

VivaSight™-DL

The cost-effective alternative for One Lung Ventilation

A study by Larsen et al., 2019 ^[5] is the first randomized control trial (RCT) to investigate and compare costs and effects between conventional double lumen tubes (cDLTs) and VivaSight-DL.

Background

cDLTs are currently the preferred choice for one lung ventilation (OLV) procedures and are in general considered safe with a low cost. It is standard care to use a bronchoscope to check whether the tube is placed correct both after tube insertion and after changing the position of the patient to the final lateral surgical position ^[1-4]. In contrast to cDLTs and a reusable bronchoscope, VivaSight-DL is the world's first single-use DLT with an integrated camera that provides continuous real-time visualization during the entire surgical procedure. However, no study has investigated the cost-effectiveness of cDLTs in combination with a reusable bronchoscope compared to VivaSight-DL. This study is conducted at a large Danish University hospital performing approx. 600 OLV procedures annually. The study is designed with two arms; 22 patients in the cDLT arm and 30 in the VivaSight-DL arm, respectively ^[5].

Cost of use

This study found an average per-procedure cost of US\$35.41 for a cDLT, and an average bronchoscope per-procedure cost of US\$27.01. Repair and maintenance per-procedure costs amounted to US\$163.17 and manual reprocessing amounted to US\$81.61 per procedure. Additional costs of US\$40.40 were added for time spend on bronchoscope use and backup anesthesiologists during the procedures, **resulting in a total average cost per procedure of US\$347.61 for cDLT**. In comparison, the cost per procedure for VivaSight-DL was only US\$299.96, resulting in an incremental cost per procedure of US\$47.65 per use. Hence, the annual savings will be approx. US\$28,600, assuming 600 annual procedures.

Bronchoscope use during the procedure

In general, fiberoptic confirmation is needed twice when using a cDLT; however, in this study, fiberoptic confirmation was needed on average 3.14 times per procedure. During intubation, a bronchoscope was used 35 times for the 22 OLV procedures which equals 159.09% usage. A bronchoscope was only needed in two out of the 30 cases for VivaSight-DL (6.66%). First case was due to secretions and blood on the VivaSight-DL lens. The second case was to check for tumor mass in the trachea; thus, not related to the tube placement.

Key findings

Larsen et al. found VivaSight-DL to be cost-effective compared to a cDLT and reusable bronchoscope for OLV procedures. The incremental savings per procedure is US\$47.65 resulting in an annual saving of \$28,600 assuming 600 annual procedures. Furthermore, this study revealed a significant reduction in bronchoscope use for OLV procedures leading to increased patient safety and optimized workflow. Lastly, the risk of cross-infections is minimized since VivaSight-DL is a sterile single-use product.

References:

1. Rapchuk et al. Original Papers A six-month evaluation of the VivaSight™ video double-lumen endotracheal tube after introduction into thoracic anaesthetic practice at a single institution. *Anaesth Intensive Care*. 2017;45(2):189–96
2. Heir et al. A retrospective evaluation of the use of video-capable double-lumen endotracheal tubes in thoracic surgery. *J Cardiothorac Vasc Anesth* [Internet]. 2014
3. Massot et al. Evaluation of the Double-Lumen Tube VivaSight-DL (DLT-ETView): A Prospective Single-Center Study. *J Cardiothorac Vasc Anesth* [Internet]. 2015
4. Szarpak et al. Double-lumen tube tracheal intubation in a manikin model using the VivaSight Double Lumen: a randomized controlled comparison with the Macintosh laryngoscope. *Am J Emerg Med* [Internet]. 2016
5. Larsen et al. A Cost-effectiveness Analysis Comparing the VivaSight Double-lumen Tube to a Conventional Double-lumen Tube in Adult Patients Undergoing Thoracic Surgery Involving One-lung Ventilation. 2019 *Pharmacoeconomics Open*

Appendix

Cost per procedure (n = 600):

VivaSight-DL (US\$)	cDLT (US\$)
VivaSight: 299.00	Bronchoscopes: 27.01
aView: 0.94	Tubes: 35.41
Backup anesthesiologist: 0.02	Backup anesthesiologist: 0.80
	AER (incl. power + water): 23.33
	AER (service): 50.62
	Detergent for AER: 7.27
	Drying cabinets (incl. power): 29.58
	Drying cabinets (service): 35.43
	Cleaning (diverse): 12.62
	Cleaning personnel - manual pre-cleaning (15 min): 8.82
	Repair costs: 77.13
	Time spend on bronchoscopy (OR running costs): 39.60
Total: 299.96	Total: 347.61

The below-mentioned clinical data are the ones presented in the health economic publication:

	VivaSight-DL (n=30)	cDLT (n = 22)
Intubation time (average)	1.66 min.	1.43 min.
Intubation attempts (average)	1.23 attempts	1.14 attempts
Repositions (during intubation)	4 times	20 times
Repositions (during surgery)	10 times	17 times
Time spend on repositioning (during surgery)	60.86 sec.	144.42 sec.
Backup anesthesiologist called into the OR	1 time	4 times
Time the backup anesthesiologist spent on assistance	18 sec.	520 sec.
Bronchoscope used (during intubation)	0 times (0%)	35 times (159.09%)
Bronchoscope used (during surgery)	2 times (6.66%) *	34 times (154.55%)

* A bronchoscope was used once due to secretions and blood on the lens.
The second time the bronchoscope was used to check for tumor mass in the trachea.

Definitions:

- Number of intubation attempts
 - Intubation attempt is defined as the number of intubation attempts until successful intubation is accomplished. If the endobronchial tube is incorrectly placed and the tube is withdrawn from the subjects throat it counts as one attempt.
- Number of times the tube needs to be repositioned during intubation
 - In this study, repositioning is defined as the action where the bronchial cuff needs to be deflated to move the tube into the right position.
- Number of times the tube needs to be repositioned during surgery
 - In this study, repositioning is defined as the action where the bronchial cuff needs to be deflated to move the tube into the right position.
- Repositioning time (seconds) during surgery

In this study, repositioning is defined as the action where the bronchial cuff needs to be deflated to move the tube into the right position.

 - Time starts: When the syringe is attached to the valve to deflate the bronchial cuff.
 - Time stops: When correct bronchial cuff placement is verified by capnography.