Complications due to hysteroscopy are rare and occur more frequently with operative hysteroscopy (OH) than with diagnostic hysteroscopy. Among hysteroscopic procedures, myomectomies and resection of uterine septa have significantly higher rates of complications, especially excessive fluid absorption. Meticulous fluid management might limit the number of serious complications of these higher-risk procedures. The more clinically significant complications are uterine perforation, haemorrhage, pulmonary edema, congestive heart failure, fluid overload and electrolyte imbalance.1-5
We report a patient who developed pulmonary edema and severe hyponatremia complicated with fluid overload during OH. Diagnosis and management of fluid overload during operative endoscopic procedures is discussed in this case report.

CASE REPORT

A 45 year-old, 68 kg female patient was admitted for hysteroscopic resection of submucous myoma uteri. Patient’s physical examination and preoperative routine laboratory data were unremarkable. Following admission to the operating room, standard monitoring including electrocardiography (ECG), noninvasive blood pressure, peripheral oxygen saturation (SpO₂) was performed. Arterial blood pressure was 110/80 mmHg, heart rate was 80 bpm, oxygen saturation was 99%. Anesthesia was induced with thiopental 400 mg iv and fentanyl 0.1 mg iv. succinylcholine 100 mg iv was injected to facilitate tracheal intubation, and anesthesia was then maintained with 70% nitrous oxide and 5% desflurane in oxygen. For intraoperative fluid replacement, 0.9% NaCl solution was infused at approximately 200 mL/h. After induction of general anaesthesia, hysteroscope was connected to irrigation solution which contained 5% Mannitol solution (Rezosel 5% mannitol OSEL, bioflex, İstanbul, TURKEY). Irrigation solution was infused into the uterine cavity under a hydrostatic pressure of 150-180 mmHg with the help of hystereom (Hamau Endomat, Karl Storz, Tuttlingen, Germany) and the height of the irrigation solution was 100cm. Approximately 60 minutes after hysteroscopic resection, the value of SpO₂ declined about 90%. Because of rales on auscultation, the bronchi was aspirated through the endotracheal tube and excessive secretion was sucked out. Total amount of irrigation solution was 9000 mL and pulmonary edema complicated with fluid overload was thought.

Immediately, electrolyte status was evaluated. Serum Na⁺ concentration; serum osmolality; PaO₂; PaCO₂ were 109 mEq/L; 221 mosm/kg; 96.2 mmHg; 37 mmHg consecutively. Because of acute hyponatremia, hysteroscopic procedure was discontinued rapidly and 40 mg furosemide was injected iv. Urinary output increased to 600 mL. Repeated blood gasses at the 10th min of desaturation; serum Na⁺ concentration; serum osmolality; PaO₂ and PaCO₂ were 120 mEq/L; 245 mosm/kg; 63.6 mmHg and 41.4 mmHg consecutively. The evaluation of blood gasses at the 20th min of desaturation; PaO₂; PaCO₂; serum Na⁺ concentration and serum osmolality were 76.8 mmHg; 38.2 mmHg; 135 mEq/L; 270 mosm/kg consecutively. Urinary output increased to 1300 ml at that time. Because of the correction of patient’s electrolyte imbalance and oxygenation, the patient was extubated and observed in the Post Anaesthetic Care Unit for two hours. Postoperatively, physical and mental status was normal. In the postoperative first hour, electrolyte status was reevaluated. Serum Na⁺ concentration; serum osmolality; PaO₂; PaCO₂ were 143 mEq/L; 285 mosm/kg; 150.1 mmHg; 34.5 mmHg consecutively (Table 1). The patient was transferred to the hospital ward in the postoperative third hour due to stable vital signs and normal electrolyte levels. The patient was discharged from the hospital in the following day without any complications.

DISCUSSION

Use of the hysteroscope in modern gynaecological practice continues to develop as a diagnostic and management tool for intrauterine disease. Operative hysteroscopy is now an accepted alternative to hysterectomy for women with menorrhagia. The advantages of OH are associated with its short operating time, rapid post-operative recovery and low morbidity. However, there are

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concerns about the potential serious complications which can occur during and following OH, and it is important that both surgeons and anaesthetists are aware of these complications.\(^1,^3,^6\)

Dilutional hyponatremia and excessive intravascular volume are well known complications associated with transurethral resection of prostate (TURP), and they occur because of absorption of irrigation fluid through the open venous sinuses during surgical resection of the prostate. However, the techniques used in TURP are not entirely comparable to hysteroscopic surgery as the uterus has a very thick wall, which requires higher distension pressures. The instilled solutions are reabsorbed through the peritoneum and open uterine venous channels producing a hyperhydration syndrome. The physiopathology includes cardiovascular overload and haemodilution, causing pulmonary, cerebral and tissue edema. The main complications of OH are fluid overload, hyponatremia, hyposmolality, haemorrhage, uterine perforation, and, rarely, gas or air embolism. Fluid overload with hyponatraemia and hypo-osmolality occurs in up to 6% of cases and it can be fatal.\(^6,^7\) Therefore, all possible measures should be taken to prevent it or to detect it and treat it early.

Pratesi R and colleagues\(^7\) informed that the volumes of arterial oxygen saturation and end tidal carbon dioxide obtained on line were the first warning signals in their case report. In our case, suddenly decrease in SpO\(_2\) was the first warning signal for pulmonary edema due to fluid overload.

During hysteroscopic surgery, the hydrostatic pressure needed to distend the uterus is greater than that required for distention of the bladder. In addition, the prolonged resection time and extensive raw surface exposure during hysteroscopic procedures increase the likelihood of irrigating fluid absorption. Excessive intravasation can entail fluid overload, pulmonary edema, congestive heart failure and electrolyte imbalances.\(^6,^8\)

Bennett KL and colleagues\(^4\) inform that maintaining equilibrium between women’s intrauterine pressure and mean arterial pressure decreases the risk of uterine distention fluid absorption into the vasculature and fluid overload complications. Perioperative nurses need to monitor women’s mean arterial pressure before and during hysteroscopic procedures and maintain fluid infusion pump pressures at or below women’s mean arterial pressure to decrease the potential for intravasation.

Witz CA and colleagues\(^9\) recommend that meticulous attention to intraoperative fluid balance is imperative. In addition, a multichannel hysteroscope is necessary to keep intrauterine pressure low and most complications may be avoided by closely monitoring fluid balance intraoperatively.

Huang HW and colleagues\(^3\) presented two cases of fluid overload with acute pulmonary edema and electrolyte imbalance from hysteroscopy with different distention media. They inform that the prerequisite for treatment of hysteroscopic fluid overload is knowing the nature of the intravasation fluid and it should be promptly treated to prevent neurological sequelae. Almost all serious complications of OH can be avoided if proper precautions are taken and close communication is maintained between the gynecologic surgeon, the anesthesiologist and nursing staff.

Pasini A and colleagues\(^1\) evaluated 697 women who underwent operative hysteroscopy in their department. They informed that the most important complications were uterine perforation (1.7%), intraoperative hemorrhages (6.9%) and excessive hypotonic fluid absorptions (5%). Hyponatremia and hypokalemia(hypo-osmolarity result) were never serious.

We had observed two fluid overload cases with severe hyponatremia during hysteroscopy in the previous years.\(^10\) However, the cases were more serious, the amount of irrigation solution used in these previous cases was much more than in this case. Also, the durations of surgery were longer than this case. Initially, we thought different reasons for desaturation in that cases and desaturation was compensated with increasing
inspired oxygen concentration. But, this approach corrected desaturation for short duration and desaturation occurred again. When we evaluated blood gases because of desaturation after extubation, we observed fluid overload and decreasing in PaO₂, hypoosmolality and hyponatremia. And that cases needed reintubation and transferring to intensive care unit and treatment hypertonic saline. Because of shorter duration of operation and less amount of irrigation solution used, this case was more moderate than our previous cases. In our previous experience, we diagnosed the fluid overload at the end of surgery and after extubation and patients required reintubation. In this case, fluid overload diagnosis was suspected immediately after desaturation occurred. Blood gas analysis proved that there was fluid overload and decreasing of PO₂, dilutional hyponatremia, hypoosmolarity. Surgery was discontinued and furosemid was injected immediately.

Learning from our previous experience, we had saved from hospitalization time and occupation of intensive care unit. SpO₂ decrease may be an important finding of pulmonary edema due to fluid overload during the operative hysteroscopy. So close monitoring is very important for early diagnosis and treatment of serious complications that may be catastrophic.

REFERENCES