**Huntington CR, Prince J, Hazelbaker K, Lopes B, Webb T, LeMaster CB, Huntington TR. Safety first: significant risk of air embolism in laparoscopic gasketless insufflation systems. Surg Endosc. 2019 Feb 15.**

Link - <https://www.ncbi.nlm.nih.gov/pubmed/30771068>

Abstract

BACKGROUND: Gasketless laparoscopic insufflator systems are marketed for the ability to prevent desufflation of pneumoperitoneum during laparoscopy. However, surgeons raised concern for possible introduction of non-absorbable room air, including oxygen (O2), with these systems. A community-university collaborative was created to test this hypothesis.

METHODS: An artificial abdomen, calibrated to equivalent compliance and volume of an average abdomen, was connected to a flow meter, oxygen concentration sensor, and commercially available laparoscopic gasketless cannula system. A commercially available gasketed cannula system was utilized as a control. Intra-abdominal concentration of oxygen was measured at 0-60 L per minute (L/min) of insufflated carbon dioxide (CO2) aspiration, as would occur during laparoscopic suctioning. For reference, a 5-mm laparoscopic suction device has an aspiration rate of approx. 42 L per minute. At the test facility, room air was 20.5% O2 at 50% humidity. Descriptive and univariate statistics were calculated with p < 0.05 considered significant.

RESULTS: At 0 L/min CO2 aspiration, there was minimal (< 0.5%) oxygen detected intra-abdominally. However, with increasing rates of aspiration of pneumoperitoneum, increasing amounts of room air were detected intraabdominally in the gasketless versus gasketed cannula systems (mean ± standard deviation): 14.7 ± 1.2% versus 1.2 ± 0.5%, p < 0.0001 at 5 L/min aspiration, 18.1 ± 0.69% versus 1.1 ± 0.02%, p < 0.0001 at 10 L/min, 50.4 ± 2.19% vs 1.01 ± 0.003%, p < 0.0001 at 20 L/min. Above 25 L/min aspiration, the standard gasketed cannula systems experienced desufflation, but the gasketless system continued to entrain air to maintain insufflation: 64% room air at 30 L/min aspiration, 71% at 40 L/min aspiration, 77% at 50 L/min aspiration, and 84% at 60 L/min aspiration.

CONCLUSIONS: Gasketless cannula insufflation systems maintain abdominal insufflation by entraining non-medical room air. Especially at high aspiration rates, the majority of absorbable CO2 was replaced by non-medical room air, increasing potential for gas embolism with poorly absorbed oxygen and nitrogen.

Authors have reported these experimental findings to the FDA and companies marketing these devices.