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Case Report

Is Time Monitoring Necessary for Preventing Fluid Overload in Hysteroscopic Surgery?

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ABSTRACT

This case report summarily describes pulmonary complications after saline overload in hysteroscopic-laparoscopic multiple myomectomy and, finally, suggests a simple prophylactic strategy for fluid balance, not only increasing safety but also allowing longer procedures when possible and necessary.

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CASE REPORT

A healthy 42-year-old woman was candidate to multiple myomectomy because excessive menstrual bleeding and secondary iron deficiency (Figures 1A and 1B). Hysterectomy was not considered in order to guarantee her reproductive status. Hysteroscopic-laparoscopic approach under general anesthesia with oral intubation was indicated. Saline (NaCl 0,9%) was used as uterine distention media and the maximal fluid pressure was adjusted to 100 mm Hg (Stryker Endoscopy Pump®).

After 12 minutes of hysteroscopic myomectomy with bipolar electrosurgery system (Figure 2), the patient presented gradual increase in airway pressure, decrease in oxygen saturation and wheezing, suggesting bronchospasm. After checking anesthetic and clinical conditions, fluid balance was made while surgery was interrupted because of iatrogenic acute pulmonary edema. Impressively, it was noticed a difference of 4.500 mL of saline. Without delay, it was administered 100% oxygen, intravenously morphine 6 mg and furosemide 60 mg, positive end-expiratory pressure was adjusted to 5-10 cm H_20 and the condition became close to normal in 30 minutes. Fortunately, distension media was not a non-electrolytic solution as, for example, sorbitol and manitol which probably would have generated most serious consequences. The cause of the massive saline absorption was initially attributed to the high flow device (wash button) which was exceptionally pressed several times in order to improve the visual field inside a complex non-compliant myomatous uterus.

Laparoscopic step was then started as planned (Figure 3). After pneumoperitoneum, no significant fluid volume was visualized inside the abdominal cavity, confirming massive intravascular absorption of irrigation media. As the laparoscopic myomectomy was achieved without problem and patient kept clinically stable, a new uterine pressurization was made in order to finish the hysteroscopic myomectomy which was discontinued. This time, another pump was used (Endoview Hystero-Pump®) limiting both pressure and flow in order to avoid fluid overload. However, pulmonary performance (airway pressure and oxygen saturation) did not allow a safe surgery and once again it had to be stopped. Surprisingly, 2.000 mL of fluid were absorbed in less than 10 minutes although fluid pressure did not exceed the 100 mm Hg limit.

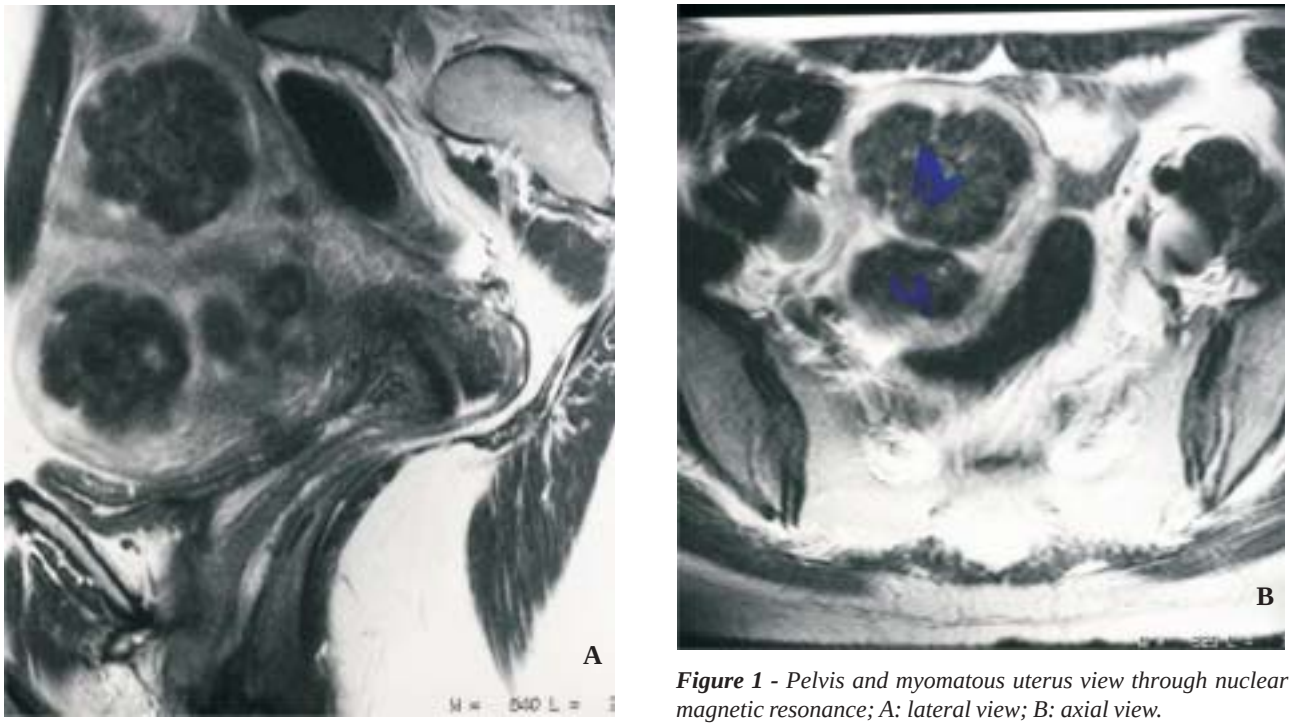

Figure 1 *- Pelvis and myomatous uterus view through nuclear magnetic resonance; A: lateral view; B: axial view.*

When surgery had finished, the patient was conducted to the intensive care unit (ICU) for clinical monitoring, where she was appropriately extubated by the anesthesiologists. Immediate postoperative blood tests showed metabolic acidosis, high lactate and chloride levels, and leucocitosis. Chest X-ray showed bilateral opacity, initially diagnosed by ICU physicians to be a shock lung secondary to sepsis (Figures 4A and 4B).

After discussing the case with the anesthesiologists, infectious etiology was immediately excluded because the cause was obvious: a non-cardiogenic pulmonary edema secondary to an iatrogenic saline overload in a previously healthy patient. Although pleural effusion caused symptoms (Figures 5 and 6), the treatment mainstay was non-invasive positive pressure ventilation and diuretics. The discharge from hospital occurred after 1 week (Figure 7).

A second hysteroscopic surgery (Figure 8) was conducted under spinal anesthesia 1 month after

Figure 2 *- Hysteroscopic myomectomy with bipolar ressectoscope (first surgery).*

Figure 3 *- Laparoscopic myomectomy (first surgery).*

Figure 4 - *Chest X-ray; A: before first surgery; B: immediately after patient was extubated in intensive care unit (first surgery).*

discharge for concluding myomectomy, without complications. However, fluid absorption was high again: 2.500 mL after only 20 minutes of surgery using saline in Endoview Hystero-Pump® system.

DISCUSSION

Besides transurethral resection of the prostate, operative hysteroscopy (OH) is an endoscopic surgery in which undesirable absorption of irrigation fluids is a major risk factor for complications[1,2,3,4,5]. Actually, the excessive intravasation of the fluid used to distend and irrigate the uterine cavity is the most dangerous complication during hysteroscopic myomectomy[6]. Long surgeries, high intrauterine pressures, and fibroid resection (myomectomy) favor high distension media absorption during surgical procedure; significant intravasation and high risk of fluid overload may be present as well. Complications such as cardiovascular collapse and noncardiogenic pulmonary edema may occur if large volumes of any distension media are rapidly absorbed[7,8,9,10,11]. Moreover, fluid overload becomes quite dangerous when a solution lacks electrolytes (i.e. sodium) because of the risk of dilutional hyponatremia and cerebral edema[12,13,14].

Our team considered saline as the safest distension media. However, its safety can not be overestimated. This case suggests a concomitant uncommon uterine condition which predisposed this patient to massive absorption and fluid overload.

A multiple myomatous uterus more likely shows low compliance for fluid distention and high vascularization; these conditions may have a higher

Figure 5 - *Chest X-ray (lateral decubitus); third day.*

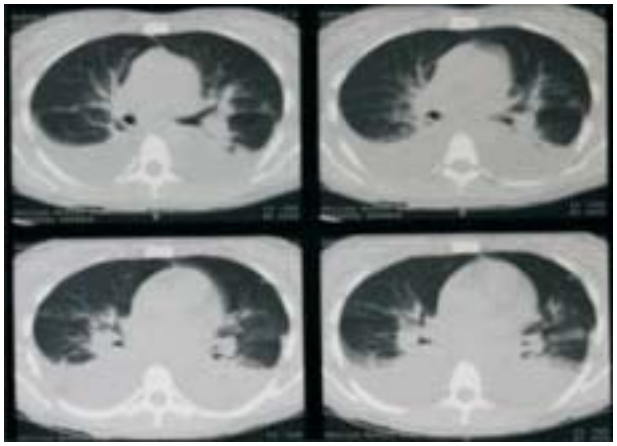

Figure 6 - *Computerized axial tomography scan showing pleural effusion; third day.*

chance of transforming hysteroscopic surgery into a more complex and risky procedure[2,11]. We suggest repeated fluid balance (ex. after each two liters of irrigation) and a frequent evaluation about the possibility of stopping surgery if a tendency to high absorption is occurring. Using this strategy, time becomes not important but the absorbed fluid volume must be continually monitored.

Actually, there is no rule for defining a maximum fluid input because patients are not the same. However, pressure must be set as low as possible, particularly if the fluid lacks sodium[12,13,14] (ex. sorbitol, manitol and glycine). If the distension media is NaCl 0.9% (bipolar system), the capacity to tolerate fluid absorption will be higher and it will depend on body mass, age and cardiovascular status. Of course, hyponatremia will not be problem with saline[12,13,14].

Nowadays, with basis on American College of Obstetricians and Gynecologists[15], our team has adopted a more rigid strategy to prevent fluid overload allowing maximal time in hysteroscopic surgery[10,11]:

A- Begin surgery with fluid pressure of about 100 mm Hg until uterine distension and panoramic view are satisfactory; **B**- Decrease pressure as low as possible to maintain satisfactory surgical field (Ex. 70-80 mm Hg - maybe less); **C**- Check fluid balance after each 2 L of pumped solution: *[Absorbed fluid = pumped - recuperated]*; **D**- Keep yourself alert for the tendencies in absorption by avoiding "surprises" considering the sum of absorbed fluid after each fluid verification (pressure can be changed when necessary); **E**- Evaluate the possibility of interrupting the procedure if 1 L were absorbed (non-electrolytic solution) and administer furosemide 0.5 - 1 mg/Kg; **F**- End surgery if absorption hits 1.5 L (non-electrolytic solution) and measure blood-sodium for follow-up (Attention: fast absorptions are more dangerous than slow ones!).

Obs. If bleeding becomes expressive and/or if fluid bags are significantly overfilled, *Absorbed fluid* can become negative[5,6,16].

Figure 7 - *Discharge from hospital after one week (first surgery).*

Figure 8 - *Uterine cavity view at the end of the second surgery (without fibroids).*

CONCLUSION

If fluid intravasation is frequently monitored and the lowest pressures are tried when possible, time will not be so important. Besides, while surgeon is sure about the intravasation, general anesthesia can be as safe as epidural or spinal anesthesia and there is the added benefit that patient does not need to be awake during surgery. Surgeon, anesthesiologist and nurse should be a team.

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