

Lung Isolation and One-Lung Ventilation System

Tech ID: 24672 / UC Case 2011-739-0

SUMMARY

Dr. Nir Hoftman in the Department of Anesthesiology has developed a novel one-lung ventilation system that is deployed through a standard endotracheal breathing tube and achieves reliable, switchable isolation of either lung, along with integrated imaging ability.

BACKGROUND

Surgeries of the lung and thorax commonly require the ventilation of one lung to be stopped while maintaining ventilation of the other. The traditional device and gold standard for one-lung ventilation is the double lumen endotracheal tube (DLT), based on the design of the Robert-Shaw tube developed in the 1950s. Drawbacks of the DLT design include its difficulty of insertion, limited compatibility with bronchoscopes and suction catheters, and the need to exchange the DLT for a single-lumen breathing tube for post-surgical ventilation. Balloon-tipped catheter tubes known “bronchial blockers” are a common alternative used in clinical practice but suffer from other drawbacks, including the inability to easily alternate ventilation between lungs, a delicate seal with the isolated lung, and the inability to deflate the isolated (non-ventilated) lung. Further, both DLTs and bronchial blockers rely on continued visualization using a bronchoscope inserted in parallel. A system that achieves robust, switchable lung isolation and ventilation while eliminating the need for parallel bronchoscope visualization would significantly improve the ease and fluidity of one-lung ventilation procedures.

INNOVATION

Dr. Nir Hoftman in the UCLA Department of Anesthesiology has developed a unique one-lung ventilation system that can be inserted through a standard (“large-bore”) endotracheal breathing tube and delivers the collective advantages of both DLT and bronchial blocker designs, without the stated drawbacks. It achieves a robust seal with the bronchial branch to be isolated using a novel expandable bronchial isolation tube in conjunction with a specially designed balloon cuff, and is compatible with standard endotracheal ventilation systems by means of a custom adaptor/connector. Finally, the system incorporates a steerable optical stylet on the distal end that serves both to visualize and guide the correct positioning of the device.

APPLICATIONS

One-Lung Ventilation is pertinent to a variety of surgical procedures and indications, including:

- ▶ All surgeries of the lung itself
- ▶ Esophageal Surgery
- ▶ Cardiac Surgery
- ▶ Thoracic Spinal Surgery
- ▶ Isolation of pulmonary bleeding
- ▶ Management of punctured and/or leaking lungs

ADVANTAGES

- ▶ Easy insertion and placement
- ▶ Robust seal for reliable lung isolation
- ▶ Easy switching of isolated vs. ventilated lungs
- ▶ Integrated video system precludes the need for inserted bronchoscope
- ▶ Compatible with suction catheters (for deflation of isolated lung)

CONTACT

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OTHER INFORMATION

KEYWORDS

Lung Isolation, One-Lung Ventilation, Anesthesia, Respiration, Ventilator, Endotracheal Breathing Tube, Double-Lumen Tube (DLT), Pulmonary Surgery, Thoracic Surgery, Bronchoscope

CATEGORIZED AS

- ▶ **Biotechnology**
 - ▶ Health
- ▶ **Engineering**
 - ▶ Engineering
- ▶ **Medical**
 - ▶ Devices
 - ▶ Disease: Respiratory and Pulmonary System

RELATED CASES

2011-739-0

- ▶ Deployed through standard, single-lumen breathing tube that can be left in place for post-operative ventilation

STATE OF DEVELOPMENT

The technology has been fully described and awaits further development.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,744,323	08/29/2017	2011-739

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