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How I Do It

Using the Shikani Optical Stylet

Henri Colt, M.D.

Pulmonary and Critical Care Division, University of California Medical Center, Orange, California, U.S.A.

Difficult airway management often requires a multidisciplinary approach involving anesthesiologists, otorhinolaryngologists, emergency physicians, and pulmonary specialists. When pulmonologists are called about difficult airways, it is usually to perform flexible bronchoscopy. Thus, the bronchoscope is used for difficult intubations as well as to verify endotracheal tube placements. The bronchoscope, however, is an expensive instrument. It is not always easy to intubate trauma victims or victims with substantial upper airway abnormalities. Experience is needed to intubate patients rapidly and effectively over the bronchoscope in emergency as well as in controlled settings.

The Shikani Optical Stylet (SOS) is a possible alternative to bronchoscopy to assist physicians with intubation. It is easily set up, portable, and inexpensive (compared with a fiberoptic or video bronchoscope). In addition, the SOS is a possible alternative to chest radiography or flexible bronchoscopy to verify endotracheal tube placement after controlled or emergency intubations in the field, in the emergency department, or in the intensive care unit. The purpose of this article is to describe the SOS, and to increase pulmonologists awareness about this instrument.

DESCRIPTION

The SOS (Clarus Medical, Minneapolis, MN, USA) is a malleable light wand, similar to the light wands, but with fiberoptics that allow airway visualization. It is United States of America Food and Drug Administration approved (Fig. 1). The SOS consists of a malleable stainless steel sheath that contains 78 light fibers for transilluminating and 30,000 pixel fiberoptics to provide a clear view. Because the sheath is sealed, it can be sterilized using immersion techniques, Steris, Sterrad, or ethylene oxide. Currently, the SOS comes in adult and pediatric sizes. The adult size fits into endotracheal tubes that are 5.5 mm internal diameter or larger. The pediatric SOS fits into endotracheal tubes in the 3.0 to 5.0-mm range.

The stylet is compatible with a variety of light sources. However, it is most convenient when used with a dedicated portable handle made by Clarus Medical. This handle, often referred to as the Sitelite, is a 6-V, halogen, hand-held light source that uses four AA batteries. Although the stylet and handle are used for direct visualization, the optical head of the SOS can be attached to a video camera so that images can be projected on a video monitor.

TECHNIQUE

The technique for using the SOS varies depending on whether it is being used to verify endotracheal tube placement or for intubation. When using the SOS to verify the placement of an endotracheal tube placed using rigid laryngoscopy, the malleable stainless steel stylet should first be bent slightly into a curvature similar to that of a Macintosh laryngoscope blade. The stylet attached to the portable handle–light source is inserted through an ETT–ventilator swivel adaptor, allowing procedures to be performed without removing patients from mechanical ventilation. The stylet is advanced until it extends past the tip of the endotracheal tube under direct visualization. When the carina is visualized, the position of the endotracheal tube can be altered as warranted. Essentially, the procedure is identical to that performed using a flexible bronchoscope, except that suctioning is not possible. More recently, the manufacturers have designed a flexible stylet called the FAST, which can be

Address correspondence and reprint requests to Dr. Henri Colt, Professor of Clinical Medicine, Director, Clinical Programs, Pulmonary and Critical Care Division, University of California Medical Center, 101 The City Drive South, Building 53, Room 119, Rt 81, Orange, CA 92868 U.S.A.; e-mail hcolt@uci.edu

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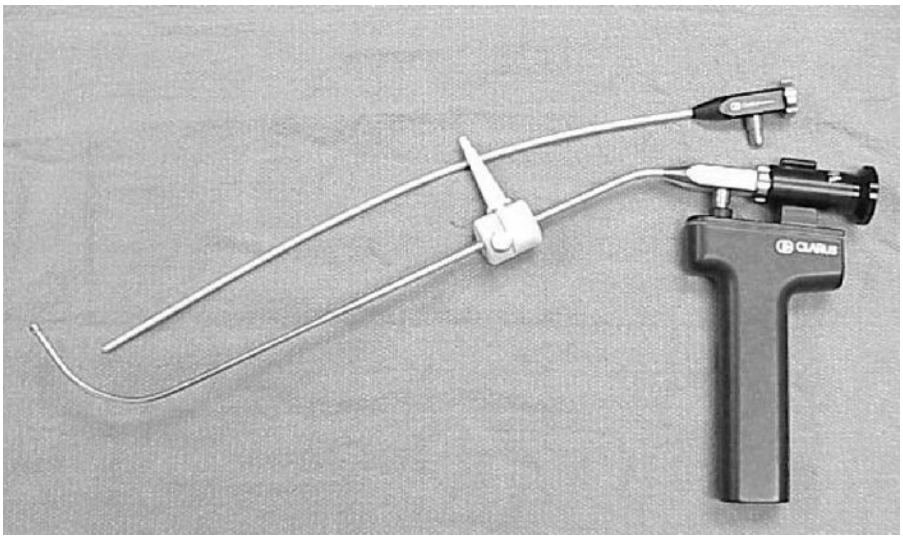

FIG. 1. The Shikani Optical Stylet.

substituted for the SOS to confirm placement of endotracheal tubes and laryngeal mask airway fastrachs.

When intubating with the SOS, an endotracheal tube is slid over the stainless steel malleable stylet and press fit into the tube stop. The position of the tube stop is adjusted so that the tip of the stylet does not protrude beyond the tip of the endotracheal tube. The stylet is again bent slightly into a curvature similar to that of a Macintosh laryngoscope blade. The mouth should be suctioned, and additional oral suctioning should be immediately available. The operator should then stand at the head of the patient. Patients should be preoxygenated using 100% oxygen, similar to preparation for rigid laryngoscopy intubation. Sedation or rapid sequence anesthesia can then be administered. (Vital signs should be monitored for any and all rigid laryngoscopy or bronchoscopic intubations.) The operator or an assistant should then perform a jaw thrust and/or tongue pull. This will assist the operator as the stylet is advanced under direct visualization toward the glottic opening. Supplemental oxygen should be provided to the patient by hooking oxygen to the tube stop and setting it to 3 to 5 L per minute. Because the oxygen flow is high, it helps keep secretions away from the end of the scope to improve visualization. The patient's mandible is then grasped with the operator's left hand, and the stylet is inserted into the right side of the patient's mouth. The stylet can be advanced carefully and gently until the tip is in the hypopharynx. At this time, the epiglottis is visualized, and the stylet can be inserted through the vocal cords. The endotracheal tube is then released from the tube stop and is advanced over the stylet into the trachea. The stylet is then removed, the endotracheal tube is fixed into position, and its placement can be verified by using the stylet as described previously. In certain instances, a floppy epiglottis or redundant pharyngeal tissue may prevent visualization of the vocal cords. In these instances, a rigid laryngoscopy blade can be used to lift the epiglottis. In other instances, it may be necessary for an assistant to apply pressure to the cricoid cartilage to help bring the larynx into view.

DISADVANTAGES

The main problem with this technique is that secretions cannot be suctioned from the upper airway using the stylet. It may thus be necessary to remove the stylet from the mouth to clean the lens and to aspirate oral secretions. Another problem can be caused by the unsatisfactory curvature of the stylet itself. It may be necessary to remove the stylet, change the curvature (creating either more or less bend depending on the situation), and repeat the attempt at intubation. Between intubations, it is wise to ventilate and oxygenate the patient manually.

ADVANTAGES

Use of an optical stylet allows intubation under direct visualization and should help operators avoid esophageal intubation—a recognized risk of intubations "in the field." In addition, having an optical stylet available in the field will allow operators to verify tube placement immediately if intubation is performed using rigid laryngoscopy, thereby avoiding prolonged inadvertent mainstem bronchial or esophageal intubations. The scope is reusable and easy to clean. Studies have not been performed, however, to determine impact on costs of care.

DISCUSSION

It is noteworthy that multiple instruments exist to assist the physician intubating a patient with a "difficult airway." Ideally, a bronchoscopist desiring to become an expert at difficult airway management should be familiar with most of them. For example, hollow guides placed through the endotracheal tube may help maintain rigidity of the endotracheal tube while providing a conduit for patients to breathe during the procedure. The length and small diameter of these hollow guides, however, increase airway resistance. In addition, these guides may tear airway mucosa (especially if being used as endotracheal tube changers) or may even become dislodged as a new endotracheal tube is being threaded onto them.

Various light wands have also been described. One such example is the Trachlight (Laerdal Med Corps, Long Beach, CA, USA). This instrument consists of a rigid internal stylet, a flexible wand with a bright bulb at its end, and a handle. For insertion, the wand and the endotracheal tube are bent approximately 90° into the shape of a hockey stick. As the wand is inserted, a well-circumscribed glow is noted in the midline as it passes the glottic opening. In general, the wand (having retracted slightly the rigid stylet) and the endotracheal tube are advanced until the light glow disappears at the sternal notch (the sternal notch is approximately at the midpoint between the vocal cords and the carina).

The instrument described in this paper has the advantage of fiberoptic or video visualization added to the technologic concept of the light wand. Interestingly, not much has been written yet regarding the use of this device, or of other optical stylets.[1–4] One report[5] describing the SOS for tracheal intubation in 20 patients reported satisfactory intubation of 11 patients at a first attempt, 3 patients using assisted cricoid pressure, 4 patients requiring two attempts, and 2 patients requiring three attempts. Range of time to intubation was 8 to 54 seconds. Other descriptions of accessories to intubation can be found in anesthesiology textbooks.[6]

CONCLUSION

The purpose of this "How I Do It" is simply to raise the awareness of pulmonologists about the existence of alternative instruments that can be used for intubation or to verify endotracheal tube placement. A variety of such instruments is increasingly available, and warrant careful study and evaluation. In my opinion, management of the difficult airway is an important topic for pulmonologists and bronchoscopists alike, who should be trained in the use, advantages, and disadvantages of a variety of different instruments and techniques. A multidisciplinary approach toward education and training in difficult airway management strategies should result in less physician stress, development and study of patient management algorithms, and fewer adverse outcomes.

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