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Review

VivaSight: a new era in the evolution of tracheal tubes

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Abstract

Study objective: To evaluate the available data describing the use of single and double lumen VivaSight tubes.

Design: Systematic review.

Setting: The use of VivaSight tubes for elective surgeries including advantages, disadvantages, and possible complications.

Patients: Systematic review of randomized controlled trials from databases including Medline, Web of Knowledge, Google Scholar, and Cochrane Central Register of Controlled Trials.

Interventions: Comparison of VivaSight single and double-lumen tubes with conventional tubes during normal airway and expected difficult airway management. The effectiveness of the devices was also evaluated during 1-lung ventilation for patients undergoing thoracic surgery.

Measurements: Intubation time, success rate, the requirement for fiberoptic bronchoscope, and the rate of complications.

Main Results: Following a VivaSight double-lumen tube, a flexible bronchoscope is still needed. It is difficult to agree that VivaSight tube reduces the need or use of a bronchoscope. According to the current literature, it is unclear if there is any advantage of the VivaSight compared with using flexible bronchoscopy to direct a blocker into the correct lung. The cost may be another issue. Studies comparing VivaSight tubes with standard double lumen tubes reported faster tracheal intubation rate and higher success rate at first attempt for VivaSight. However, VivaSight tubes may cause soft tissue trauma such as bleeding, hematoma, edema, and erythema. Sore throat and dysphonia are other reported complications. Due to the outer thickness, smaller-sized double-lumen tube may be necessary. It has been reported to have the disadvantages, such as melting due to the heat of light source before insertion and sudden shutdown without warning.

Conclusions: Problems such as overheating and melting on the distal end of the tube due to the light source and potential breakdowns of the cable should be solved by the manufacturer. This will probably require a redesign and necessitate further studies.

1. Introduction

Today, the technological advances enable more frequent use of new devices, which may be lifesaving in various circumstances in clinical practice. The VivaSight (ETView Ltd, Misgav, Israel) tracheal tube, with an integrated camera, has

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recently started to be used for both airway management and 1-lung ventilation (OLV) in the clinical practice.

Despite providing several advantages to clinicians, the VivaSight has not been able to achieve the expected utilization rate in airway management. One of the main reasons of that may be the cost of the disposable device. The cost of one disposable VivaSight double-lumen tube (DLT) is 130€ and single-lumen tube (SLT) is 100€ [1]. Distribution agreements of VivaSight include North and South America, Europe, Africa, and Asia. Besides, VivaSight has the international patents of FDA for United States, CE for Europe, and KFDA and AMAR for Asian countries. In the Unites States, the price for one disposable VivaSight DLT can range from 180 to 300$. It may change according to purchases.

Moreover, limited knowledge and experience regarding the device may have led to prejudices. As a matter of fact, considering the long-term outcomes, such as lower fiberoptic bronchoscope (FOB) requirement, the cost may be ignored. However, limited knowledge can remain as a problem because there is a definite lack of information on the use of VivaSight in the literature and no systematic review is available with or without meta-analysis.

In this review, we aimed to analyze the clinical and simulation-based studies regarding the VivaSight single-lumen tube (VSLT) and double-lumen tube (VDLT) (Fig. 1). We also intended to describe the characteristics, advantages, disadvantages, and possible complications of VivaSight tubes.

2. Methods

A literature search was conducted using the search term "VivaSight" in the search engines of PubMed (http://www.ncbi.nlm.nih.gov/pubmed), Web of Knowledge (http://webofknowledge.com), Google Scholar (http://scholar.google.co.uk/), and Cochrane Central Register of Controlled Trials (http://community.cochrane.org). We identified 13 peer-reviewed articles written in English in PubMed, 11 articles in Web of Knowledge, and again 13 articles in Google Scholar. However, we did not come across any related articles in Cochrane. The search consists of peer-reviewed articles published up to January 2016 to describe VivaSight (from 1945 to 2016). The references of the selected articles were also reviewed (Fig. 2). We screened ClinicalTrials.gov to ensure the identification of relevant ongoing studies. There were 3 completed prospective randomized clinical trials comparing VivaSight DLT and conventional DLT. However, there were no study data posted.

3. The structure and dimensions of VivaSight

VivaSight is a sterile single-use plastic polyvinyl chloride tracheal tube. It embodies 2 light-emitting diodes and a miniature Complementary Metal-Oxide Semiconductor single-chip video camera. It operates at 320 × 240 CIF high-resolution corresponding to 76.800 pixels. VivaSight provides an 85° diagonal field of vision in 12- to 60-mm depth via the progressive scan mode of Complementary Metal-Oxide Semiconductor sensor. The cylinder-shaped camera is 3 mm in diameter and 16 mm in length. The distal aperture of the VSLT is elliptical shaped, and thus, it becomes possible to accommodate the camera [2]. Two Murphy eyes are positioned bilaterally to the camera. In this way, the laryngeal entrance can be visualized which facilitates intubation of the patients. The imaging

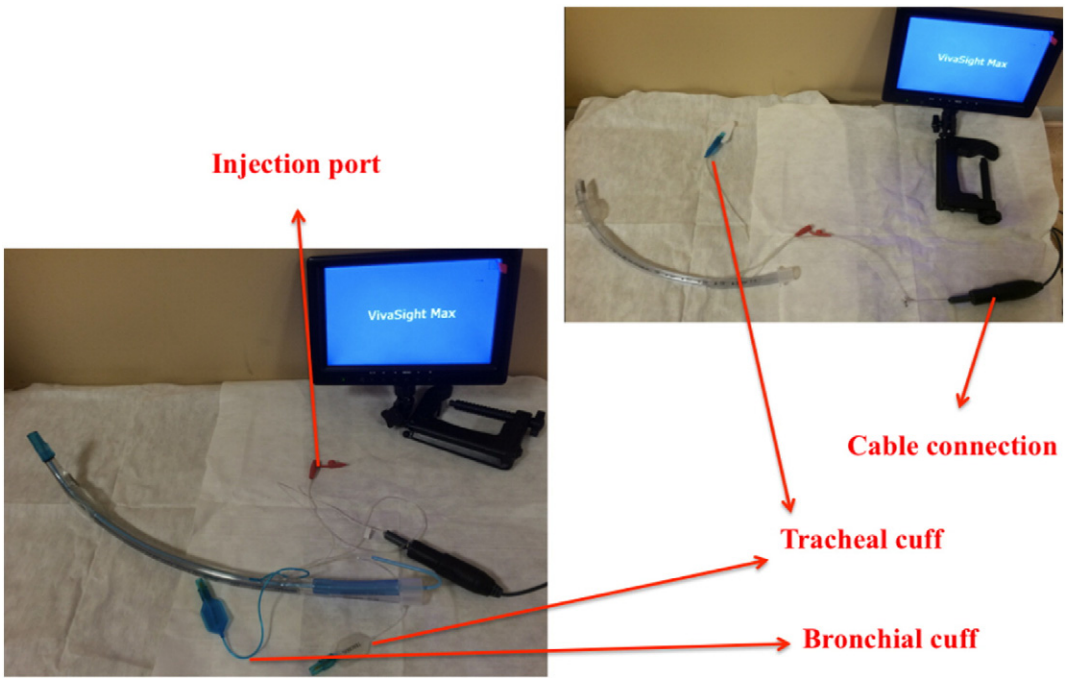

Figure 1 The components of VivaSight single lumen and double lumen tubes.