Clinical Examination of the Recurrent and Superior Laryngeal Nerves during Thyroid Surgery using Vagus Nerve Stimulation

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INTRODUTION

The during thyroid surgery, intraoperative neuro monitoring of the laryngeal nerves is a reliable way to check nerve function. A bipolar electrode is selectively placed via the cricothyroid ligament into the thyroarytenoid muscle (TAM) and cricothyroid muscle after the cricothyroid ligament has been identified (CTM).

DESCRIPTION

The recurrent laryngeal nerve and the external branch of the superior laryngeal nerve (EBSLN) in the TAM and CTM, respectively, can be monitored with vagus nerve stimulation. With 100% sensitivity and 98 percent specificity, a significant muscle response (greater than 100 V) is 100% predictive of maintained laryngeal mobility, while the absence of a muscle response is 70% predictive of vocal fold paralysis. Only ipsilateral to the stimulus is a significant thyroarytenoid muscle response recorded, with a shorter latency on the right side.

One of the most common complications of thyroid surgery is recurrent laryngeal or inferior laryngeal nerve injury, which can be fatal, especially in the case of bilateral nerve lesions. Less severe clinical characteristics of damage to the external branch of the superior laryngeal nerve include lethargy and monotonous voice, loss of high-pitched sounds, and singing voice, which is particularly problematic for voice professionals. Surface electrodes on thev endotracheal tube or monopolar or bipolar electrodes implanted directly into the laryngeal muscles are being used for intraoperative recurrent laryngeal nerve monitoring. There are two types of nerve stimulation: stimulation of the recurrent laryngeal nerve or the external branch of the superior laryngeal nerve, and stimulation of the vagus nerve.

The effects of vagus nerve stimulation of the laryngeal muscles, which is regularly employed following total thyroidectomy, are described. After selective intramuscular insertion of bipolar electrodes, this approach analyses both the recurrent laryngeal nerves and the external branch of the superior laryngeal nerve [1,2].

As with any thyroidectomy performed under general anesthetic with a typical endotracheal tube, the patient is put in the supine position with the head in modest extension. There is no muscle relaxant used. Even in the presence of a big goitre, the midline suprasternal low-neck incision, after creating a flap underneath the platysma muscle, allows exposure of the cricothyroid membrane. Two bipolar recording electrodes (Medtronic Xomed) are positioned in the inferior thyroarytenoid muscle and the cricothyroid muscle, respectively, in two laryngeal muscles. In the superior parasternal subcutaneous tissue, two neutral monopolar electrodes are implanted.

The electrodes are put into the left and right thyroarytenoid muscles, and then crossed the cricothyroid membrane 5 mm from the midline in a superior, lateral, and posterior manner, forming a 15-degree angle with the sagittal plane. Stimulation of the vagus nerve is now available. The contralateral electrode is positioned parallel to the fibres of the ipsilateral cricothyroid muscle in the second stage, while the ipsilateral thyroarytenoid bipolar electrode is left in place. The vagus nerve stimulation is then activated. The position of the bipolar electrode used in the second stage of the process is not changed in the third step, but the external branch of the superior laryngeal nerve is now activated [3,4].

The association of the intraoperative muscle reaction with the immediate postoperative laryngeal endoscopic outcome determines the predictive value of intraoperative neuromonitoring. The prognostic value for maintaining postoperative laryngeal mobility was 100 percent when a significant intraoperative muscle response (> 100 V) was obtained. The predictive value for reduced laryngeal mobility was 70% when an intraoperative muscle response was not recorded. In the absence of a muscle reaction, electrode placement and the quality of vagus nerve dissection must be confirmed before deciding on transitory nerve paralysis. Only the side ipsilateral to nerve stimulation showed a significant reaction. There was no discernible change in response amplitude between the left and right sides. On the other hand, there was a significant difference (P 0.001) in terms of the right and left sides had a latency difference of around 2.30 ms: the right side's mean latency at 1 mA was about 3.83 ms (2–5.75 ms), while the left side's mean latency at 1 mA was about 6.22 ms [3.75–10 ms]. Stimulation at 0.5 mA or 1 mA resulted in no significant differences in response amplitude or latency [5].

CONCLUSION

During vagus nerve stimulation, combined analysis of the thyroarytenoid muscle and ipsilateral cricothyroid muscle (2nd step) revealed a significant response of the thyroarytenoid muscle associated with a response of the cricothyroid muscle; the amplitude of the cricothyroid muscle response was similar on both sides, but generally of lower amplitude than the thyroarytenoid muscle response: about 530 V for the cri In 76 percent of the cases, both muscles responded at the same time.

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