

Comparative Evaluation of Fogging: Single-Use Saberscope® vs. Traditional Reusable Laparoscopes

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INTRODUCTION

Surgeons spend an estimated 40% of MIS operating time under suboptimal visual conditions, contributing to nearly 20% of surgical complications. Lens cleaning adds \$132–\$493 per procedure, averaging \$312.53 based on 9.7 cleaning events per case. Visualization-related complications contribute an additional \$251 per case. Combined, these issues result in over \$2.2 billion in annual costs in the U.S. Poor visualization also disrupts workflow, increases surgeon fatigue, and hinders integration of emerging technologies such as artificial intelligence (AI)*

Intraoperative lens fogging is a persistent obstacle in minimally invasive surgery, degrading visualization, prolonging operative time, and increasing patient risk. Traditional reusable laparoscopes frequently fail to maintain clarity in high-humidity, thermally dynamic environments. Prior findings show that traditional laparoscopes exhibited immediate and complete fogging upon exposure, with zero usability throughout the simulation period. This study expands on that work by evaluating fogging behavior across multiple temperature–humidity combinations using a controlled test chamber.

METHODS

- Standardized fog-simulation chamber, maintained temperatures between 88–95°F and relative humidity above 80%.
- Digital hygrometer placed inside the chamber to document temperature and humidity for each trial.
- Devices tested: Saberscope® (Xenocor) single-use laparoscope and Stryker reusable laparoscope.
- Each scope inserted into the chamber at identical environmental conditions across multiple temperature–humidity combinations.
- High-resolution images captured to document fog onset, severity, and clearing behavior.
- Quantitative and qualitative assessments performed.

OBJECTIVES

- Compare fogging onset, severity, and clearing behavior between the Saberscope single-use laparoscope and a Stryker reusable laparoscope.
- Validate performance across varying combinations of temperature and humidity.
- Confirm environmental consistency using hygrometer-verified chamber conditions.
- Determine whether Saberscope maintains functional visibility under fog-inducing conditions.

FIG. 1

Saberscope® 5mm Articulating Laparoscope at 93F and 96% humidity



FIG. 3

Saberscope® Single-use Laparoscopic System from Xenocor



FIG. 2

5mm Stryker Laparoscope from at 93F and 96% humidity



FIG. 4

1688 video tower from Stryker



RESULTS

- Across all tested temperature–humidity combinations, the Saberscope showed no perceptible fog upon insertion and remained clear.
- The Stryker scope fogged immediately upon insertion in every trial and remained fogged throughout.
- Hygrometer images confirmed identical environmental conditions for both devices.

CONCLUSIONS

The Saberscope® consistently maintained visual clarity across all tested fog-inducing environments, while the Stryker reusable laparoscope fogged immediately and remained unusable. These results reinforce that the Saberscope offers a transformative advantage in fog resistance under challenging conditions. Reliable visualization without the need for manual defogging may reduce intraoperative delays, improve workflow efficiency, and enhance surgical safety.

REFERENCES, DISCLOSURES AND ACKNOWLEDGEMENTS

*Dhingra J, Beinart N, Ahmed A, Patel M, Ameerah A, Srinivasan M, Idelson CR, Uecker JM. Clear Vision, Clear Savings: Enhancing Efficiency in Minimally Invasive Surgery. JSLS. 2025 Jul-Sep; 29(3):e2025.00023. doi: 10.4293/JSLS.2025.00023. Epub 2025 Jul 14. PMID: 40666161; PMCID: PMC12257872.

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