

A Simple Solution to Lens Fogging during Robotic and Laparoscopic Surgery

Ceana Nezhat, MD, Vadim Morozov, MD

INTRODUCTION

One of the fundamental principles of safe and successful endoscopic procedures is an ability to maintain a clear operating field. Fogging of the laparoscopic lens, splatter of irrigation fluid, blood, and bodily fluids are among those factors that affect a surgeon's ability to maintain a clear operating field.

We have routinely used FRED antifog solution (US Surgical, North Haven, CT), which consists of less than 15% isopropyl alcohol, 2% surfactant, and more than 85% water, during laparoscopic procedures.¹ We also use the Insuflow (Lexion Medical, St. Paul, MN) device. Insuflow is a single-use device that attaches to the outlet port of an insufflator and is designed to warm and humidify the gas stream prior to insufflation into the abdominal cavity to prevent drying of peritoneal surfaces and to improve recovery time.²⁻⁴ The Insuflow device consists of a disposable filter heater/humidifier tubing set and a control module that houses the control and safety circuits for the system.⁵ Gas from the insufflator flows into the Insuflow device, through the in-line filter, continues along the tube to enter the Insuflow device cassette that contains the heating element and humidification media.

Maintaining clarity of the laparoscopic lens in robotic cases proves more difficult. The da Vinci system has 2 independent scopes, requiring double the amount of routine care in preventing fogging and maintaining cleanliness of the lenses. A bulky robotic camera makes removing and cleaning the lenses more challenging. High intensity lights, while providing excellent illumination of internal anatomy, preclude cleaning the lenses by touching the serosal surfaces due to potential serosal burn. The usual situation in the robotic OR is a

condition where one "eye" is clean and the other is either fogged or "smudged," requiring constant disengagement of the camera arm, prolonging operating time, and adding to frustration.

The Insuflow device warms and humidifies CO₂ gas that bathes both lenses and significantly decreases the amount of fogging when attached to a robotic camera cannula. We have developed a method of mixing 30 mL of sterile saline with 3 mL of FRED antifog solution. Injecting this mixture into the Insuflow chamber allows the delivery of warm, moistened CO₂ gas admixed with an antifogging substance right to the tip of the robotic scopes, almost entirely eliminating the problem of lens fogging. Although this technique does not entirely eliminate the need to clean the scope, it does decrease this problem significantly. We have used this mixture in over 100 cases without any problems and have achieved good results.

References:

1. Material Safety Data Sheet: FRED™ Anti-Fog Solution. North Haven, CT: United States Surgical; 2004. Updated August 18, 2004. Available at: <http://www.autosuture.com/imageServer.aspx?contentID=6591&contenttype=application/pdf>
2. Ott D, Reich H, Love B, et al. Reduction of laparoscopic-induced hypothermia, postoperative pain and recovery room length of stay by pre-conditioning gas with the Insuflow® device: a prospective randomized controlled multi-center study. *JSLS*. 1998;2:321-329.
3. Mouton W, Bessell J, Millard S, Baxter P, Maddern G. A randomized controlled trial assessing the benefit of humidified insufflation gas during laparoscopic surgery. *Surg Endosc*. 1999; 13:106-108.
4. Jacobs R, Morrison J, Mundhenke C, Golombeck K, Jonat W, Harder D. Model to determine resistance and leakage-dependent flow on flow performance of laparoscopic insufflators to predict gas flow rate of cannulas. *J Am Assoc Gynecol Laparosc*. 2000; 7(3):331-337.
5. Premarket Notifications. Rockville, MD: US Food & Drug Administration, Center for Device and Radiological Health. Updated Mar 6, 2008. Available from: <http://www.fda.gov/cdrh/pdf6/K063546.pdf>. Accessed March 17, 2008.

Atlanta Center for Special Minimally Invasive Surgery & Reproductive Medicine, Atlanta, Georgia, USA (all authors).

Address reprint requests to: Ceana Nezhat, MD, Director, Atlanta Center for Special Minimally Invasive Surgery & Reproductive Medicine, 5555 Peachtree Dunwoody Rd, Ste 276, Atlanta, GA 30342, USA. Telephone: 404 255 8778, Fax: 404 255 5627, E-mail: Ceana@Nezhat.com

© 2008 by JSLS, Journal of the Society of Laparoendoscopic Surgeons. Published by the Society of Laparoendoscopic Surgeons, Inc.