

Anatomical Variations of Recurrent Laryngeal Nerve (RLN) as Seen in Thyroid Surgery

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This is a prospective study of 50 consecutive cases in which Recurrent Laryngeal Nerve (RLN) was explored during various operations on thyroid gland. Ninety percent of the patients were female. Their age ranged from 17 to 60 years with the average age of 38.5 years. Thirty two patients (64%) had Multinodular Goitre (MNG) and 18 patients (36%) had solitary thyroid nodule. Right subtotal lobectomy and isthmectomy was carried out on 21 patients (42%) while 11 patients (22%) underwent left subtotal lobectomy and isthmectomy. Eighteen patients (36%) had subtotal thyroidectomy. A total of 68 nerves were explored. They showed varied pattern of extralaryngeal branches. None of the patients had any iatrogenic injury to the recurrent laryngeal nerve. Routine exploration of the recurrent laryngeal nerve is recommended.

Key Words: Recurrent Laryngeal Nerve, Thyroidectomy.

Recurrent laryngeal nerve (RLN) is an important structure encountered in thyroid and parathyroid surgery. It is the main motor supply of the vocal cords. The integrity and normal functioning of this nerve are mandatory for the production of voice.

Surgical trauma to this nerve is responsible for 20% RLN palsies¹. Unilateral RLN injury can cause hoarseness of voice. Bilateral RLN palsy is a potentially fatal complication. It can cause adductor spasm of both the vocal cords which can choke the patient to death. Victor Riddell views bilateral permanent RLN palsy as a surgical tragedy comparable to surgically induced facial nerve paralysis and possibly more incapacitating and embarrassing than the loss of a lower limb². Furthermore, such a disaster is likely to be followed by the misery of litigation.

The course of RLN in the neck is variable, especially on the right³. A careful surgeon needs to be well aware of these variations to minimize injury to this nerve. Adequate exposure, good illumination and a bloodless field are of paramount importance⁴.

Material and Methods

This was a prospective study conducted at East Surgical Unit of Mayo Hospital, Lahore from June 1996 to December 1997. Fifty consecutive patients of goitre were entered into this study. The status of thyroid gland was evaluated clinically and biochemically. Thyrotoxic patients were made euthyroid before surgery. Indirect laryngoscopy was performed on every patient. Hb, TLC, DLC, Urine C/E, Blood sugar, Blood urea, ECG and X-ray chest was performed where indicated. In some selected patients X-ray thoracic inlet was also requested.

On the operation table, recurrent laryngeal nerve was searched for below the Inferior Thyroid Artery (ITA). It was then traced out to the point where it pierced the cricothyroid membrane. Its relation with the ITA and its extralaryngeal branching patterns were also noted. Meticulous attention was paid to secure haemostasis.

Movements of the vocal cords were checked at the time of extubation. In the ward, voice of the patient was noted.

Results

The recurrent laryngeal nerve was explored in 50 consecutive patients of goitre. Among them 5 (10%) were male and 45 (90%) female. Their ages ranged from 17 to 60 years with the average age of 38.5 years (Table 1). Out of these 50 patients 32 (64%) were of multinodular goitre (MNG) and 18 (36%) were of solitary thyroid nodule (Table 2). All of them proved benign adenomas on excision biopsy. Four patients (8%) were thyrotoxic at presentation. They were made euthyroid before surgery by prescribing antithyroid drugs and beta blockers. The rest were euthyroid to start with (Table 2).

Right subtotal lobectomy and isthmectomy was performed on 21 patients (42%) while 11 patients (22%) underwent left subtotal lobectomy and isthmectomy. Eighteen patients (36%) had subtotal thyroidectomy (Table 3). A total of 68 nerves were explored comprising of 39 nerves (57.35%) on the right and 29 nerves (42.65%) on the left side of the neck. Sixty seven nerves (98.53%) were recurrent and one (1.47%) was non-recurrent inferior laryngeal nerve. Forty nerves (58.82%) traveled as a single trunk in the neck and 25 nerves (36.75%) branched into two extralaryngeally. In 3 instances (4.41%) the nerve divided into three branches (Table 4).

Table 1 Age and sex distribution

Age in years	Males	Females
11-20	Nil	5
21-30	Nil	15
31-40	2	10
41-50	1	11
51-60	2	4

The nerve or its branches passed anterior to the inferior thyroid artery (ITA) in 16 cases (23.53%) and posterior to it in 44 cases (64.21%). In 5 cases (7.35%) the nerve

passed through the branches of ITA. The ITA was absent in 3 cases (4.41%), one on the left side and two on the right side of the neck (Table 5).

Table 2 Clinical types of goitre

Type of Goitre	n=	Male	Female	Euthyroid	Thyrotoxic
MNGs	32	-	32	28	4
Solitary nodules	18	5	13	18	-

MNGS = Multinodular goitres. n = Total number

Table 3 Surgical procedures performed

Name of the procedure	n=	%age
Right subtotal lobectomy and isthmectomy	31	42
Left subtotal lobectomy and isthmectomy	11	22
Subtotal thyroidectomy	18	36

n = Total number

Table 4 Branching pattern of the nerve

Branching pattern	n=	Left	Right
Single trunk	40(58.82%)	15(22.06%)	25(36.76%)
Two branches	25(36.75%)	13(19.12%)	12(17.65%)
Three branches	3(4.41%)	1(1.47%)	2(2.94%)

n = Total number

Table 5 Relationship of the nerve and its branches with the inferior thyroid artery (ita)

Relationship	n=	Left	Right
Anterior to the ITA	16 (23.53%)	6 (8.82%)	10 (14.71%)
Posterior to the ITA	44 (64.71%)	21 (30.88%)	23 (33.82%)
In between branches of ITA	5 (7.35%)	5 (7.35%)	
Absent ITA	3 (4.41%)	1 (1.47%)	2 (2.94%)

n = Total number

Discussion

Surgical treatment of thyroid disease has become very much safe in modern times. It is associated with very limited morbidity in majority of the current series^{5,6}. Meticulous attention to detailed anatomic and technical knowledge, and experience are essential ingredients needed to perform careful thyroid and parathyroid surgery³.

Extralaryngeal branching of the RLN occur frequently. Branching may start near the origin of the nerve from the vagus nerve, but generally it begins after RLN has crossed the ITA, and becomes more frequent as the nerve approaches the cricothyroid membrane. The extralaryngeal branches may vary from one to six⁷. Non-

recurrence of the inferior laryngeal nerve is a rare anomaly on the right side and quite exceptional on the left side, but overlooking its possibility may lead to severe operative morbidity^{8,9,10,11}. This is an additional argument in favour of systematic dissection of the inferior laryngeal nerve¹². Inferior Thyroid Artery (ITA) has a very close relationship with the RLN (except in the rare cases when the nerve is not recurrent or the ITA is absent)¹³. The most usual relationship is for the nerve to pass posterior to the artery, but it may pass anterior to, or in between the branches of the ITA. Sometimes the relationship differs on the two sides. It is rare for the nerve to divide below the ITA. Hence, it is safer to search for the RLN below the ITA, where the nerve trunk is single, rather than looking for it superiorly where there may be multiple branches of the nerve¹³. Thus, it seems obvious that to be safe, any thyroid surgeon must include identification and preservation of the recurrent laryngeal nerves and their branches. By adopting this technique, we can reduce the morbidity associated with the thyroid surgery.

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