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Case Report

A Rare Cause of Hyponatremia Transurethral Resection of the Prostate Syndrome: Case Report

Eren Demir[1], Halil Doğan[2]* and Mehmet Toptaş[1]

[1]Department of Anesthesiology and Reanimation, University of Health Sciences, Haseki Education and Research Hospital, Istanbul

[2]Department of Emergency Medicine, University of Health Sciences, Bakırkoy Dr. Sadi Konuk Education and Research Hospital, Istanbul

***Corresponding Author:** Halil Doğan, Associate Professor, Department of Emergency Medicine, University of Health Sciences, Bakırkoy Dr. Sadi Konuk Education and Research Hospital, Istanbul.

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Abstract

Introduction: Transurethral prostate resection (TUR-P) syndrome is a syndrome consisting of symptoms that can range from hypervolemic hyponatremia, agitation, confusion, pulmonary edema, arrhythmia, hypertension to cardiovascular collapse due to the absorption of fluids used for irrigation during transurethral resection of the prostate. In this article, we aimed to emphasize the importance of early diagnosis and treatment of TURP syndrome, which develops under spinal anesthesia, a rare cause of hyponatremia.

Case Report: In a 60-year-old male patient with no additional features on preoperative examination, severe hyponatremia (Na: 107 mEq/L) was detected in the arterial blood gas due to sudden unconsciousness, agitation and acute hypertension during TUR-P operation under spinal anesthesia. TUR-P syndrome was diagnosed. He was discharged on the 3rd postoperative day after the treatment in the intensive care unit.

Conclusion: TUR-P syndrome is a serious clinical condition, although it is rarely seen with the use of hyperosmolar fluids, nowadays. TUR-P syndrome should be suspected in the presence of clinical findings such as perioperative hyponatremia, headache, agitation, dyspnea, tachyarrhythmia and hypertension.

Keywords: *TUR-P Syndrome; Hyponatremia; Spinal Anesthesia*

Introduction

Transurethral resection of the prostate (TUR-P), first applied in 1932, is applied as a 'gold standard' surgical technique in prostate volume 30 - 80 ml [1]. However, TUR-P has serious complications such as bleeding, infection, urethral stricture, erectile dysfunction, retrograde ejaculation, TUR-P syndrome and death [2]. TUR-P syndrome is a complication that is caused by increased electrolyte imbalance, especially hyponatremia, caused by absorption of liquids used for irrigation during operation into the prostatic venous sinuses. The incidence of TUR-P syndrome ranges from 1.2% to 3% in extensive studies [3]. TUR-P syndrome as can be seen in the first 15 minutes after resection started, can also be seen at 24 hours postoperatively [4]. Although it is rarely seen (about 1.4%) with the use of hyperosmolar fluids nowadays, causes a vital risk if not noticed early [3]. TUR-P operation can be performed under general or regional anesthesia. However, general anesthesia has a higher risk of masking TUR-P syndrome. In this article, the TUR-P syndrome under spinal anesthesia, a rare cause of hyponatremia, is presented and the effects of early diagnosis and treatment on mortality are discussed in the light of the literature.

Case Report

A 60-year-old male patient with an 85-mL prostate volume without known comorbid disease was scheduled for TUR-P operation for chronic urinary retention. Preoperative laboratory tests were normal except for creatinine 1.4 mg/dL (0.51 - 0.95 mg/dL). The sodium value (Na) was 141 mEq/L (136 - 145 mEq/L). The patient, who was evaluated as American Society of Anesthesiologists (ASA) 1, peripheral oxygen saturation (SpO_2) was 99%, non-invasive blood pressure (NIBP) was 128/83 mmHg, and heart rate (HR) was 62/min in preoperative monitoring. Before the spinal anesthesia, 500 ml of 0.9% NaCl infusion and 1.5 mg midazolam intravenous (iv) for premedication were applied to the patient. Spinal anesthesia was performed with a 25 G spinal needle from the L3-L4 range in the patient's sitting position. 18 mg of 0.5% hyperbaric bupivacaine (Marcaine Spinal Heavy 0.5%, AstraZeneca PLC, UK) was administered to the subarachnoid space. After reaching the T10 level of the sensorineural block seen by the Pinprick test, the operation was initiated. 0.9% NaCl was used as the maintenance fluid. 14 pieces of 3000 ml 0.9% NaCl solution (in total 42000 ml) were used by the surgical team for the purpose of irrigation, hanging 80 cm high from the operation table. Bipolar device was used as resectoscope. At the 110th minute of operation, acute hypertension (BP: 167/98 mmHg), agitation and blurring of consciousness developed. On physical examination, pupils were isocoric, skin was sweaty, decreased respiratory sounds and crackles in bilateral lung bases. At this time the electrocardiogram (ECG) was normal sinus rhythm, HR 69/min, SpO_2 98%. An arterial blood gas sample was taken immediately. When the sodium value was 107 mEq/L in blood gas sample, TUR-P syndrome was considered. Furosemide 20 mg was administered intravenously and the operation was terminated rapidly. The patient was admitted to intensive care unit. When the sodium level in the intensive care unit is seen as 101 mEq/L, 150 mL of 3% NaCl solution was administered intravenously within 20 minutes. The control sodium level was 111 mEq/L and the patient whose symptoms began to decline was given 0.9% NaCl infusion as a maintenance fluid. Sodium levels were 120 mEq/L and 133 mEq/L on the postoperative first and second day, respectively. The patient who had stable vital findings and Glasgow Coma Score 15, was discharged on the third postoperative day.

Discussion

TUR-P syndrome includes neurological (headache, nausea-vomiting, pitting, confusion, lethargy, convulsions, unconsciousness), cardiopulmonary (bradycardia, hypotension, hypertension, tachypnea, cyanosis, pulmonary edema), systemic (hypothermia, death) symptoms and signs that develop due to the absorption of irrigating fluid. These symptoms and findings are vary according to the type of irrigation fluid, amount, hanging height and duration of operation. For this reason, it is vital to consider close clinical observation and TUR-P syndrome for an early and accurate diagnosis. The earliest signs are usually lethargy, tingling in the face and neck, restlessness and headache [5]. At the 110th minute of operation, when development of agitation and blurring of consciousness in our case, arterial blood gas sample was taken and the sodium level was determined to be 107 mEq/L. Neurological symptoms and signs are due to hyponatremia, hyperglycinemia and/or hyperammonemia. While hyponatremia can develop with the use of any fluid, hyperglycinemia and hyperammonemia are due only to the use of glycine. Glycine is a neurotransmitter that causes inhibition in retina, and absorption of high doses may cause blurred vision and even vision loss [6]. 0.9% NaCl solution was used as irrigation fluid in our case. Depending on fluid loading, pulmonary edema may occur, especially in patients with left ventricular dysfunction. On presentation, crackles were detected in the bilateral lungs on auscultation depending on fluid loading. T and ST segment changes in ECG, hypotension, hypertension may occur; but there was no sign other than hypertension in our case, and ECG was in normal sinus rhythm. However, several studies have shown that, when glycine is used as an irrigation fluid, perioperative it affects the myocardium, glycine absorption is associated with echocardiogram changes and increased troponin I levels [6].

There are no clear defined criterias for establishing definitive diagnosis of TUR-P syndrome. However, in addition to the above-mentioned symptoms and findings, parameters such as hyponatremia, hyperkalemia, hyperglycinemia, low Glasgow coma score, acute unconsciousness, disseminated intravascular coagulation (low thrombocyte count, increased fibrinolysis products) which develop during or after TUR-P operation, support TUR-P syndrome. In the presented case, TUR-P syndrome was diagnosed upon seeing hyponatremia, low Glasgow coma score and acute unconsciousness.

After TUR-P syndrome has been diagnosed, the first step towards treatment is fluid restriction and finishing the operation as soon as possible. The surgical team should be prompted to perform bleeding control and to finish the operation quickly. Treatment is mainly supportive care and hyponatremia treatment. Supportive treatments are ventilation and circulatory support, diuretics, anticonvulsants. Among the diuretics, furosemide which is loop diuretic, should be the first choice [7]. Hyponatremia symptoms usually do appear when the serum sodium concentration falls below 120 mEq/L. Hypertonic 3% NaCl solutions are used in the treatment of hyponatremia. Replacement speed should be adjusted, to the degree of hyponatremia. In the literature, 150 mL 3% hypertonic saline or equivalent is recommended for rapid intravenous infusion over 20 minutes, regardless of whether acute or chronic hyponatremia is present in the first hour of severe symptomatic hyponatremia. They recommend repeating the infusion of a 150 mL 3% hypertonic saline or equivalent for the next 20 minutes and controlling the serum sodium concentration after 20 minutes. It is recommended that these two therapeutic recommendations be repeated twice, or until an increase of 5 mmol/L in serum sodium concentration is observed. At the first hour, an increase of 5 mmol/L is detected in serum sodium concentration and if the patient's symptoms improve, recommend stop infusion of hypertonic saline and infusing of 0.9% saline to the lowest possible volume until cause-spesific treatment is started [8]. It should not be forgotten that rapid correction of hyponatremine may cause central pontin myelinosis. Raising the serum sodium concentration at a rate of 0.5 - 1 mEq/L/hour is considered safe [9]. Because we had clinical findings of pulmonary edema in our case, furosemide was performed intravenously and then 150 mL of 3% NaCl solution was infused within 20 minutes because serum sodium value was very low.

There are some risk factors for TUR-P syndrome. These, the opening of big venous sinuses, the use of hypotonic irrigation fluids, the delivery of irrigation fluids with high pressure, use of excess fluid and the long surgery time. For these reasons, the duration of the operation should not exceed 60 minutes, the irrigation fluid should not be hung up to higher than 60 cm, not given with high pressure and careful resection should be performed [10]. Given that an average of 10 - 30 ml of fluid is absorbed per minute during the resection, approximately 2 lt fluid may be absorbed in a 60 minute operation. Because of duration of the operation is 110 minutes, it can be thought that the amount of fluid absorbed may be over 3 lt. If the amount of absorption fluid exceeds 2 lt, the risk of TURP syndrome increases significantly.

TUR-P operation can be performed under both general and regional anesthesia. Regional anesthesia allows to detect especially neurological symptoms and signs such as headache, nausea, vomiting, tingling, convulsions, blurred vision. In addition, spinal anesthesia is often preferred in appropriate patients because of TUR-P operations are usually less than 2 hours. In the case of general anesthesia, especially cardiopulmonary changes (decrease in peripheral oxygen saturation and especially ST changes in ECG) may be a guide for early diagnosis [7]. The fact that the presented case is under spinal anesthesia has contributed to early diagnosis. TUR-P operation compared with under the general and regional anesthesia, it was found that the mortality and morbidity were similar in the short and long term, regional anesthesia has been reported to be advantageous in terms of bleeding and pulmonary thromboembolism [7].

Conclusion

TUR-P syndrome is a rare complication that can pose a life risk if not noticed. Therefore, preventive measures should be taken during surgery, if the syndrome develops, it should be discerned immediately and treated with care. In addition, the choice of regional anesthesia in appropriate patients may contribute to the easier recognition of TUR-P syndrome.

Conflict of Interest

None.

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