Introduction

One of the most serious problems of therapeutic hysteroscopic procedures nowadays depending on a distending media in use, remains a fluid overload with concomitant electrolyte imbalance. This rare but very life threatening condition remains of great concern and requires interdisciplinary management from experts of different fields such as anesthesiology, intensive care, cardiology and nephrology.

The irrigating media plays an essential role during hysteroscopic operations because it distends a uterine cavity and so provides a necessary visibility. There are gasous and liquid types of media. The Carbon dioxide is obsolete because it provides insufficient visibility and can lead to severe complications such as embolism or systemic accumulation due to its high solubility.

The liquid ones vary according to their osmolality, viscosity and electrolyte content, respectively an overload can cause different kinds of pathological settings.

Depending on the type of current (monopolar vs. bipolar) the irriganting fluid may or may not content electrolytes. The electrolyte-free, low-viscosity fluids, such as Mannitol/ Sorbitol mixture, Glycin 1,5%, Glucose 5%, Sorbitol 3% are standard media in monopolar surgery. The excessive absorption can lead to a hypoosmolal hyperhydratation (also known as transurethral resection syndrome of prostate in urology patients) resulting in severe overload and dilutional hyponatriaemia, which can be a cause of different neurological clinical sequelae such as grand-mal-seizures and cerebral edema up to a brainstem herniation.

The isotonic solutions such as NaCl 0,9% or Ringer-Lactat on the other hand, are golden standard in bipolar hysteroscopic procedures and its systemic absorption can cause an isoosmolal hyperhydratation associated with hyperchloremic acidosis and pulmonary edema up to acute respiratory distress syndrome.

In this case report we will describe a particular clinical setting of excessive fluid overload with severe pulmonary edema in a 38-years-old female after a hysteroscopy and resectoscopy.

Patient’s Medical History

38-years-old black woman, 55kg, presented herself for a hypermenorrhea caused by multiple submucous and intramural myomas. Due to longlasting, intense bleedings she developed iron-deficiency-anemia with hemoglobin level of 8,8g/dl. The anemia has been treated with iron infusions, vitamin-B12 and folic acid. However she was well adapted and didn’t show tachycardia or any kind of anemia-related symptoms.
Further on she suffered from infertility most likely caused by Uterus myomatosus, which had been previously treated by hysteroscopic and laparoscopic myomectomy.

Further preoperative assessment revealed an occasional smoker but otherwise healthy patient and routine laboratory analysis were unremarkable except for earlier mentioned anemia. The previous general anaesthesias were uneventful and she was classified as ASA II- patient. The premedication consisted of 7,5mg Midazolam p.o.

The Procedure and Intraoperative Setting

After the general anesthesia has been inducted, consisting of 200mg Propofol, 0,2mg Fentanyl and 6mg Cisatracurium, patient was intubated uneventfully. A single-shot-antibiotic with 2g Cefazolin was administered before surgical start. Further anaesthesia was maintained with Sevoflurane (endexpiratory concentration 1,2 vol%) during low-flow-volume-controlled-ventilation.

The hysteroscopy was performed with a physiological saline solution as a distending medium administered by Karl Storz Hamou Endomat pump in hysteroscopy modul within preselected pressure- (max.150mmHg) and flow- range (max.400ml/min). The resectoscope had an active suction channel and myomectomy was facilitated with bipolar current.

After a resection time of 35 minutes the operating procedure became complicated due to big intracavitary myomas, consequently a larger amount of distending media was required to keep the visibility during the hysteroscopy. The efflux of the irrigating fluid wasn’t monitored because of the high amount lost in the sterile drapes.

In the meantime the patient developed mild tachycardia with discrete ST-depressions, that disappeared after deepening the anaesthesia. Further on she developed high respiratory pressures and the accurate examination of the patient lying in Trendelenburg position and in a dark operating theatre revealed swollen face that was misinterpreted as Quincke-edema and immediately treated with 4mg Dimetinden, 50mg Ranitidin and 500mg Prednisone.

The immediate termination of the procedure revealed a general swelling of a patient especially in abdominal and facial region. The uterus perforation was denied by the gynaecologist but due to threatening abdominal compartment syndrome an urgent laparoscopy was preformed, which revealed 2,5l of intraabdominal fluid. At that point the gynaecologist declared 9l deficit between the in- and outflow of the irrigating fluid.

Meanwhile the ventilation was severely impeded by massive pulmonary edema and 1,5l clear fluid was suctioned from the endotrachal tube. The oxygen saturation dropped to 53% and the inspiratory peak pressure reached up to 60 mmHg. The diuresis was stimulated by 80mg furosemid.

Under full mechanical ventilation support with high positive endexpiratory pressure and analgosedation we transferred the patient to the ICU.

ICU-Management

By the admission to the ICU the arterial blood gas analysis revealed

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>pH</td>
<td>6,95</td>
</tr>
<tr>
<td>pO2</td>
<td>92,2 mmHg</td>
</tr>
<tr>
<td>pCO2</td>
<td>58 mmHg</td>
</tr>
<tr>
<td>SO2</td>
<td>87%</td>
</tr>
<tr>
<td>HCO3</td>
<td>12,7 mmHg</td>
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<tr>
<td>BE</td>
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<tr>
<td>Hb</td>
<td>6,5 g/dl</td>
</tr>
<tr>
<td>Na+</td>
<td>142 mmol/l</td>
</tr>
<tr>
<td>K+</td>
<td>2,9mmol/l</td>
</tr>
<tr>
<td>Lactat acid</td>
<td>4,27 mmol/l</td>
</tr>
</tbody>
</table>

The combined (hyperchloremic and respiratory) acidosis reached it’s peak later, when HCO3 dropped to 6,9 mmHg and was treated aggressively by 200mg HCO3 8,4%. The potassium substitution was administered via central venous line.

Noradrenaline was used to stabilize the circulation and the volume therapy was monitored with invasive hemodynamic monitoring (PICCOR), which revealed hypovolemia (GEDI 444 ml/m2) and pulmonary edema.

Figure 1: Chest X-ray reveals pulmonary edema after ICU admission
The 30.6°C body temperature was treated with an active warming system for the next 18h until the normal temperature was reached.

The intraabdominal pressure was measured by bladder pressure monitoring (14 mmHg).

The oxygenation increased with forced diuresis and positive endexpiratory pressure ventilation (12 cmH2O).

After 24h of fully controlled mechanical ventilation and 6800ml of diuresis the sedation medication was terminated and the patient extubated uneventfully. No further ventilation support or vasoactive medication was required. The patient recovered in the matter of 72 hours and was discharged from the hospital on the day 7 with a mild arterial hypertension, that was treated by Hydrochlorthiazide 25mg a day.

**Discussion**

The isoosmolar hyperhydratation due to massive absorption of irrigating fluid, also known as Operative Hysteroscopy Intravascular Absorption Syndrome (OHIA) is a life threatening complication of the bipolar resectoscopic procedures.

There are three different manners the distending fluid can be absorbed:

1. The fluid instillation in peritoneal cavity via fallopian tubes causing a high amount of free abdominal fluid, which can lead up to an abdominal compartment syndrome

2. The absorption via endo- and myometrium causing a massive subcutan fluid overload

3. The intravascular absorption due to exceed of the venous vascular pressure of endometrium by an irrigating fluid pressure causing expansion of plasma volume and consequently intravascular fluid overload.

This case report shows a massive absorption of distending fluid mostly throughout the endometrium causing generalized and later on pulmonary edema and throughout fallopian tubes causing acute abdomen. The delayed diagnosis of this complication was due to unreported imbalance between the irrigating fluid instilled (12 litres) and the volume recovered (3 litres) from the patient. Other conditions that impeded the early diagnosis were darkened operating theatre because of the hysteroscopy and Trendelenburg position of the patient, fully covered in warm sheets in order to prevent hypothermia.

The threatening abdominal compartment was promptly treated by an urgent laparoscopy and the patient responded very well to a complex symptom-orientated intensive care therapy. A mild arterial hypertension is a residual symptom of a massive NaCl-absorption and respectively delayed sodium and water excretion and is expected to disappear within days.

The top priority is the prevention of the excessive absorption and once this complication occurred, its rapid, correct diagnosis as well as early-goal-therapy is essential. The fundamental knowledge of different distending media and its possible complications must be considered by the gynecologist and anesthesiologist. Once the distending medium has been determined, certain strategy must be applied in order to avoid the massive fluid overload. The exact amount of administered and removed irrigating fluid must be accurately monitored, which can be impeded by different factors such as spilling the media on the floor or in sterile sheets, not exact amount of media in the bag (varies up to 5%), difficult estimation of not-used fluid in the bag. The irrigation pressure limit should be lower than the mean arterial pressure whenever possible and complicated operative procedures that take longer time such as myomectomy require splitting in two sessions.

As soon as the difference of instilled and recovered amount reaches the limit, that should be set a priori or a patient starts showing symptoms, the measurement of electrolytes, osmolality and arterial blood gasses should be preformed and the procedure terminated as soon as possible.

**References**


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