INTRODUCTION

In performing thyroidectomy, the gold standard is that of visualization of the recurrent laryngeal nerve. The nerve integrity monitor (NIM) is thought to serve as a valuable adjunct. In a study of 29,998 nerves by Drake et al; the dissections were divided into three groups, those with no recurrent laryngeal nerve identification, a second group with visualization recurrent laryngeal nerve identification and visual ID use of recurrent laryngeal nerve monitoring. They found that visualization of the recurrent laryngeal nerve is the gold standard in that there was no statistical difference in nerve visualization with or without monitoring. There was evidence of improved results with use of the NIM but it did not reach statistical significance. In a meta-analysis of 64,699 nerves, there was no statistical difference in the rate of false vocal cord paralysis using nerve integrity monitoring versus recurrent laryngeal nerve identification without monitoring.

Use of the nerve integrity monitor, however, is becoming more prevalent. It is commonly used in otologic and parotid procedures and becoming more so in thyroid surgery. In a survey of 685 otolaryngologists, 29% use the NIM when performing Thyroidectomy. The surgeons who used the NIM were three times more likely to use the nerve integrity monitor if they had been exposed to it during training.

In the last 5-7 years, a video laryngoscope has been developed that allows video visualization of placement of the endotracheal tube and is commonly known as the "GlideScope" (Verathon Medical, Bothell, WA, USA). The use of the GlideScope has been found to be effective in both primary intubation and in management of the difficult airway in both adults and children. Use of the GlideScope has recently been reported in patients undergoing NIM thyroidectomy. In a brief clinical description, three cases successful use of the GlideScope for NIM tube thyroidectomy were reported. In a more recent report of 250 patients undergoing NIM thyroidectomy, the GlideScope allowed successful intubation in all of the patients.

The purpose of this study is to understand the value of using the GlideScope to assure proper NIM tube and electrode placement within the larynx at the time of thyroidectomy.

METHODS

A total of 33 patients undergoing thyroidectomy or parathyroidectomy using the NIM system are reported.

After direct laryngoscopy and intubation by the anesthesiologist the patient is positioned on the operating room table for thyroidectomy or parathyroidectomy. The GlideScope is then used to visualize the endotracheal tube within the larynx. (Figure 1) If repositioning of the endotracheal tube proved necessary measurements were made as to proper vertical positioning of the length of the tube and also rotational orientation of the tube within the larynx to assure maximal contact at the EMG electrodes with the true vocal folds. Once the optimal tube position has been verified the patient is prepped and the procedure commences.

RESULTS

Of the 33 patients, there were 6 men and 27 women. The average age was 58.3 years with a range of 28-82 years. Of the surgeries performed, there were 20 lobectomies, 8 total thyroidectomies, 5 parathyroid gland excisions, and 2 patients underwent concomitant zone VI dissections. There were no instances of NIM system malfunction/nonfunction noted.

The pathology indicated a benign goiter in 16 patients; there were 8 benign follicular adenomas. Of the malignancies, there were 3 papillary thyroid cancers and 1 squamous cell carcinoma. The squamous cell carcinoma within the thyroid gland resulted as metastatic disease after previous chemoradiation for a T3N2bM0, clinical stage IV, supraglottic laryngeal cancer. One patient underwent surgery for what was found to be thyroiditis and 5 patients underwent surgery with findings of a parathyroid gland adenoma.

Some type of endotracheal tube adjustment was required frequently, in a total of 69.7% of the patients. In 33% of the patients, tube retraction to a proper depth was needed. In 21% of the patients both adjustment of tube depth and tube rotation for proper electrode alignment was required.

Of the 33 patients, all had successful visualization of the recurrent laryngeal nerve at surgery. All of the patients were found to have recurrent laryngeal nerves in their proper anatomic position with the exception of one patient who had a non-recurrent laryngeal nerve on the right side. The nerve was successfully identified and dissected with normal function postoperatively. Another patient had a transient left true vocal cord paresis which subsequently resolved thought secondary to traction type injury. A final patient underwent a right thyroid lobectomy, but developed a left-sided vocal cord paresis postoperatively. This was thought to be pressure injury from the endotracheal tube cuff. This paresis resolved also. There were no permanent instances of recurrent laryngeal nerve paresis.

DISCUSSION

Use of the NIM system is fraught with several potential issues regarding the equipment and the monitoring system. Most of these relate to the endotracheal tube. This type problem has been reported in 3.8% to 23% of patients undergoing NIM thyroidectomy. It is also thought that a right-handed anesthesiologist tends to rotate the tube clockwise to approximately 30 degrees when intubating the patient. This rotational error would require a counterclockwise rotation to properly align the NIM tube electrodes within the larynx. However only 0.5% of the patients in this series required counterclockwise tube rotation.

There seems to be no significant relationship between the endotracheal tube depth of insertion and the patient’s weight, age, body mass index, or height. After initial tube positioning, tube readjustment during thyroidectomy is required in only 5.7%. In this series, of patients requiring tube correction after intubation, about 50% required advancement of the tube and 50% required retraction of the tube. In the current series, the tube always had to be retracted but not advanced.

The significance between adequate NIM tube placement and optimal NIM tube placement in terms of reliability of the NIM system is not known. The NIM endotracheal tube has a long area wired for laryngeal contact and it may be that this “sweet spot” allows the NIM system to function with tube placement that is not always optimal. In the senior author’s experience, use of the GlideScope has only recently been utilized. However in several previous series of thyroidectomies without verifying tube position, there were few instances of NIM system failure related to tube placement.

The real advantage of GlideScope verification of optimal NIM tube placement is that it eliminates tube placement issues from the paradigm of possible causes of a non-functioning nerve monitor which may encountered during thyroidectomy.

CONCLUSIONS

Use of the GlideScope permits optimal placement of the NIM tube prior to initiation of thyroidectomy. It promotes a team approach to optimal tube placement by both anesthesiologists and the otolaryngologist-head and neck surgery and eliminates tube location as a possible reason for a non-functioning NIM system. It is non-invasive, inexpensive and usually requires less than 1-2 minutes to verify tube placement and adjust the tube as needed. Use of the GlideScope in this situation is recommended.

Figure 1: GlideScope view of endotracheal tube within the larynx. Note proper alignment of EMG electrodes contacting the vocal folds.

References