

The Pediatric Video-optical Intubation Stylet

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Citation

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Abstract

This is a report of an ultrathin video-optical intubation stylet particularly designed for pediatric airway management. An ultrathin fiberoptic endoscope has integrated a distal forming element. It is inserted in a pediatric endotracheal tube with I.D. 3.0 mm or larger and is looked at the 15 mm endotracheal tube adapter with a the stylet connector. The endotracheal tube respectively the stylet can be bent as needed.

The pediatric video-optical intubation stylet transmits the view from the endotracheal tube tip directly onto a video-display during conventional laryngoscopy. It allows monitoring and supervising tracheal intubation in neonates or infants. In case of impaired direct visualization of the vocal cords, the video view from the stylet tip can be used to guide the endotracheal tube around the floppy epiglottis into the trachea.

BACKGROUND

Video-transmission of the view from the endotracheal tube tip during conventional laryngoscopy is a new aid to assist tracheal intubation (1,2). This can be achieved using either a video-optical endotracheal tube (VETT) or a video-optical intubation stylet inserted in an endotracheal tube (ETT). They have been reported to be useful for monitoring and teaching tracheal intubation and helpful in case of unexpected difficult direct visualization of the vocal cords (12,3,4,5,6,7,8). Actually, these devices are only available for use in adult patients.

Therefore I designed a pediatric video-optical intubation stylet and describe it's technical features and clinical applications.

INSTRUMENTATION

The pediatric video-optical intubation stylet consists of a 1.5 meter long, ultrathin video-endoscope (O.D. 2.8 mm) and an stylet connector. The video-endoscope (manufacturer : Volpi AG, Schlieren/Schweizerland) carries optic fibers (10'000 pixels) for image transmission, light transmitting fibers for airway illumination and an oxygen channel for oxygen flowing at the lens. The distally integrated forming element makes the endoscope to a malleable intubation stylet (fig. 1).

Oxygen flowing at the stylet tip protects the distal lens against fogging and secretions and allows apnoic oxygenation during tracheal intubation. The stylet connector fits on the 15 mm ETT adapter and prevents rotational and

longitudinal displacement of the stylet within the ETT.

The pediatric video-optical intubation stylet is inserted in a pediatric endotracheal tube with I.D. 3.0 mm and larger. The stylet tip may protrude the ETT tip and can be bent as needed (fig. 2). The device is attached with the proximal endoscope plug to a video monitoring system.

{image:1}

{image:2}

Use of the pediatric video-optical intubation stylet

According the use of video-optical stylets in adult patients, the pediatric video-optical intubation stylet can be used for supervising/monitoring and guiding tracheal intubation (2).

Monitoring / Supervising Tracheal Intubation

{image:3}

{image:4}

Guiding Tracheal Intubation

{image:5}

{image:6}

DISCUSSION

Teaching and supervising tracheal intubation in neonates and infants is limited by narrow airway spaces and rapid arterial

desaturation due to low pulmonary capacity and high oxygen consumption. The pediatric video-optical intubation stylet allows the instructor to follow and correct the intubation procedure by the video view transmitted from the stylet tip.

Management of difficult tracheal intubation with a gum elastic bougie or an intubation stylet is a common and familiar technique. The video-view transmitted from the stylet tip helps to guide the ETT safely and visually controlled around the epiglottis into the trachea.

Particularly in neonates and small infants the large, floppy and v-shaped epiglottis often obstructs the direct view to the vocal cords. Placing the pediatric video-optical intubation stylet behind the epiglottis under direct vision, the video view from the stylet tip would be a useful aid to manage such situations. Final confirmation of proper tracheal ETT position is an additional benefit.

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