KJA
Korean Journal of Anesthesiology

Complications during hysteroscopy for gynecological procedures: prevention is better than cure!

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Letter to the Editor

Korean J Anesthesiol 2020;73(1):79-80
https://doi.org/10.4097/kja.19339
pISSN 2005-6419 • eISSN 2005-7563

Received: August 7, 2019
Revised: August 8, 2019
Accepted: August 11, 2019

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Hysteroscopy is the preferred method of diagnostic and therapeutic intervention for intrauterine pathologies. However, it may be associated with rare but serious complications such as venous air embolism (VAE), female transurethral resection of prostrate syndrome, fluid overload, uterine perforation, and hemorrhage.

We read with great interest the article, "Complications of fluid overload during hysteroscopic surgery," by Hoffman et al. [1]. We commend the authors for the prompt diagnosis and successful management of a relatively rare complication. However, we have few concerns and suggestions in this regard.

Early signs of fluid overload in this case would be indicated by any measurable deficit in the input/output of the fluid used for distension and increase in venous pressures [2]. Mild pulmonary edema is reported with infusion of 800 ml of fluid under high pressure [3]. Two liters of isotonic normal saline used as the distention media in this case can surely lead to volume overload. However, the authors did not report the uterine distension pressure and difference in the volumes of the returning and purged fluids, which is important in cases of fluid overload and VAE [1].

The authors used laryngeal mask airway (LMA) for the prolonged surgery in the lithotomy and Trendelenburg positions, considering the possibility of fluid overload. However, the position recommended in these cases is supine/reverse Trendelenburg, and endotracheal intubation with positive-pressure ventilation should be performed [4,5]. In addition, the airway seal pressure at the time of insertion and during the event are not mentioned. The possibility of LMA displacement or laryngeal edema that can lead to inadequate ventilation cannot be ruled out.

The Trendelenburg position causes negative pressure in the pelvic veins and increases the risk of VAE, especially in spontaneously breathing patients. Positive pressure ventilation was not mentioned in the report prior to the event; thus, we can assume that both the conditions were prevailing, thereby increasing the risk of VAE in this patient.

Desaturation and hemodynamic instability occurred in the present case 150 minutes after induction, and the possibility of a VAE cannot be ruled out. Hysteroscopy-related VAE is a relatively common occurrence, with a high reported incidence of 10–50% [5]. However, most of such VAE events are clinically insignificant, as the liver might be acting as a filter reducing the amount of air reaching the pulmonary circulation. The characteristic clinical features include decreased end-tidal carbon dioxide ($EtCO_2$) concentration, desaturation, bradycardia, tachycardia, "mill wheel" murmur, bronchospasm, and respiratory and cardiac arrest [4,5]. Other characteristic clinical features include increased pulmonary arterial and central venous pressures, decreased blood pressure, electrocardiogram (ECG) changes, decreased arterial partial pressure of oxygen, and a widened gap

between the arterial pressure of carbon dioxide ($PaCO_2$) and $EtCO_2$. Use of continuous $EtCO_2$ has been recommended for hysteroscopy cases [4,5]. The authors have documented only desaturation, hemodynamic instability, hypercapnia ($PaCO_2$ of 49 mmHg) with no reference to $EtCO_2$ values, ECG changes, murmur, hypotension, or bradycardia at the time of the event [1]. The patient had bronchospasm, which can occur consequent to VAE and lead to increased peak airway pressures as noted in this case. On these grounds, we would put forward the argument that the present scenario could well be a non-fatal sequel of VAE rather than fluid overload.

The other arguments in favor of air embolism in the present case include the sudden catastrophic occurrence of hemodynamic instability with desaturation, lithotomy in the Trendelenburg position, probable spontaneous respiration during the event (positive pressure initiated after the event), and large uterine fibroids with the possibility of opening up the uterine sinuses. The patient had large uterine fibroids, and any uterine injury exposing large venous sinuses is the usual inciting factor of VAE [1]. Surgeons should maintain a close communication with anesthetists and inform the occurrence of even minor injuries. In this report, surgical complications were not ruled out. An echocardiography should have been performed after the event, which could reveal dilatation of the right side of the heart and elevated pulmonary artery pressure along with preserved left ventricular function in case of VAE.

Certain precautions have been suggested to reduce the incidence of VAE in hysteroscopy, such as the use of a mechanical pump with Y connectors, pressure monitoring system (keep < 100 mmHg), use of advanced hemodynamic monitoring, restricting the height of the fluid bottles to < 1 m, keeping the hysteromat set free of air, airtight connections, early termination of the procedure if the infusion fluid deficit is > 1,000 ml with sorbitol or > 1,500 ml with saline, and avoiding the use of external pressure infusers [2,4,5]. In addition, surgeons should keep the cervix occluded at all times after dilation and avoid repeated reinsertions of the hysteroscope.

In such cases, rapid identification and prevention of further gas entrainment into the circulation is crucial to the ultimate patient survival. The surgery should be stopped immediately, the uterus should be deflated, and a dilator or wet gauzes should be used to occlude the vagina. In addition, the patient should immediately be placed in the reverse Trendelenburg position to raise the level of the heart above the site of air entry, reducing further air entrainment.

Hence, we urge utmost caution and vigilance in managing these cases to reduce morbidity and mortality. Appropriate protocols and training should be in place to prevent such mishaps.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

Author Contributions

Nishkarsh Gupta (Data curation; Writing–review & editing)
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References

1. Hoffman CR, Hal MV, Tariq R, George S. Complications of fluid overload during hysteroscopic surgery. Korean J Anesthesiol 2019; 72: 387-8.
2. Cooper JM, Brady RM. Intraoperative and early postoperative complications of operative hysteroscopy. Obstet Gynecol Clin North Am 2000; 27: 347-66.
3. Shirk GJ, Gimpelson RJ. Control of intrauterine fluid pressure during operative hysteroscopy. J Am Assoc Gynecol Laparosc 1994; 1: 229-33.
4. Groenman FA, Peters LW, Rademaker BM, Bakkum EA. Embolism of air and gas in hysteroscopic procedures: pathophysiology and implication for daily practice. J Minim Invasive Gynecol 2008; 15: 241-7.
5. Verma A, Singh MP. Venous gas embolism in operative hysteroscopy: a devastating complication in a relatively simple surgery. J Anaesthesiol Clin Pharmacol 2018; 34: 103-6.

https://doi.org/10.4097/kja.19339