



Learning From Others:

A Case Report From the Anesthesia Incident Reporting System

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Review of unusual patient care experiences is a cornerstone of medical education. Each month, the AQI-AIRS Steering Committee abstracts a patient history submitted to the Anesthesia Incident Reporting System (AIRS) and authors a discussion of the safety and human factors challenges involved. Real-life case histories often include multiple clinical decisions, only some of which can be discussed in the space available. Absence of commentary should not be construed as agreement with the clinical decisions described. Feedback regarding this article can be sent by email to airs@asahq.org. Report incidents or download the AIRS mobile app at www.aqiairs.org.

Case 2019-04: Water, Water Everywhere

Hysteroscopic procedure with rapid administration of fluid for uterine distention by the Gyn team followed by acute changes in respiratory status (acute drop in oxygen saturation, acute increase in oxygen requirements, rhonchi auscultated in bilateral lung fields). Diuretic administered, and clinical symptoms improved shortly afterward.

Discussion

Trans-urethral resection of the prostate (TURP) syndrome is a well-described and well-studied complication of irrigation-facilitated cystoscopic surgery. Multiple case reports have also established the risk for TURP syndrome during prolonged or complicated hysteroscopic procedures. Damage to the uterine endothelium in association with intracavitary fluid pressure in excess of central venous pressure facilitates rapid uptake of irrigating fluid, with associated symptoms of acute fluid overload. If electrocautery is being used to perform hysteroscopic biopsies or fibroid ablation, then the irrigating fluid will necessarily be non-ionic (e.g. sorbitol, mannitol or glycine). Rapid absorption of these fluids can also lead to acute electrolyte abnormalities, including profound hyponatremia. There are three components to the pathophysiology of TURP syndrome: absorption and mal-distribution of excess water, hypo-osmolarity and acute hyponatremia. The use of modern, iso-osmolar, irrigating fluids has mitigated one of these risks, but the other two remain.

If the irrigating fluid is hypo-osmolar, the direct effects of hyponatremia are exacerbated, and cardiac and neurologic complications will develop rapidly. Even when iso-osmolar solutions are used, however, neurologic symptoms of acute hyponatremia, including agitation and confusion, will be evident with a serum sodium below 120 mEq/L. Electrocardiogram changes, including ST-segment elevation and QRS widening, develop as sodium falls below 115 mEq/L. Sodium below 105 mEq/L is associated with coma and the potential for permanent neurological impairment. Complications can also

occur based on the specific molecule used in the irrigating fluid, e.g., transient blindness associated with a toxic serum level of glycine.

Absorption of irrigating fluid is based on the height of the bag, the number of open venous plexuses in the prostate or uterus and the duration of the procedure. Unfortunately, the patients with the most open veins require the greatest pressure of irrigating fluid in order to preserve surgical vision. Rapid uptake of fluid will affect hemodynamics in vulnerable patients, but even those with a normal cardiovascular system can develop pulmonary edema. Early case reports of TURP syndrome were characterized by the sudden development of profuse, frothy pulmonary edema, with associated desaturation.

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Treatment consists of cessation of irrigation with supportive care of the heart, lungs and brain. Although administration of diuretics is a common recommendation (and common in practice, as the case illustrates) it is likely that most previously healthy patients will rapidly equilibrate on their own by reabsorbing and excreting surplus water, facilitated by judicious application of positive end-expiratory pressure through the ventilator. Some case reports have described the use of hypertonic saline in treatment, but there is little

scientific evidence one way or the other; permanent neurologic injury can result from too-rapid correction of hyponatremia due to central pontine myelinolysis, but in the hyper-acute pathophysiology of TURP syndrome this risk appears to be lessened, especially if the hypo-osmolarity does not occur.

It would be better for all concerned, of course, if TURP syndrome did not develop in the first place. There are three obvious ways that risk can be reduced:

1. Mindfulness of anesthesiologists, surgeons and O.R. staff regarding the risk factors for TURP syndrome.
2. Mitigation of risk, through use of the least possible iso-osmolar irrigating solution, at the lowest possible pressure for all cases where TURP syndrome is possible.
3. Monitoring of both the procedure and the patient, noting the amount of irrigation fluid used as well as the baseline physiology of the patient (blood pressure, EKG morphology, oxygen saturation and ventilation pattern and pressure).

A strong culture of safety in the O.R., with frequent communication between the surgeon (visibility conditions, extent of surgery required and amount of ongoing bleeding), the circulating nurse (type and quantity of irrigation being used) and the anesthesiologist (patient signs and symptoms)

can greatly reduce the occurrence of this event. While the team reporting this AIRS case is to be commended for their rapid, focused and successful response to a potential crisis, it is always better to avoid trouble than to confront it when it has already arrived!

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