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Association of Irrigation Fluid Used and Serum Electrolyte Changes in Trans-Ureteral Resection of Prostate (TURP) at Dr Hedgewar Rugnalaya, Aurangabad

Supriya Gajanan Kulkarni*

Department of Anaesthesia, Dr. Hedgewar Hospital, Aurangabad, Maharashtra, India

***Corresponding author:** Dr Supriya Gajanan Kulkarni, Dr. Hedgewar Hospital, Aurangabad, Maharashtra, India, E-mail: supugk@gmail.com

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Abstract

Introduction: Trans Urethral Resection of the Prostate as a gold standard treatment for benign prostatic hyperplasia is performed with fluid irrigation that may cause electrolyte disturbance due to excessive fluid absorption; and may lead to electrolyte imbalance crises. It can cause hemolysis and changes in hematocrit value. Here in this study we primarily focused on electrolytic disturbances only. Different types of irrigation fluid are used for Trans-Urethral Resection of Prostate (TURP) procedure worldwide. In our institute we used sterile water as an irrigation fluid. The advantage of using sterile water are-Easily available, cheap, electrically inert, nontoxic, transparent, and easy to sterile and disadvantage is it is hypotonic. Ideal irrigation fluid should be isotonic, non-hemolytic, electrically inert, nontoxic, transparent and easy to sterile and should be inexpensive.

Objective: This study is to determine the incidence of changes in electrolyte level in TURP procedure.

Materials and methods: A descriptive retrospective study was conducted at Dr. Hedgewar Hospital, Aurangabad between January to December 2017. The subjects were BPH patients who underwent TURP surgery at Dr. Hegdewar Rugnalaya. Data were retrieved from medical records. We used sterile water as an irrigation fluid in TURP procedures. We had performed pre and post-operative electrolyte level, weight of prostate, amount of irrigation fluid used.

Results: 76 subjects, the mean age was 70.77 years and the mean weight of the prostate was 47.56 grams. No significant change in levels of Sodium, Potassium and chloride noted post operatively (mean changes in electrolytes are Na^+-0.51, K^+-0.05, CL^--1.03 respectively).

Conclusion: Serum electrolyte levels were not significantly changes after surgery.

Keywords: BPH; Electrolyte Disturbance; TURP; Irrigation fluid; ASA grade

Introduction

Trans Urethral Resection of the Prostate (TURP) is performed by cutting or resecting the prostate tissue with electrocautery through urethra and use a cystoscope to visualize the prostate area [1]. Irrigation fluid is needed to distend the operative area and maintain the visibility [2]. Electrolyte disturbances such as hypervolemic hyponatremia and hyperkalemia, because of cell lysis often occurred during the TURP procedure [1,3,4]. These disturbances should be fully corrected because it leads to increased morbidity and mortality rate. Pre and post-surgery electrolyte monitoring should be done.

Different types of irrigation fluid are used for TURP procedure worldwide e.g. 1.5% glycine, 5% Dextrose, 0.9% normal saline and sterile water. There are some advantages and disadvantages of each irrigation fluid 1.5% Glycine is more cardio toxic, more expensive, and chances of TURP syndrome are high with Gycine 8.5% dextrose causes hyperglycemia and stickiness of the surgeon's gloves and instruments. Monopolar cautery cannot be used along with 5% Dextrose and NS 0.9%, as it causes dispersion of high frequency current from resectocope.

In our institute we used sterile water as an irrigation fluid. The advantage of using sterile water are- Easily available, cheap, electrically inert, nontoxic, transparent, and easy to sterile and disadvantage is it is hypotonic. Ideal irrigation fluid should be isotonic, non-hemolytic, electrically inert, nontoxic, transparent, and easy to sterile and should be inexpensive.

Materials and Methods

This study was conducted at Hedgewar Hospital, Aurangabad, Maharashtra India. The subjects were benign prostatic hyperplasia (BPH) patients of ASA grade I and II who underwent TURP surgery in the period from January 2017 to December 2017. We had collected data of 76 patients. Data were retrieved from medical records, including;

1) Name and age

2) Weight of prostate

3) Serum Electrolyte level pre and post-surgery

4) Time of resection (in minutes)

5) Amount of irrigation fluid used in (liters)

6) Amount of irrigation fluid drained out (liters)

7) Difference in irrigation fluid used and drained out in liter.

Electrolyte imbalance was defined as presence of any or both serum sodium<130 or>145 mmol/L and serum potassium<3.5 or >5.5 mmol/L, Serum Chloride<97 or>117 mmol/L. Average age was 70.77 years, average weight of prostate 47.56 gm, average resection time 29 min, the average irrigation fluid used 8.3 liter, average irrigation fluid came out 8.22 liter. All patients had received subarachnoid block with Inj. Bupivacane 0.5 heavy. Average level of subarachnoid block was T10, average IV fluid given intraop were 1 liter of Ringer lactate.

Inclusion criteria: Patients with Benign prostate hyperplasia BPH of ASA grade I and II.

Exclusion criteria: Patient who were having comorbidities like;

- Patients of hypertension who were on diuretics,
- DM-uncontrolled requiring Inj. Insulin
- Patients having cardiac conditions like IHD, Old MI, on diuretic and antiplatelet agents like clopidogrel.
- Patients undergoing additions surgery along with TURP like cystolitholapexy, cystolithotripsy
- Patient having urinary tract infection urine pus cells>10.
- Patient having pre op electrolyte imbalance.

In our setup we used the sterile water as an irrigation fluid in all TURP procedures. We compared preoperative and post-operative electrolyte changes and difference in irrigation fluid used and drained out during TURP of the all patients. In our institution, surgeon does low pressure TURP i.e. bladder is frequently evacuated and does not allow to distend. The height of irrigation fluid was constant, i.e. 70 cm.

Statistical analysis was done using GraphPad insta program. Results and baseline characteristics were described by mean and standard deviation. One way ANOVA was applied to determine significant changes between pre and post-surgery variables. As P value less than 0.05 considered statistically significant.

Results

76 Male subject of BPH who required TURP, was enrolled in this study of age group 53 to 97. The P value is<0.0001, considered extremely significant. Variation among column means is significantly greater than expected by chance.

Tukey-Kramer multiple comparisons test

If the value of q is greater than 3.344 then the P value is less than 0.05. Average pre-operative serum electrolyte were, average Na^+ 135.81, average K^+ 4.21, average Cl^- 102.11. And average post-operative serum electrolyte were, average Na^+ 135.15, average K^+ 4.27, average Cl^- 102.4.

Mean irrigation fluid used was 8.3 liters, mean irrigation fluid drained out 8.2 liters, mean irrigation fluid absorbed 0.07 liters.

Average age in years was 70.77 years; average weight of prostate gland in grams was 47.56 gms, average resection time 29 min.

No significant difference found in pre and post levels of Na^+, K^+ and Cl^-. No significant difference found in the irrigation fluid used and came out of bladder. The fluid is absorbed directly into the vascular system when the tissue has been resected and venous sinus opened. [1] Fluid pressure exceeds 2 kPa (15 mmHg) significantly increases volume absorption [1,2] Electrolyte imbalance such as hyponatremia, hyperkalemia, and hypo/hyperchloridemia often occurred when excessive fluid was absorbed during the TURP procedure, depending upon which fluid is used for irrigation [5,6]. Preoperative electrolyte monitoring is most important before TURP. Some factors can influence the electrolyte disturbances; such as weight of resected tissue, intravenous fluids, irrigation fluids, irrigation volume, and the time spent for surgery [4].

We had done all the cases under regional anesthesia i.e. subarachnoid block, symptoms caused due to electrolyte imbalance can be early picked up in regional anesthesia but in case of GA general anesthesia it can be masked and may be recognize after full blown TURP syndrome [3].

Also that duration of surgery, amount of irrigation fluid used, height of irrigation fluid are the major factors which plays role in electrolyte imbalance. Dilutional hypernatremia can causes neurological symptoms like headache, confusion, visual disturbance and convulsion etc. and hypo osmolality due to fluid absorption can causes hemolysis. K Gupta et al. mentioned in their article that satisfactory reduction of serum Na^+ level and elevation of serum K^+ level were observed post operatively which was directly proportional to volume of irrigation fluid used, duration of procedure and volume of prostate gland resected [6].

Herein our study low pressure TURP were done i.e. bladder was frequently evacuated and did not allowed to distend the difference between amount of irrigation fluid used and amount which had drained out was not significant which indicate very minimal absorption of fluid through open venous sinuses. Average duration of surgery was not more than 30 mins and volume of prostate was not more than 48 gm.

Mohrari et al. also did the study in 2008 using sterile water as an irrigating fluid for TURP in 1600 cases and found no statistically significant changes in serum sodium, blood urea nitrogen, creatinine and hematocrit values. Our results are similar to their study that no significant difference found in pre and post-operative electrolytes. Mean changes in electrolyte are Na^+0.51, K^+ 0.05, Cl^- 1.03 [7-10].

Conclusion

There was no significant change of electrolyte during TURP surgery. Pre and post-operative electrolyte should be monitored to prevent electrolyte imbalance and its consequences. Care and precaution were taken at many levels to avoid the electrolyte changes such as,

- Low pressure TURP done in all cases so that less absorption of irrigation fluid ensured.
- Height of irrigation fluid was maintained constant and as low as possible.
- Time of resection was not more than 29 min.
- Proper selection of patients for TURP having prostate gland weight less than 47.56 gm.

So, proper selection of patients, limiting the resection time and maintaining low pressure in bladder definitely prevent the electrolyte disturbances in post TURP surgeries.

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