TOPOGRAPHICAL ANALYSIS OF THE RECURRENT LARYNGEAL NERVE DURING THYROIDECTOMY

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INTRODUCTION

The goal of thyroidectomy is ablation of the underlying disease process while preserving the function of the recurrent laryngeal nerve (RLN) and parathyroid glands. Currently patients undergoing thyroidectomy benefit from the surgeons’ physiologic understanding of thyroid disease, knowledge of the anatomy of the recurrent laryngeal nerve, operative experience, and technological advancements, such as the nerve integrity monitor. Despite these advancements, recurrent laryngeal nerve paresis following thyroidectomy persists. It is estimated to be as high as 5-10% in a series by Sancho et al. Shinodo estimates the incidence of a temporary recurrent laryngeal nerve palsy to be 5% with a 0.5% rate of permanent paralysis of the recurrent laryngeal nerve following thyroidectomy. Randolph estimates the incidence of recurrent laryngeal nerve palsy to be even higher with some reports of 6-8% ranging up to as high as 23%.

Embryologically, the left recurrent laryngeal nerve loops around the aortic arch before ascending in the neck, while the right recurrent laryngeal nerve curves around the right subclavian artery. For this reason, the right recurrent laryngeal nerve is not thought to be tucked as tightly into the tracheo-esophageal groove, and hence more likely to be injured during thyroidectomy according to conventional teaching.

The purpose of the current study was to 1) establish normative values for RLN dissection during thyroidectomy, ie, length of nerve dissected from the tracheoesophageal (TE) groove, and width of the RLN. 2) Determine if there is a relationship between the length of the RLN dissected and post op paresis 3) measure the distance of the RLN from the TE groove.

METHODS AND MATERIALS

The procedures were performed by a single surgeon (CRC) in a community hospital setting using non-paralytic anesthesia. Dissection was facilitated using 4X Loupe magnification. The use of the nerve integrity monitor and harmonic scalpel were utilized in all patients. During the dissection constant traction on the RLN was avoided by limiting dissection to 5 minutes or less and then releasing tension on the gland for several minutes before proceeding with further dissection.

At the completion of the thyroidectomy, calipers were used to determine the length and width of each RLN dissected and the distance from the TE groove. (Figure 1) All patients were seen at one week post op for laryngeal exam by indirect or direct laryngoscopy using a fiberoptic scope. Serial exams were carried out in the 4 patients with RLN paresis until nerve function returned.

RESULTS

There were 79 right and 65 left nerves dissected (N=144). On the right, the mean length of the dissection was 27.72 mm and on the left 31.40 mm. (Table 1). The length of the dissection ranged from 7 to 65 mm on the right and 3 to 62 mm on the patients left side.

The recurrent laryngeal nerve consists of motor, sensory and parasympathetic fibers providing movement of the vocal folds as well as sensation below the level of the vocal folds. As the right recurrent laryngeal nerve loops around the subclavian artery, it has a more oblique point of direction into the larynx. Shinido et al measured the course of 278 RLN at the time of thyroidectomy and found the right RLN at 15-45 degrees from the cricothyroid joint in 78% of their patients. On the left side in 77% of patients the RLN curved between 0-30 degrees. On the left side the RLN has a more direct course into the larynx and is thought to lie closer to the TE groove.

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The basic surgical tenet in thyroidectomy and parathyroidectomy is that of identifying the nerve while removing the underlying pathology. In each technique, the nerve is visualized and dissected, removing the underlying pathology the rate of facial nerve (FN) paresis in parathyroidectomy is generally higher than that of RLN paresis in thyroidectomy. Temporary FN paresis after parathyroidectomy occurs in 15-65% of patients and permanent paresis in 14.5%. More recent data indicates the rates of FN paresis are in the range of 12-26%. In a 2004 year review with statistical analysis indicates a transient FN paresis in 17.9% of partial superficial parathyroidectomy patients. In a previous study of seventy-eight patients who underwent seventy-nine parathyroidectomy procedures the authors demonstrated that increased length of facial nerve dissection and exposure resulted in a higher incidence of facial nerve paresis, albeit temporary. In that study, the mean length of facial nerve dissection with normal postoperative function was 94.7 mm, and those patients with temporary paresis the length dissected was 136.73 mm. In the current study the length of dissection of the RLN was generally in the range of 3 cm. Thus, the low rate of recurrent laryngeal nerve palsy may be due to the short distance of nerve that is actually dissected. No statistical inference could be made for length of RLN dissected and paresis, perhaps in part because of the small number of patients with post op paresis. Other factors which may be important are those of traction on the RLN and damage to the microscopic circulation of the vas a nervorum. The reason for the slightly increased distance of left RLN dissected as compared to the right is unclear but appears unimportant as it relates to RLN paresis in this series.

The surgical field, the distance from the recurrent laryngeal nerve to the tracheo-esophageal groove was the same on each side. Thus the RLN should be carefully sought without regard to distance from the TE groove.

DISCUSSION

The clinical implications of this study are: The distance that the RLN dissected is short, generally about 3 cm. The low rates of recurrent laryngeal nerve palsy may be due to the short distance of nerve dissected. A parallel may be found in a series of patients undergoing parathyroidectomy in which the longer the distance of nerve dissection the higher the rates of post op paresis. Additionally, the right recurrent laryngeal nerve is not significantly displaced from the TE groove as compared to the left and in most cases the nerve on each side is found < 5 mm from the TEG.

REFERENCES