CASE REPORT

SEVERE PULMONARY EDEMA DUE TO HYPONATREMIA AFTER HYSTEROSCOPY – RAPID AND FULL RECOVERY

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ABSTRACT
Hysteroscopy is an important diagnostic and therapeutic procedure that can cause serious complications, including uterine perforation and dilutional hyponatremia. Hyponatremia itself may cause central pontine myelinolysis, and pulmonary edema, which could be dangerous. We report a patient who developed near fatal pulmonary edema, and hyponatremia during hysteroscopy. A total of 12 L irrigation fluid was given in 45 minutes and eight litres were collected. At the end of the procedure, the patient was suddenly being desaturated (Saturation O2 < %50) and huge amount of frothy fluid had come out of laryngeal mask airway, pulmonary edema was considered. The supportive treatment, mechanical ventilation and 3% hypertonic saline solution were used in the ICU. Initial sodium levels were below the value of 100mEq/L but after 12 hours it was reached 135mEq/L. At the 17th hour she was extubated and day after she healed completely. This case report emphasizes the importance of rapid correction of hyponatremia and pulmonary edema caused by excessive fluid overload during hysteroscopic surgery.
Key Words: Hysteroscopy; Hyponatremia; Pulmonary Edema; 3% Sodium Chloride

Introduction

Hysteroscopy is an important diagnostic and therapeutic procedure that is used increasingly in last two decades. Although hysteroscopy is requiring less operating time, it is not entirely uncomplicated. Serious complications, such as pulmonary and cerebral edema associated with fluid overload and hyponatremia can occur during surgery. This condition is similar to transurethral resection of the prostate (TURP) syndrome which is seen in during urological surgeries.[1,2] The development of fluid overloading and hyponatremia is associated with several factors such as type and duration of surgery, type of irrigation fluid, and infusion pressure. Also it is stated that the risk is increases during menstruation.[3] Hyponatremia itself may cause central pontine myelinolysis, and may be an independent contributing factor to morbidity.[4] Rapid treatment of pulmonary edema and the replacement of sodium deficiency is vital.[5]

Herein we report a woman who developed severe pulmonary edema, and hyponatremia during hysteroscopy. The indication for the procedure was ongoing vaginal bleeding for two months after the termination of eight weeks pregnancy. She healed completely without any sequelae. The patient has given us written informed consent for publication.

Case Report

A 20 years-old, (G2P1A1) woman was admitted to the gynecology outpatient clinic because of the ongoing vaginal bleeding for two months after the termination of eight weeks pregnancy. On transvaginal ultrasonographic evaluation, considering rest placental tissue, due to the irregularity of the endometrium, we decided to perform operative hysteroscopy. Preoperative physical examination and laboratory tests were normal, Her height was 160 cm, weight was 50 kg, and her preanaesthetic physical status was American Society of Anaesthesiologists - I.

In the operating room the standard monitoring was applied. The blood pressure and heart rate of the patient were 115/73 mmHg and 88 bpm, respectively. An 18-gauge intravenous (IV) catheter was placed and 0.9% NaCl solution was administrated at a rate of 100 mL/h. After administration of 10 mg of IV metoclopramide, the patient was pre-oxygenated, and anaesthesia was induced with midazolam 2 mg IV, fentanyl 50 µg iv and propofol 120 mg iv. Laryngeal mask (number 4) insertion was facilitated by 40 mg of rocuronium. Anaesthesia was maintained with 60% nitrous oxide and 2% sevoflurane in oxygen.

The patient was placed in lithotomy position and a foley's catheter was inserted. Irrigation fluid containing 5% mannitol (resectisol®, osmolarity (mOs / L): 275) connected to a lateral port of the hysteroscope was given under hydrostatic pressure of 400 mmHg. The procedure ended peacefully after 45 minutes. A total of 12 L irrigation fluid was given and 8 L were collected. During the procedure, some of the fluid escaped out through the cervix. At the end of the procedure, the patient was

suddenly being desaturated (< 50% SatO2) and huge amount of sparkling fluid had come out of laryngeal mask airway, pulmonary edema was considered and laryngeal mask airway was replaced with endotracheal tube. Sinus tachycardia (155/min) and a hypotension (< 65 systolic blood pressure) were suddenly developed. The patient rapidly transferred to Intensive Care Unit (ICU) and positive pressure ventilation as the SIMV mode was started. (Tidal volume: 420 ml, FiO2: 95%, PEEP: 5.5, f: 16/min). Firstly, an arterial line was opened, jugular central venous catheter was introduced. The arterial blood gas (ABG) analysis before ICU showed pH 7.02, PaO2 58 mmHg, PaCO2 54 mmHg, SpO2 73%, and sodium <100 mmol/L. In the ICU, consecutive ABG values were given in Table 1. After 17 hours the patient successfully extubated and allowed to spontaneous breathing with 2 L/min oxygen. At the time of admission to the ICU, patient's body temperature was 34.5° C; with the use of heater blanket, 36.5 0C was reached after 10 hours. There were widespread infiltration almost all areas of the lungs in the chest radiogram, which is confirming the pulmonary edema (Figure 1).

Table-1: Twelve hours (H) changes in some blood gas parameters: "0" is ICU admission time

H	pH	PaCO2 mmHg	PaO2 mmHg	Na+ mmol/L	Lactate mmol/L	HCT %	HCO3- mmol/L	BE (B) mmol/L	SatO2 %
0	7.02	54	58	<100	0.9	25	13.9	-16.1	73
1	7.14	57	40	101	0.5	30	19.4	-9.4	57
2	7.29	59	45	113	1.2	34	28.4	0.9	75
3	7.28	40	61	112	2.9	39	18.8	-7.5	87
5	7.34	35	69	111	2.8	34	18.9	-6.2	92
12	7.42	37	71	135		30.4		-0.2	94

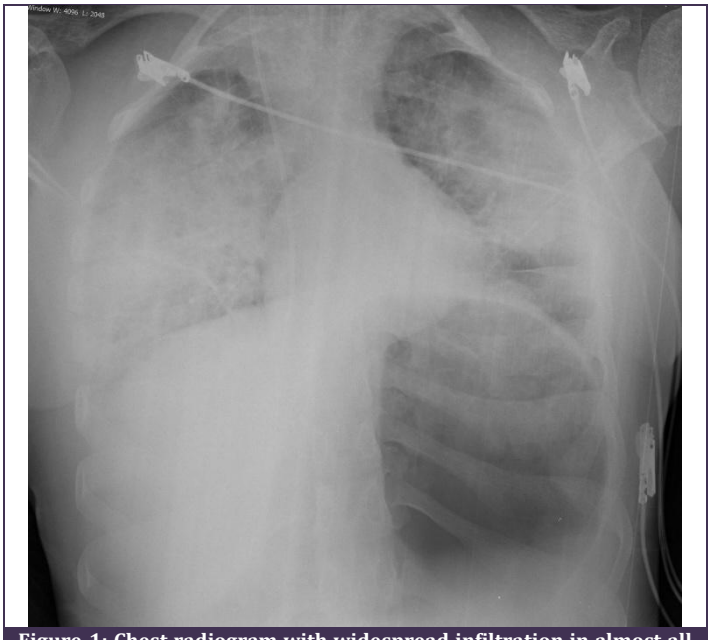

Figure-1: Chest radiogram with widespread infiltration in almost all areas of the lungs

Close monitoring of blood gases, and hemodynamic parameters were accomplished. Fluid restriction, diuretic medication and 3% hypertonic saline infusion was started at a rate of 20 ml/h, which was progressively decreased to 10 ml/h after one hour, and to 3 ml/h after three hours, than finally to 1 ml/h at four hours Furosemide 100mg was infused within 4 hours. A urine output of 2600 ml was obtained within the first hour. As a supportive therapy, the patient was administered ringer lactate solution 60 ml/h IV, ranitidine 50 mg iv twice a day, ipratropium bromide monohydrate 0.5 mg + salbutamol sulphate 3.01mg twice a day, 0.5 mg fluticasone propionate twice a day and a total of 14 ampoules of sodium bicarbonate 0.84 g/10ml within 8 hours. The course of the patient's blood pressure, urinary output, intravenous intake and heart rate demonstrated in Figure 2. The patient was transferred from the ICU to the gynecology service on the 2nd postoperative day and was discharged without any problem on the 3rd postoperative day.

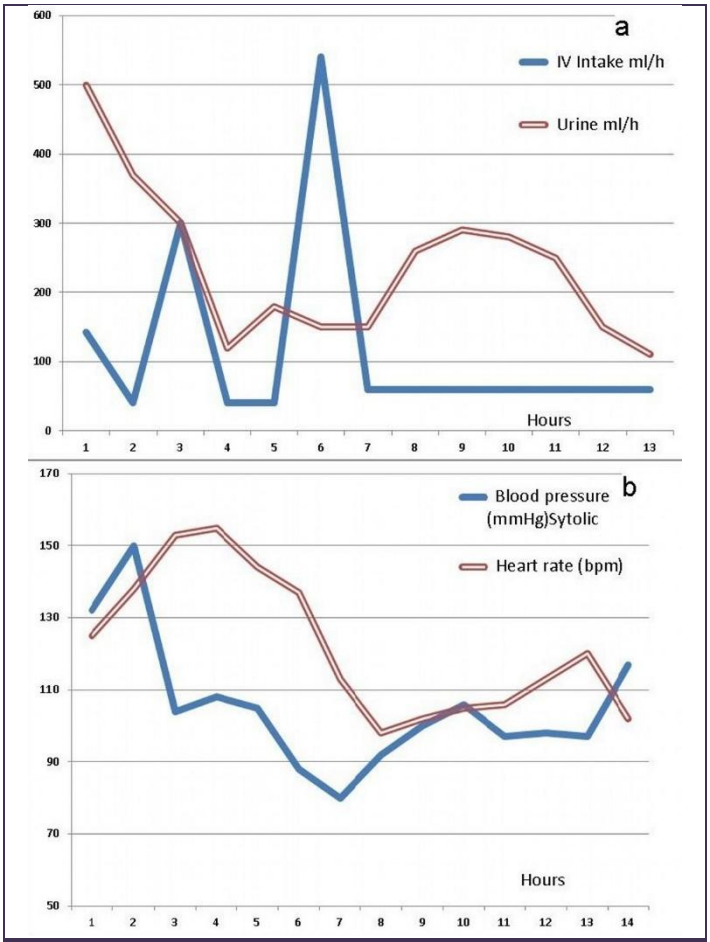

Figure-2: (a) Urinary Output and iv intakes: The 500 ml bolus can be seen at the 6th hour. (b) Heart Rate and Systolic Blood Pressure: 15 hours trends

Because of the possible problems that the patient could develop in the central nervous system as a result of severe hyponatremia, the physical and neurological examination of the patient on the second day and at the end of 1 month were both normal.

Discussion

Hysteroscopy has been used for more than thirty years. Recently, it has gained popularity at last two decades for both diagnostic and therapeutic purposes. Although it is a type of minimally invasive gynaecologic surgery, it is not fully uncomplicated. As a result of absorption of large amounts of (≥2 L) irrigation fluid by the veins, or its passage through the fallopian tubes into the peritoneal cavity, it can even lead to death. For the hysteroscopic procedures, the most commonly used irrigation fluid is glycine 1.5% (230 mOsmol/L) or a mixture of sorbitol 2.7% and Mannitol 0.54% (195 mOsmol/L).[6] Due to the hypotonicity of all these fluids, absorption and water intoxication may occur. Decrease in the plasma oncotic pressure eventually results in accumulation of fluid in the interstitial space of the lungs. In our case we observed large amounts of frothy fluid from the lungs.

After acute intoxication of water a dilutional hyponatremia is also occurs, which leads to serious complications (even leads to death) on heart or brain. Two types of brain injury have been reported due to hyponatremia.[7,8] One is hyponatremic encephalopathy, and another is central pontine myelinolysis. The mortality risk increases with the severity of hyponatremia (27% when serum sodium is < 120 mEq/L). Untreated acute or improperly treated severe hyponatremia can result some serious complications such as cerebral edema, irreversible neurologic damage, respiratory arrest, brain stem herniation and death.[9] It is well known that, the patients with symptomatic hyponatremia are at greater risk of cerebral edema due to hyponatremia itself.[9] Both too slow and rapid correction of hyponatremia is problematic. When acute hyponatremia was developed (over 48 hours or less) it should be treated by administering hypertonic 3% saline to achieve a mildly hyponatremic level.[5,9] Rapid identification and replacement of serum sodium is necessary in patients with severe acute hyponatremia to avoid brain stem herniation and death.[5]

The present study, we used Mannitol solution and we could not able to measure the fluid deficit due to the overestimated fluid leakage that occurred through the cervical canal to the floor. In addition, we noticed that the last 3 L of fluid consumed quite fast, may be due to absorption from opened vessels.

Conclusion

In conclusion, hysteroscopic surgery can cause serious complications as a result of distending fluid overload, therefore careful fluid management and monitoring is crucial. And the rapidly developed hyponatremia caused by hysteroscopic surgery can be corrected rapidly in one day, uneventfully.

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