Article ID: WMC005796 ISSN 2046-1690

Universal Use Of 9/32-Inch 7-Millimeter Internal Diameter Suction Tubing During Anesthesia Care And Gastrointestinal Endoscopy

Peer review status:
No

Corresponding Author:
Dr. Deepak Gupta,
Anesthesiologist, Wayne State University - United States of America

Submitting Author:
Dr. Deepak Gupta,
Anesthesiologist, Wayne State University - United States of America

Other Authors:
Dr. Shushovan Chakrabortty,
Clinical Associate Professor, Wayne State University, Anesthesiology - United States of America
Prof. David Edelman,
Professor, Wayne State University, Surgery - United States of America
Mr. Christopher Rusch,
Endoscopy Technician, Detroit Medical Center - United States of America

Article ID: WMC005796
Article Type: My opinion
Submitted on:25-Sep-2022, 11:28:59 AM GMT **Published on:** 28-Sep-2022, 01:53:19 AM GMT
Article URL: http://www.webmedcentral.com/article_view/5796
Subject Categories:GASTROENTEROLOGY
Keywords: Suction Tubing, Anesthesia Care, Gastrointestinal Endoscopy
How to cite the article: Gupta D, Chakrabortty S, Edelman D, Rusch C. Universal Use Of 9/32-Inch 7-Millimeter Internal Diameter Suction Tubing During Anesthesia Care And Gastrointestinal Endoscopy. WebmedCentral GASTROENTEROLOGY 2022;13(9):WMC005796

Source(s) of Funding:
NOT APPLICABLE

Competing Interests:
NOT APPLICABLE

Universal Use Of 9/32-Inch 7-Millimeter Internal Diameter Suction Tubing During Anesthesia Care And Gastrointestinal Endoscopy

Author(s): Gupta D, Chakrabortty S, Edelman D, Rusch C

My opinion

The SSCOR DuCanto Catheter Competition Video [1] demonstrates improved anesthesia practice to protect airways. However, this video has inspired us to look at suction tubing during gastrointestinalÂ endoscopy procedures. Currently, we use 3/16-inch 10-foot suction tubing during anesthesia care and duringÂ gastrointestinalÂ endoscopy procedures. We use the same tubing irrespective of whether they are operating at 0-200mmHg suction pressure while connected to central medical vacuum systems [2] during anesthesia care orÂ operating at 50-520mmHg suction pressure whileÂ connected toÂ on-site waste management system [3] duringÂ gastrointestinalÂ endoscopy procedures. The video has inspired us to change our anesthesia practice universally by using variably long 9/32-inch suction tubing wherein the suction tubing length ranging from 6-foot to 20-foot [4] will depend on whether we continue to useÂ central medical vacuum system-connectedÂ suction inlet in our anesthesia machines usually located at head-end of surgical tables or we begin connecting our suction tubing toÂ on-site waste management system usually located at leg-end of surgical tables.Â Concurrently, we are exploring changing suction tubing to 9/32-inch 3-foot [5] forÂ gastrointestinalÂ endoscopy procedures becauseÂ on-site waste management system being located adjacent toÂ gastrointestinalÂ endoscopy tower does not need suction tubing to be 10-foot-long thus allowing better volumetric flow rate of suctioned solids-liquids-gases especially from lower gastrointestinal tract.

Â

It is unclear if improved volumetric flow rates [6] will increase procedural times forÂ gastrointestinalÂ endoscopy procedures. The insufflator gas flow rate is 2-3 liters per minute [7] duringÂ gastrointestinalÂ endoscopy procedures. The higher flow rate of suctionedÂ solids-liquids-gases acrossÂ 9/32-inch 3-foot suction tubingÂ could interfere with bowel distension for visual inspection and endoscope insertion. Counter-intuitively, the higher flow rate of suctioned gases may allow more rapid return to normalcy for the patients during their recovery period.

Â

An additional question is related to turbulence [8] at the connection point risking disconnection and consequent splashing of suctionedÂ solids-liquids-gasesÂ when the slower flow from < 4mm size suction channel [9-11] inside theÂ gastrointestinalÂ endoscope meets the faster flow within >7mm (9/32-inch)Â size suction tubing.

Â

Finally, will this change increase cost? The direct cost may increase for supplies, but the overall cost could decrease related to faster patient recovery (less time in recovery units) secondary to more complete evacuation of insufflator gases [12-13]. Additionally, there will be less environmental costs since the volume of plastic will have decreased [14].

Â

The readers can perform a simple experiment in their ownÂ gastrointestinalÂ endoscopy labs comparing different suction tubing with liquid water. The wider and shorter suction tubing may only increase the volumetric flow rate by a few milliliters of fluid per second. This extrapolates into less than 100 milliliters extra fluid suctioned during the entire procedure clinically. However, when suctioning insufflated gas, this may become clinically significant since the viscosity of suctioned liquid is 100 times larger than the viscosity of suctioned gas [6, 15-17].

Â

For creating a do-it-yourself simulator for insufflated gastrointestinal tract, the readers can take a 3-liter breathing bag [18] and insertÂ gastrointestinalÂ endoscopeÂ inside that bag.Â With thumb and index finger encircling the neck of 3-liter breathing bag below its bushing, air-tight seal can be created around thisÂ gastrointestinalÂ endoscope.Â Thereafter, the bag can be over-inflated to 10-liter [19-21] in 5-minutes with insufflator flow rate set at 2 liters per minute.

Subsequently,Â gastrointestinalÂ endoscopeÂ can be

timed to suction 10-liters of insufflated gas to compare between currently used suction tubing connectingÂ gastrointestinalÂ endoscopy tower toÂ on-site waste management system vs.Â 9/32-inch 3-foot suction tubingÂ connectingÂ gastrointestinalÂ endoscopy tower toÂ on-site waste management system.

Â

The bottom line is that when time is of the essence and when even few seconds can matter for patients by providing extra-protection for their airways during anesthesia care and evacuation of extra-gas [22] during theirÂ gastrointestinalÂ endoscopy procedures, wider and shorter suction tubing may come in handy even if anesthesia providers do not choose to change from Yankauer suction tip to SSCOR DuCanto catheter [23] or even whenÂ gastrointestinalÂ endoscopy proceduralists cannot change the size of suction channels inside theirÂ gastrointestinalÂ endoscopes.Â Â Â Â Â Â

Reference(s)

1. SSCOR DuCanto Catheter Competition Video. https://www.sscor.com/competition
2. VACUUM TECHNOLOGY IN MEDICAL APPLICATIONS. https://www.vacuumscienceworld.com/blog/vacuum-technology-medical-applications
3. Neptune 3 Waste Management System. https://www.stryker.com/us/en/surgical-technologies/products/neptune-waste-management-system.html
4. Sterile Universal Suction Tubing with Straight Connectors. https://www.medline.com/product/Sterile-Universal-Suction-Tubing-with-Straight-Connectors/Suction-Tubing/Z05-PF96683
5. Patient Connecting Tubing, 9/32" ID x 3'. https://www.medline.com/sku/item/MDPSSZ12000001
6. Flow Rate Calculator. https://www.gigacalculator.com/calculators/pipe-flow-rate-calculator.php
7. CO2MPACT Endoscopic InsufflatorÂ® System. https://www.steris.com/healthcare/products/endoscopy-equipment/co2-insufflation/co2mpact-endoscopic-insufflator-system
8. Enhanced liquidâ€“gas mixing due to pulsating injection. https://www.sciencedirect.com/science/article/pii/S0045793014004319
9. Video Colonoscope. https://medical.olympusamerica.com/products/colonoscope/evis-exera-cf-2t160i
10. Endoscope Technology Theory-Lesson 3-Endoscope Parts. https://www.youtube.com/watch?v=kHONXxQK3iE
11. Endoscopy Technology Theory-Lesson 4-Scope specifications. https://www.youtube.com/watch?v=5rYXQ19US6s
12. Air and carbon dioxide volumes insufflated during colonoscopy. https://www.sciencedirect.com/science/article/abs/pii/S0016510703801128
13. Carbon dioxide insufflation for colonoscopy: evaluation of gas volume, abdominal pain, examination time and transcutaneous partial CO2 pressure. https://link.springer.com/article/10.1007/s00535-010-0286-5
14. Volume of a hollow cylinder. https://www.omnicalculator.com/math/cylinder-volume#volume-of-a-hollow-cylinder
15. Water - Dynamic (Absolute) and Kinematic Viscosity vs. Temperature and Pressure. https://www.engineeringtoolbox.com/water-dynamic-kinematic-viscosity-d_596.html
16. Air - Dynamic and Kinematic Viscosity. https://www.engineeringtoolbox.com/air-absolute-kinematic-viscosity-d_601.html
17. THE USE OF SUCTION IN CLINICAL MEDICINE. https://academic.oup.com/bja/article/32/10/486/246296
18. Medline Breathing Bags Breathing Bag, Soft Bushing, 3 L. https://www.medline.com/sku/item/MDPDYNJAA03SH
19. Overdistention of the Rebreathing Bag, A Hazardous Test for Circle-system Integrity. https://pubs.asahq.org/anesthesiology/article/42/3/365/22729/Overdistention-of-the-Rebreathing-Bag-A-HazardousÂ
20. A Modified Portable System for Oxygen Supply Using Anesthetic Rebreathing Bags. https://journals.lww.com/anesthesia-analgesia/Citation/1993/05000/A_Modified_Portable_System_for_Oxygen_Supply_Using.57.aspx
21. Anesthesia rebreathing bags: Physical characteristics and use as portable oxygen reservoirs. https://www.sciencedirect.com/science/article/abs/pii/095281809290135N
22. Overview of intestinal gas and bloating. https://www.uptodate.com/contents/overview-of-intestinal-gas-and-bloating
23. SSCOR DuCanto CatheterÂ®. https://www.sscor.com/ducanto_catheter