

**N:M5**

## EMG Endotracheal Tube



Detects Free Run EMG from  
Recurrent Laryngeal Nerve

## EASY INTUBATION. REAL-TIME EMG FEEDBACK OF THE RLN.

### CLINICAL BACKGROUND

The incidence of Recurrent Laryngeal Nerve (RLN) injury leading to dysphonia with anterior cervical discectomy and fusion (ACDF) ranges from less than 1% to more than 20%.<sup>1,2,3</sup> Complaints of hoarseness and difficulties with speaking and singing are persistent problems among a significant proportion of patients, even beyond five years after ACDF surgery.<sup>4</sup> The suggested causes for RLN palsy include traumatic division of the nerve, entrapment of the nerve between retractors and the EMG Endotracheal (ET) Tube, and overstretching of the nerve during lateral retraction.<sup>3,5,6,7</sup>

The RLN ascends along the tracheoesophageal groove, frequently bifurcating before entering the larynx where the RLN innervates the vocalis and arytenoid muscles. The ET Tube intraoperatively evaluates the activity of these muscles. Compound muscle activity potentials may be detected to possibly identify and help evaluate the functional integrity of the RLN during surgery.<sup>1</sup> With its exposed electrodes for contact directly with the vocal cords, the NVM5<sup>®</sup> EMG Endotracheal Tube helps detect responses from RLN activity.

### PATIENT SETUP

#### STEP 1

**Intubate the patient with a short-acting neuromuscular blocking agents.**  
**Use non-anesthetic lubricants.**

#### STEP 2

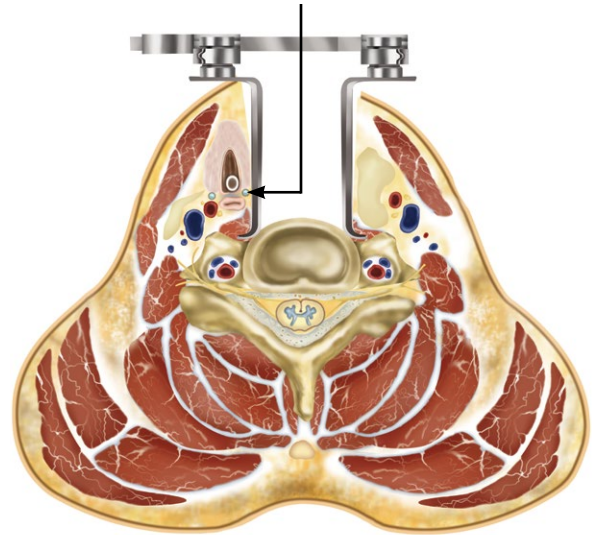
**Position the patient for surgery.**

#### STEP 3

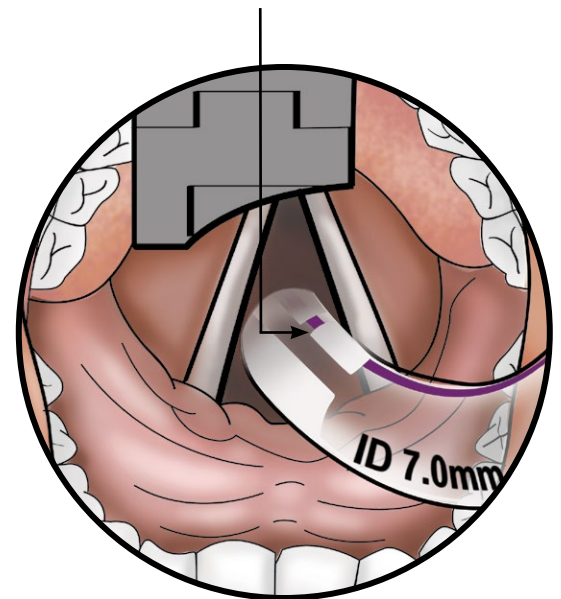
**Verify with a laryngoscope that the ET Tube is positioned correctly.**

The exposed electrodes should make contact with the vocal cords and the gap in the anterior marker positioned with the vocal cords (see figure). The tube should also be positioned with the purple line and ANTERIOR MIDLINE marking placed anteriorly.

**RLN Impingement  
Against Retractor**



**Place the Alignment Gap  
on the Vocal Cords**



<sup>1</sup> Pearlman RC, Isley MR, Ruben GD, et al. Intraoperative monitoring of the recurrent laryngeal nerve using acoustic, free-run, and evoked electromyography. *J Clin Neurophysiol* 2005;22(2):148-52.

<sup>2</sup> Beutler WJ, Sweeney CA, Connolly PJ. Recurrent laryngeal nerve injury with anterior cervical spine surgery: risk with laterality of surgical approach. *Spine* 2001;26(12):1337-42.

<sup>3</sup> Jellish WS, Jensen RL, Anderson DE, et al. Intraoperative electromyographic assessment of recurrent laryngeal nerve stress and pharyngeal injury during anterior cervical spine surgery with Caspar instrumentation. *J Neurosurg* 1999;91(2 Suppl):170-4.

<sup>4</sup> Yue WM, Brodnew W, Highland TR. Persistent swallowing and voice problems after anterior cervical discectomy and fusion with allograft and plating: a 5- to 11-year follow-up study. *Eur Spine J* 2005; 14:677-82.

<sup>5</sup> Apfelbaum RI, Kriskovich MD, Haller JR. On the incidence, cause, and prevention of recurrent laryngeal nerve palsies during anterior cervical spine surgery. *Spine* 2000;25(22):2906-12.

<sup>6</sup> Audu P, Artz G, Scheid S, et al. Recurrent laryngeal nerve palsy after anterior cervical spine surgery: the impact of endotracheal tube cuff deflation, reinflation, and pressure adjustment. *Anesthesiology* 2006;105(5):898-901.

<sup>7</sup> Jung A, Schramm J, Lehnardt K, et al. Recurrent laryngeal nerve palsy during anterior cervical spine surgery: a prospective study. *J Neurosurg Spine* 2005;2(2):123-7.



## NEUROMONITORING FOR COMMON RLN APPLICATIONS

### STEP 4

**Inflate the tube cuff to prevent migration of the tube.**

**Secure tube after final patient positioning:**

- Consider a bite block to prevent damage to the tube.
- Secure the ET Tube with tape. Two pieces of tape are recommended: wrap each around the tube and then place along the upper lip.

### STEP 5

**Connect the EMG harness to the EMG Endotracheal Tube.**

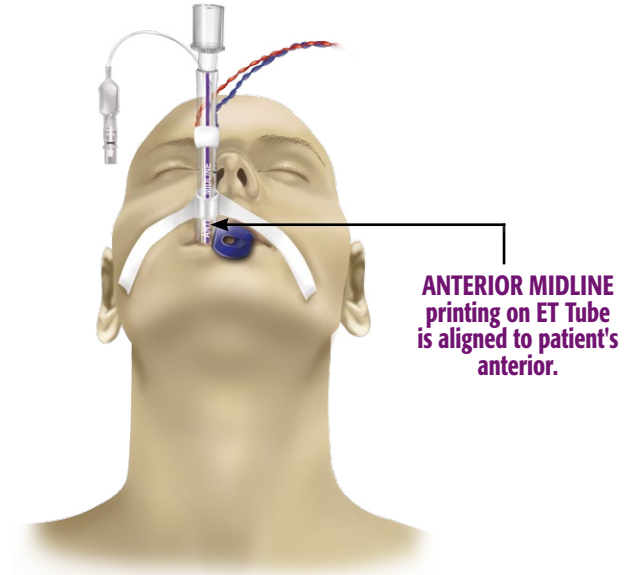
Attach the blue connector to the left electrode and the red connector to the right electrode. This should enable monitoring for the RLN with the EMG Endotracheal Tube.

### STEP 6

**Confirm good impedance values of the electrodes.**

**Reposition the Endotracheal Tube if necessary.**

The most common type of EMG activity is burst responses, which immediately alert the surgeon about anatomical proximity of the RLN. Train activity or repeated nerve firing may alert the surgeon about potential nerve damage leading to hoarseness due to excessive or prolonged retractor pressure.<sup>1</sup>



### ANESTHESIA REQUIREMENTS

Induce with short-acting neuromuscular blocking agents and then discontinue use.

## ANTERIOR CERVICAL INSTRUMENTATION



### CoRoent® Small Interlock™

- True "no-profile" device implanted within the confines of the intervertebral disc space
- Surgical exposure limited to intervertebral disc
- Fully integrated PEEK spacer and fixation device simplifies implantation procedure
- Large central aperture provides ample space for fusion to occur

## CLINICAL ADVANTAGES

- Optimal placement of the exposed contact electrodes on the vocal cords enables continuous monitoring of EMG activity of the RLN.
- The integrated, low-profile electrodes detect iatrogenic nerve injury, which may lead to RLN palsy.<sup>1</sup>
- The semirigid and curved PVC tube is designed to make intubation easy.
- The red and blue leads connect to a right and left monitoring channel.
- The purple line and ANTERIOR MIDLINE marking along the anterior aspect of the tube aid in tube alignment.
- Endotracheal tube position may be monitored with depth markings measured from the distal tip.

## SUBDERMAL NEEDLES



Low-Pressure, High-Volume Inflatable Cuff

Alignment Gap – Place on Vocal Cords

Bipolar Contact Electrodes

Insulated Electrode Leads

Airway Adapter

Electrode Leads & Connectors

Dual-to-Din Adapter

DESCRIPTION	CATALOG #	O.D.(mm)
EMG Endotracheal Tube, 6mm I.D.	2010360	8.7
EMG Endotracheal Tube, 7mm I.D.	2010370	10.0
EMG Endotracheal Tube, 8mm I.D.	2010380	11.3

DESCRIPTION	CATALOG #	O.D.(mm)
EMG Endotracheal Tube, 6mm Dual-to-Din Adapter, Subdermal Needles	2010460	8.7
EMG Endotracheal Tube, 7mm Dual-to-Din Adapter, Subdermal Needles	2010470	10.0
EMG Endotracheal Tube, 8mm Dual-to-Din Adapter, Subdermal Needles	2010480	11.3

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