Complications of Fluid Overload from Resectoscopic Surgery

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Excess absorption of liquid distending media is one of the most frequent complications of operative hysteroscopy. Although most women recover uneventfully, we are seeing cases of permanent morbidity or death resulting from this complication.

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Prevention of Fluid Overload

To prevent the potential adverse effects, the following principles should be observed:

1. Avoiding excess fluid absorption
   - Selecting the distending medium least likely to cause serious complications should it be absorbed in excess.
   - Prompt recognition and proper treatment of overload should it occur.

Accurate measurement of intake and output remains the mainstay of preventing excess absorption. Such measurement, however, should be supplemented by other monitoring techniques, as commercially available containers of fluids may contain 5% to 10% more fluid than is specified.

Pumps are being developed to monitor continuously and limit approximate intrauterine pressure, and they may decrease fluid absorption. Mechanical pumps, however, have not been entirely safe.

When gravity feed is used, bags of liquid distention media should be at the lowest height that adequately distends the uterus. Intrauterine pressure is calculated with the formula:

\[ \text{Pressure (mm Hg)} = \left( \text{Pressure (inches of Hg)} \times \frac{25}{12} \right) \]

In contrast to the previous study, absorption of 1000 ml was associated with a decrease in serum sodium levels of 4 to 8 mmol/L. In this study, 1.5% glycine was used for uterine distention at a pressure of 100 mm Hg. Postoperative decrease in serum sodium levels of 2.5 mmol/L occurred during hysteroscopic surgery. Cerebral edema was diagnosed in 1 (10%) of these women. When postoperative decrease in serum sodium levels greater than 8 mmol/L occurs during operative hysteroscopy, the hysteroscope should be immediately turned off.

In an effort to minimize potential osmotic imbalance between extracellular fluid and brain cells, hypotonic fluid must be contrarily iso-osmotic with the intracellular fluid. Hypotonic fluid causes an osmotic imbalance between extracellular fluid and brain cells. Irrigant absorption was measured during hysteroscopic surgery, and serum sodium fell to 120 mmol/L when 1000 ml of irrigant was absorbed. Computerized axial tomography showed cerebral edema occurring as a result of fluid absorption during hysteroscopic resection of the endometrium.

Although commonly used liquid distending media do not cause hemolysis, their excess absorption can result in hyponatremia and hypoosmolality, nausea, vomiting, and neurologic symptoms including muscular twitching, grand mal seizures, and coma.

Urologists originally used sterile water during transurethral surgery with the resectoscope. Because absorption of water causes hemoglobinuria, resectoscopic irrigation is no longer recommended. Because pressure on tissues is affected by the design of the resectoscope, rate of fluid flow through the resectoscope, and whether or not suction is used, methods for monitoring intrauterine pressure are necessary.

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Choice of Distending Fluid

There are essentially three choices of fluid: isotonic solutions, hydromechanical distention, and endometrial resection. With isotonic solutions, isotonic saline, Ringer’s lactate, Hartman solution, 5% glucose in water, or lactated Ringer’s solution is usually used. These solutions help to maintain a constant pressure on the endometrial surface and prevent the formation of a pseudocapsule. Hydromechanical distention involves the use of a balloon placed in the uterine cavity to maintain pressure on the endometrial surface. The balloon is inflated with water or saline and is removed after the procedure. Endometrial resection involves the use of an endometrial resection device to remove the endometrial tissue.

Guidelines for Resectoscopic Surgery

Surgery with the resectoscope should be done only by surgeons who are familiar with the procedure. The resectoscope should be inserted only after the patient has been adequately prepared for surgery. The procedure should be done in a hospital setting with a dedicated operating room and staff trained in the use of the resectoscope.

Table 1. Measurements of blood or respiratory alcohol levels are used to calculate fluid absorption. Continuous monitoring of fluid balance should be done throughout the procedure. A Foley catheter should be placed in the bladder to monitor urine output in any case considered at risk for excess fluid absorption. The operating room staff should be aware of the potential for fluid overload and monitor patients accordingly.

References:


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