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RESEARCH ARTICLE

RECURRENT LARYNGEAL NERVE IDENTIFICATION AND PRESERVATION IN THYROIDECTOMIES: OUR EXPERIENCE

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ABSTRACT

Vocal cord paresis or paralysis during thyroid surgeries is still continues to be one of major problems. Visual identification of the nerve is the gold standard of recurrent laryngeal nerve protection for all types of thyroid surgeries. The present prospective study was carried out to highlight a simple, safe, effective and less time consuming procedure of identification and preservation of recurrent laryngeal nerve. A total number of 120 patients were included in the study, 90 females (75%) and 30 males (25%), who underwent various thyroid procedures for benign 74 (617%) and malignant tumors 46 (38.3%). The mean age was 35 years (range, 14-80 year) ,lobectomy was done in 74 (61.7%), total thyroidectomy was in 40 (33.3%) and completion thyroidectomy was done in 6 (5%) of patients. The commonest benign and malignant tumor was colloid nodule in 45 (37.5%) and papillary carcinoma in 40 (33.5%) respectively. The mean size of the tumor was 8.9cm ranging from 3.5-12.4cm, recurrent laryngeal nerve was identified in all cases in the upper most part of its course where it is very close to the gland and enters into the larynx. There were no transient or permanent paralysis of recurrent laryngeal nerve in this study.

INTRODUCTION

Thyroidectomy is one of the most common operations, particularly in countries where iodine deficiency is a common condition[1]. Similarly management of thyroid tumors represents a significant workload for the modern head and neck oncologist. The morbidity created by a poorly performed thyroid gland operation can exceed the morbidity caused by leaving some thyroid lesions alone. Apart from post thyroidectomy hypocalcemia[2] and hematoma[3], the recurrent laryngeal nerve paralysis is the most serious complication of surgery in benign and malignant thyroid disease[4]. Although not all post-operative voice disturbances are related to surgical laryngeal nerve injuries[5], symptomatic RLN paralysis has been proved to be a major cause of impaired quality of life[6], besides being a frequent concern of litigation.[7]

The recurrent laryngeal nerve on the right side approaches in thyroid gland from the starting point behind the first part of subclavian artery. It then lies relatively laterally in the first part of its course, but moves medially as it ascends towards the gland, just below the level of inferior thyroid artery, it comes to lie in its classical position of Tracheo-Oesophageal groove. It crosses the inferior thyroid artery either superficially, deeply or between its terminal branches and beyond that part lies immediately posterior-lateral to ligament of Berry before disappearing behind the crico thyroid joint. It is not uncommon for the nerve to divide into two or sometimes three terminal branches. The left recurrent laryngeal nerve lies in tracheo-oesophageal groove throughout its length like the nerve on right & is closely related to inferior thyroid artery and may also divide into two or more terminal branches. The recurrent laryngeal nerve preservation has evolved from an era of non-identification of nerve at all by Billorth and Kocher to mandatory visual recurrent laryngeal nerve identification and in recent years the use of intra operative nerve monitoring is being used as an adjunct to identification of recurrent laryngeal nerve.[8]

MATERIAL AND METHODS

The present study is a prospective study carried out in a tertiary care hospital of SKIMS – Medical College Bemina Srinagar. A total of 120 patients were operated. All the patients were subjected to ultrasonography (USG) and fine needle aspiration cytology (FNAC) of the swelling before surgery. Computed

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tomography (CT) scan was done in all patients with malignant tumors. The female to male ratio was 3:1 and average age of patient was 35 years. Among 120 patients, benign tumor were 74 (61.7%) and malignant tumor were 46 (38.3%). Lobectomy was done in 74 (61.7%), total thyroidectomy was in 40 (33.3%) and complete thyroidectomy was done in 6 (5%) of patients. Thus in all 160 sides were operated. The surgery was done for benign tumor in 74 (61.7%) and malignant tumor in 46 (38.3%) patients. The commonest benign and malignant tumor operated was colloid nodule in 45 (37.5%) and papillary carcinoma 40 (33.3%) respectively. The average size of tumour was.

Table 1 Tumour type in the studied subjects

Tumours	Histopathology Examination	No. of Patients	Total Number (%)
Benign	Colloid nodule	45	74
	Follicular adenoma	29	(61.7%)
Malignant	Papillary carcinoma	40	46
	Follicular carcinoma	6	(38.3%)
	Total	**120**	

Table 2 Operations done in various cases

Operation	No. of Cases	Percentage(%)
Lobectomy	74	61.7
Total thyroidectomy	40	33.3
Completion thyroidectomy	6	5

Functional neck dissection was done in 22 (47.8%)cases and central compartment clearance was done in all cases of malignant tumors. The surgical method comprised of the skin crease incision in lower part of neck. Subplatysmal flaps were elevated to give an adequate exposure. Strap muscles were retracted. After securing adequate exposure, the superior thyroid pedicle was first ligated and superior pole freed from its bed. In the second step the terminal small branch/branches of inferior thyroid artery (ITA) supplying the lower pole were divided. There is always a sufficient room between these branches as they enter the gland and the recurrent laryngeal nerves to secure them without injuring the nerve.

In the next step the gland is retracted in forward and medial direction. This was safely done by the left hand of surgeon using thumb and index finger in highly vascular colloid goiters or using a tissue forcep in less vascular tumors. The assistant was needed to give an adequate retraction so that tissue in the interval between laterally retracted carotid sheath on one hand and trachea on another hand were put under tension.

In the next step extra capsular dissection was carried very close to the gland in the upper part and recurrent laryngeal nerve was easily identified where it enters the larynx. A great care was always taken to ligate an accompanying arterial branch which is very closed to recurrent laryngeal nerve in its upper part. Any blind attempts to secure haemostasis by artery forceps or diathering is bound to injure recurrent laryngeal nerve.

After identifying the nerve, the nerve was traced downwards with minimal dissection and inferior thyroid artery and middle thyroid vein were safely ligated. No transient/permanent paralysis was observed in any patient.

DISCUSSION

Thyroid surgery is a technically specific surgery involving highly detailed anatomy. The recurrent laryngeal nerve is the most important structure at risk during thyroidectomies.[9] Despite many advances in surgical techniques during the last several decades, the risk for recurrent laryngeal nerve injury during thyroid and parathyroid surgery has only declined, not disappeared.[10] In contrast to the first era of thyroid surgery with Kocher and Billorth who tried to avoid exposure of the nerve Frank Lahey[8] of Boston in 1938 and subsequently Riddell[11] independently advocated routine dissection and demonstration of the recurrent laryngeal nerve. The superiority of this approach has been documented by Hemann and Colleagues[12] who reviewed thyroidectomies for Benign disease from 1979 to 1991 (n=15865) and from 1991 to 1998 when visualization of recurrent laryngeal nerve was standard practice. The authors showed that risk for permanent recurrent laryngeal nerve damage in the former group was 1.1% but in the latter group in which visualization of the nerve was standard practice the risk of permanent damage decreased to 0.4%.

Review of literature shows the incidence of recurrent laryngeal nerve paralysis as 4.8% (total patients 20) in 1994, by Jatzko GR[13], 7.6% (total patients 105) in 1997 by Kasemsuwan[14], 3.84% (total patients 418) in 2005 by Ayatac[15], 1.42% (total patients 318) in 2007 by Chaudhary[16], and 0.29% (Total=340) in 2010 by Hazem. M. Zakaria[17]. Despite the decreasing trends, recurrent laryngeal nerve injuries continues to be frequent source of medical malpractice claims against surgeons.[18] Surgeons have therefore sought attempts to try to reduce the injuries to recurrent laryngeal nerve. Recurrent laryngeal nerve monitoring is an attempt to reduce the risk of nerve injury during thyroid and parathyroid surgery. Fernstein[19] first mentioned electromyography (EMG) use in diagnosing disorders of recurrent laryngeal nerve in 1946. Delgado[20] were the first to use EMG intra operatively to identify facial nerve in 1979 but Breman and Colleagues[21] were first to publish their data on recurrent laryngeal nerve monitoring in 2001.

The use of this technology in thyroid surgery has been a much debated topic for years. No consensus exists regarding the intra operative nerve monitoring effectiveness in preventing the recurrent laryngeal nerve damage. Multiple papers have failed to prove with statistical significance that use of intra operative nerve monitoring during thyroid surgery decreases the rate of RLN Palsy and Paresis.[10] A large prospective evaluation study by Dralle H *et al*[22] showed that intraoperative nerve monitoring (IONM) helps during revision surgery, but researches have not proven IONM use to be more effective than nerve identification alone for protecting the nerve during surgery.

Drallee and Colleagues[22] assessed thyroidectomy in 3 groups; no recurrent laryngeal nerve identification, visual identification alone and visual identification plus IONM identification. They concluded that surgeons performing fewer thyroid operations or average, IONM decreased the number of paralysed nerves. However, further examination didn't show any difference in recurrent laryngeal nerve injury rates in last two groups.

Thomusch and Colleagues[23] showed in 2004 with 15,403 at risk nerves that IONM is an adjunct that may be helpful, but it should never replace the meticulous technique of surgeon.

In the present study also nerve identification was strictly followed in all cases and no temporary and permanent paresis was reported. The nerve was identified where it penetrates the larynx in all cases. The same point of identification was followed by Baryran Vey Seller[24] in their comparative surgery

of methods of recurrent laryngeal nerve identification. Two different recurrent laryngeal nerve identification methods were used during thyroidectomies. The first method identified the nerve where it penetrates larynx following superior pedicle ligation and the second method traces the nerve in superior direction after locating it in the tracheo oesophageal groove. In the first group 19 patients underwent lobectomy and 48 total thyroidectomy, in the second group 42 patients underwent lobectomy and 80 underwent total thyroidectomies. Recurrent laryngeal nerve paralysis was not observed in group 1 where as 2 (1.56%) patients in group 2 developed permanent recurrent laryngeal nerve paralysis. The results are consistent with the present study.

Searching the recurrent laryngeal nerve in the tracheo oesophageal groove and following it where it enters the larynx requires more dissection and can lead to parathyroid devascularization which can cause ischemia and necrosis and lead to hypoparathyroidism. The superior-inferior approach to recurrent laryngeal nerve allows the surgeon reach to the region directly and involves less dissection. We observed the same in our study as well.

CONCLUSION

The use of visual nerve identification is safe, less time consuming, recurrent laryngeal nerve was identified in the upper most part of its course where it is very close to the gland and enters into the larynx. By this method no transient or permanent paralysis of nerve occurs in this study.

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