80 \pm 3.136	139.52 \pm 5.316	0.822
Serum K ⁺			
Pre op	4.340 \pm 0.578	4.488 \pm 0.570	0.367
Intra op	4.584 \pm 0.704	4.700 \pm 0.471	0.497
Post op	4.572 \pm 0.391	4.92 \pm 0.549	0.013

P value <0.05 is significant

In our study, none of the patients had changes in respiratory rate or changes in peripheral saturation of oxygen, none of the patient had complaints of nausea, vomiting, visual disturbances or convulsions, none of the patient required blood transfusion & also none of the patient had surgical complications.

DISCUSSION

Water intoxication with hyponatremia has been postulated as primary cause for genesis of TURP syndromes. Absorption of large quantity of irrigating fluid during TURP leads to Dilutional hyponatremia and severe metabolic acidosis called as TURP acidosis. In our study there was no significant change in intraoperative and postoperative serum Na⁺⁺ level even though in our study irrigation fluid used was boiled cooled water.

Moskovitz¹³ et.al, demonstrated no significant changes in serum Na⁺⁺, K⁺ albumin and other parameters when distilled water was used as irrigating fluid.

There was significant rise in mean serum K⁺ level in Group II in post operative period. Also at the same time in Group I, the change in mean serum postoperative K⁺ level were higher as compared to mean serum K⁺ preoperative level of 4.34 \pm 0.578 and mean serum K⁺ intraoperative level of 4.58 \pm 0.704.

Dr H. Krishna Moorthy¹³ and Dr Shobha Philip in their study showed significant hyperkalemia in patients during TURP and PCNL and the variation in

potassium level was dependant more on duration of procedure than the other determinants.

Clinical manifestation of hyperkalemia occurs when the plasma level of the K⁺ rise above 6 meq/L. Hyperkalemic cardiotoxicity is increased by hyponatremia and acidosis. Therefore it is possible that the cardiovascular changes occurring in TURP syndrome can be due to combination of both hyponatremia and hyperkalemia Hahn⁷ (1991) et al also found significant rise in serum K⁺ levels during absorption of irrigating fluid intra-operatively

Exact cause of serum K⁺ changes is not known, it is probably due to hemolysis during absorption of fluid into circulation. In other study there was no significant alteration in serum K⁺ levels when normal saline was used as irrigating fluid for PCNL. This signifies the importance of monitoring K⁺ levels during endourological procedure when 1.5% glycine or

There is no explanation of the increase in serum K⁺ associated with irrigating fluid absorption. A decrease would rather be expected since the irrigating fluid contains no potassium. The analysis of lactate dehydrogenase before and during irrigating fluid absorption indicates that the increase in serum K⁺ is not a result of hemolysis. Possible reason are transient acidosis which transiently displaces potassium from the intracellular space coupling between sodium and Potassium diffusion of leakage from injured prostatic cells

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