

Video-Assisted Airway Management

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Citation

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Abstract

BACKGROUND

Difficulties with tracheal intubation are a major cause for anaesthesia-related morbidity and mortality. Although pulse oximetry and capnometry are used for standard intubation monitoring, claims due to oesophageal intubations and difficult intubations remain still 6% for each in the ASA closed claims study project as 10 years ago (1). Furthermore, increasing failed intubation rates in obstetric anaesthesia have been reported and are a reason for great concern (2). Video-assisted airway management (VAAM) is a recently designed new concept for routine intubation monitoring and for management of the unanticipated difficult tracheal intubation.

PRINCIPLE

VAAM means airway management with the support of video-transmission of the view from the tip of conventional intubation devices such as endotracheal tubes, stylets, intubation laryngoscopes. Using an ultrathin fiberoptic cable leading from the tip directly to a bedside video-monitoring system enables to use such video-enhanced devices in the usual manner for conventional laryngoscopy. This allows to monitor the intubation procedure, to confirm the endotracheal tube position and/or to guide the endotracheal tube (ETT) during unexpected difficult intubation.

INSTRUMENTATIONS

- The “Visualized Endotracheal Tube” (VETT) is a standard endotracheal tube with image and light transmission fibers placed in the wall transmitting the tube’s eye view onto the attached video-monitor system (3).
- Different “Video-Optical Intubation Stylets” (VOIS) have been designed (4,5,6,7). A conventional malleable or a directional intubation stylet has integrated image and light fibers and an oxygen channel for lens protection and apnoic

oxygenation. They all give a video-display from the stylet tip onto the connected video-monitor system.

- The “Video-Intubating Laryngoscope” (VIL) is a conventional intubation laryngoscope with a guide bore hole for insertion of an ultrathin video-endoscope, leading from the tip through the blade to the bottom of the handle. The video-endoscope inserted into the laryngoscope leaves the device as a 2 meter long cable for connection to a video-imaging unit and transmits the view from the distal blade onto the video-monitor (8).

TECHNIQUES

- **Monitoring Tracheal Intubation:** Direct conventional laryngoscopy is performed as usual and the trachea is intubated under direct vision; the monitor view is used to confirm and adjust endotracheal tube position above the tracheal carina (VETT/VOIS) respectively between the vocal cords (VIL).
- **Guiding Tracheal Intubation VETT/VOIS:** In case of unexpected difficult direct laryngoscopy, best direct laryngoscopic view is obtained with conventional laryngoscopy. The VETT or the endotracheal tube loaded with the VOIS is inserted into the pharynx under direct vision. Then, the anaesthetist uses the video-view from the ETT tip to guide the ETT through the vocal cords and to confirm correct endotracheal tube position.

VIL: If direct laryngoscopic view to the vocal cords is obstructed, the cords are visualized using the video view from the blade tip with or without lifting up the epiglottis. The ETT is placed along the blade as far as possible under direct vision. Then the ETT is inserted into the trachea under

monitor guidance.

- **Simulating Difficult Intubation:** After initial direct laryngoscopy, the laryngoscope blade is lowered so that direct view to the cords is obstructed. The trachea then is intubated using the monitor view. In this way, training in difficult intubation management can be done daily without loss of experience in direct laryngoscopy.

DISCUSSION

Looking at a video-display in critical circumstances is much more comfortable than looking in to a viewfinder of an endoscopic device, because the operator remains in the usual intubation position and can easily change the view from the oropharynx to the monitor and vice versa. This facilitates endoscopic procedures, aids manual dexterity and enables nearly simultaneous observation of the video-display, patient and monitor. Furthermore, it provides a display for multiple viewers for teaching and increased coordination of intubation manoeuvres or allows video-taping for subsequent review or documentation of the intubation procedure.

VAAM provides a new generation of routine intubation monitoring and is an excellent tool for demonstration, teaching, supervising and documentation of the conventional

intubation procedure without interfering with the intubation procedure. Most anaesthetist are familiar with conventional laryngoscopy and steering an intubation stylet. Video-assisted tracheal intubation is almost the same procedure, only in a last step, the ETT is guided by the video-view; this makes these techniques potentially easy for difficult intubation management. If routinely used, there is no delay in preparing other equipment, no need to interrupt the intubation procedure and no need for personal assistance in case of unanticipated difficult intubation.

Clinical studies are required to confirm the value and to compare simplicity and efficacy of these new intubation techniques.

Please check the Web Site of Video-Assisted Airway Management at

<http://www.vaama.net/>

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