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The neural integrity monitor electromyogram tracheal tube: Anesthetic considerations

Sir,

The neural integrity monitor (NIM) electromyogram (EMG) tracheal tube is frequently being utilized, for the head and neck procedures, when laryngeal nerves (LNs) could be injured during the process of surgical dissection. It is particularly useful for identifying the recurrent LN.^[1]

The anesthesiologist should be familiar with the proper use and functioning of this device. Initially, this unique tracheal tube must be positioned so that its color-coded contact band is appropriately placed between the vocal cords.^[2]

When attempting to identify LNs, a stimulating electrical current of 0.5-2.0 mA is used by the surgeon. This current is administered via a sterile probe, which is placed directly on the anatomical site in question. Additionally, return electrodes are positioned in the skin above the sternum.

When a LN is located, an electrical signal is subsequently generated by the motion of the vocal cords. An audibly recognizable “machine gun click” is then produced from the device’s associated monitor. This sound has a set frequency of 4 times/s (4 Hz). Simultaneously, an oscilloscope-like screen displays an identifiable sinusoidal response.

Depending on clinical conditions, either direct laryngoscopy, video laryngoscopy, or fiber-optic intubation can be utilized for airway management. However, tracheal intubation in many of these patients may be difficult; given their concomitant head and neck disease. Thus, the glottis may not be midline or the trachea may be compressed. The presence of head and neck tumors, or prior radiation treatment, could also produce limited neck extension. Inadequate subluxation of the mandible, obesity, or reduced thyro-mental distance may also be present. Accordingly, the anesthesiologist may wish to use fiber-optic intubation. It should be noted that the use of certain associated techniques, such as nebulized or trans-tracheal lidocaine, or superior LN blocks, may interfere with the performance of this tracheal tube with respect to the surgical localization of the LNs.

As these tracheal tubes have a minimum outer diameter of at least 8.8 mm, oral intubation is necessary. Furthermore, the conical connector, located on the proximal aspect of this tracheal tube, is non-removable. For these reasons, the use of the Patil-Syracuse fiber-optic-compatible oral airway (FCOA) may be advantageous. As shown in Figure 1, this FCOA is mechanically compatible with the NIM EMG tracheal tube. It also has an anterior channel which greatly facilitates intubations which may be difficult secondary to an anterior-oriented glottis. Moreover, this channel is

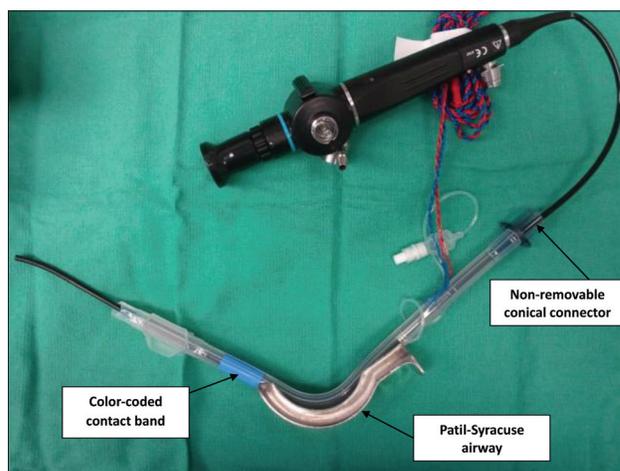


Figure 1: The Patil-Syracuse fiber-optic-compatible oral airway is mechanically compatible with the neural integrity monitor electromyogram tracheal tube. This particular tracheal tube has a non-removable conical connector. Its color-coded contact band must be placed between the vocal cords

relatively shallow and will allow the fiberscope to readily move off-midline in the event that the trachea is deviated. Once, the glottis is identified, and the fiberscope advanced into the trachea, the Patil-Syracuse airway is readily removed from the patient's oropharynx before advancement of the NIM EMG tracheal tube.^[3]

Furthermore, the use of non-depolarizing neuromuscular blocking agents is contraindicated when using this tracheal tube. To facilitate tracheal intubation, a depolarizing agent may be required. Pre-paralytic, as well as post-paralytic, assessment of train-of-four monitoring should be carried out. This documents the return of neuro-muscular function to that of the patient's baseline.

Prior to placement, the cuff of the NIM EMG tracheal tube should be covered with an aqueous lubricant rather than a local anesthetic gel. It is also advisable to use a low FiO₂ given the associated potential for an electrical fire. Lastly, it should also be noted that this particular tracheal tube is not magnetic resonance imaging compatible.

Consideration should also be made to use a Cook airway exchange catheter (CAEC) when extubating a patient with a "difficult airway" requiring a NIM EMG tracheal tube. CAECs are also mechanically compatible with these tracheal tubes and can function as a stent; facilitating re-intubation. Furthermore, they also allow for jet ventilation in the event that re-intubation cannot be readily accomplished.^[4]

In conclusion, the NIM EMG tube allows for intraoperative localization of the LNs during the surgical dissection. Proper understanding of its structure and function is an essential for the anesthesiologist.

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