Transurethral resection of the prostate syndrome with severe lactic acidosis due to the use of sorbitol-mannitol irrigating fluid: A case report

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A B S T R A C T

We report a case of transurethral resection of the prostate (TURP) syndrome with mild hyponatremia, severe lactic acidosis, and hypotension. A 73-year-old man with benign prostatic hyperplasia underwent monopolar TURP. Two episodes of hypotension occurred during the operation. These were corrected after injection of a bolus of ephedrine. After the operation, the hypotension persisted and lactic acidosis worsened. Abdominal distension was evident postoperatively. Abdominal ultrasound and computerized tomography revealed a large amount of fluid in the abdominal cavity. We suspected the leakage of sorbitol-containing irrigating fluid. After percutaneous drainage, the lactic acidosis resolved and hypotension stabilized.

1. Introduction

Transurethral resection of the prostate (TURP) syndrome is a common systemic complication of TURP with various symptoms including asymptomatic hyponatremia, headache, anxiety, seizure or coma, and fatal hemodynamic collapse.1 TURP syndrome is caused by excessive absorption of hypotonic electrolyte-free irrigating fluid into the circulation.2 Therefore, TURP syndrome has features of water intoxication.3 However, toxicity can result from absorption of the solutes in irrigating fluids, as solute toxicity.4 We report a case of TURP syndrome resulted from the absorption of sorbitol-containing irrigating fluid via the abdominal cavity during the perioperative period. The patient had mild hyponatremia with severe lactic acidosis and hypotension, which resolved after percutaneous drainage to remove the sorbitol-containing irrigating fluid from the abdominal cavity.

2. Case report

A 73-year-old man (height 179 cm, weight 71 kg) with benign prostatic hyperplasia (BPH) was scheduled for monopolar TURP. His surgical and medical history was unremarkable. No abnormalities were detected in preoperative evaluations. The patient wanted general anesthesia complaining of anxiety. General anesthesia was induced using sevoflurane and remifentanil. The vital signs were as follows: arterial blood pressure, 113/68 mmHg; heart rate, 79 bpm; respiration rate, 12 breaths/min; and peripheral capillary oxygen saturation, 100%. The surgical team used a solution of 2.7% sorbitol and 0.54% mannitol (Urosol®, CJ, Seoul, Korea) as the irrigating fluid.

Continuous irrigation was provided via a suprapubic cystostomy catheter. At 15 min into the operation, a hypotension (blood pressure 78/49 mmHg) developed. Other vital signs and monitoring parameters remained unchanged. We administered a bolus of crystalloid and 5 mg of ephedrine intravenously, and the hypotension was resolved. However, at 30 min into the operation, blood pressure decreased to 75/47 mmHg. Other vital signs and monitoring parameters also remained unchanged, and 5 mg of ephedrine was administered. The hypotension was soon corrected. We suspected TURP syndrome, because general anesthesia can mask the early symptoms such as neurological change. Simultaneous arterial blood gas analysis (ABGA) was performed (Table 1). Mild hyponatremia was observed and hypotension did not occur again; therefore, we decided close observation during the operation. The operation continued for 45 min without any problems and the patient was extubated after operation. Total 48 L of irrigating fluid was used. We estimated that approximately 1500 mL of irrigating fluid was absorbed during the resection.

At the recovery room, blood pressure decreased abruptly to 60/40 mmHg. He did not present with neurological change or respiratory deterioration. 10 mg of ephedrine was administered and phenylephrine...
was infused at 0.5 mcg/kg/min. ABGA was performed (Table 1). We suspected that the hypotension occurred due to lactic acidosis. Physical examination revealed abdominal distension. The bedside abdominal ultrasound revealed a large amount of fluid (Fig. 1). We suspected suprapubic cystostomy catheter leakage, or less likely, bladder perforation. After removing the suprapubic cystostomy catheter, abdominal computed tomography (CT) was performed. The CT image showed evident fluid collection in the retroperitoneal cavity, without definite bladder wall defects and abnormal finding indicating an injury of peritoneum (Fig. 2).

Lactic acidosis, and hypotension that necessitated an infusion of norepinephrine persisted for 5 h postoperatively (Table 1). We suspected that the sorbitol-containing irrigating fluid had leaked into the abdominal cavity during the perioperative period and caused severe lactic acidosis. Percutaneous drainage was performed to remove this fluid. A total of 1540 mL of clear fluid was drained. After drainage, lactic acidosis was resolved over the course of several hours. On the next day, the vital signs were stable, and the laboratory findings were normal. The patient was transferred to the general ward, and no other complications were observed until discharge.

3. Discussion

TURP is the gold standard surgery for BPH, and TURP syndrome is a common systemic complication. This syndrome is caused by excessive absorption of electrolyte-free irrigating fluid into the circulation, while extensive network of venous sinuses is opened during TURP. Commonly used irrigating fluids, such as glycine 1.5% or a mixture of sorbitol 2.7% and mannitol 0.54%, are hypotonic. Therefore, they can result in manifestations such as circulatory overload and water intoxication. The risk factors of TURP are the size of the opened venous sinuses, the amount of the irrigating fluid used, and most importantly, the duration of resection. The nature of the fluid absorbed is also important, as evidence in our case. Solute toxicity may also result from absorption of irrigating fluids. However, sorbitol is reportedly safer than glycine. Unlike glycine, sorbitol-containing solution is theoretically considered to cause TURP syndrome only via hypo-osmolality, but not via sorbitol toxicity. However, sorbitol is metabolized to fructose, which may cause some complications, by sorbitol dehydrogenase in the liver. Fructose can be converted into glucose or pyruvate and lactate. If certain environments such as rapid or high dose fructose infusion prefer the fructose metabolism toward pyruvate and lactate over the glucose, lactic acidosis can occur. The lactic acidosis in our case can be explained by this pathway; the leakage of the suprapubic cystostomy catheter allowed a large volume of sorbitol-containing irrigating fluid into the abdominal cavity,
where it was rapidly absorbed. Drainage of this fluid was considered the appropriate management of lactic acidosis by removing the source.

A case of TURP syndrome with lactic acidosis resulting from the use of sorbitol-containing irrigating fluid was reported. The respiratory and neurological manifestations of TURP syndrome were always included, and consequent severe hyponatraemia of <120 mEq/L was reported. However, our patient did not present with any respiratory or neurological manifestations of TURP syndrome. The lowest serum Na concentration was 123 mEq/L. He only exhibited severe lactic acidosis resulting in hypotension. Suprapubic cystostomy catheter leakage into the abdominal cavity was considered as the cause of this phenomenon.

4. Conclusion

The use of sorbitol-containing irrigating fluid can cause severe lactic acidosis rather than typical TURP syndrome, if unintended leakage occurs as in our case. If lactic acidosis and hypotension occur during TURP and are not resolved during the postoperative period, significant and rapid absorption of sorbitol-containing irrigating fluid via the abdominal cavity should be considered.

Previous presentations

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