Original Article

Anatomical Relation Between Inferior Thyroid Artery and Recurrent Laryngeal Nerve- A Study of 50 Cases In CMH Rangpur

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Abstract:

Introduction: Thyroid surgery is a very common treatment modality done for both benign and malignant thyroid disorders. It has excellent prognosis. Relationship between inferior thyroid artery (ITA) and recurrent laryngeal nerve (RLN) is crucial in preservation of recurrent laryngeal nerve. Thorough anatomical knowledge and meticulous surgery will ensure the integrity of recurrent laryngeal nerve. **Objective:** The purpose of this study is to observe the anatomical position of recurrent laryngeal nerve in relation to inferior thyroid artery which will eventually lead to identification of recurrent laryngeal nerve peroperatively. **Material and methods:** A cross sectional retrospective study was conducted during the time period of 1st July 2021 to 30st June 2023 in Combined Military Hospital, Rangpur on 50 patients who had undergone total thyroidectomy. **Results:** In this series it was found that in 78% cases RLN was dorsal to ITA, 20% cases it is ventral and in 2% cases RLN runs in between the branches of ITA in right side. In case of left side 88% cases RLN was dorsal to ITA, 8% cases it is ventral and in 4% cases RLN runs in between the branches of ITA. **Conclusion:** Usually RLN runs dorsal to ITA. In left side it is deeper and in case of right side it is more superficial. RLN may pass through the branches of ITA, but it is not very common.

Keywords: Recurrent laryngeal nerve, Inferior thyroid artery

Introduction:

In initial period thyroid surgery was associated with higher morbidity. Subsequently it was well understood that RLN, parathyroids and external branch of superior laryngeal nerve has to be preserved.[1]Anatomical relationship between RLN and ITA is very important in order to preserve the RLN[2,3]. Mostly the morbidity is due to technical failure (inadequate anatomical knowledge ,lack of surgical skill & experience, distorted anatomy as in cancer & large multinodular goiter) to identify the vital structures and the variations in the surgical anatomy. Several studies have been published revealing the anatomy of the RLN in thyroid surgery.

The Inferior thyroid artery (ITA) normally arises from the thyrocervical trunk[4]. It is a branch off first part of subclavian artery[5]. Past Studies have reported the incidence of origin of the ITA from the vertebral artery and internal thoracic artery. Absence of ITA (unilateral Or bilateral) have also been reported in previous studies.[6-10]

The recurrent laryngeal nerves branch from the vagus nerve, relative to which they get their names; the term "recurrent" from Latin: re- (back) and currere (to run), indicates they run in the

opposite direction to the vagus nerves from which they branch. The vagus nerves run down into the thorax, and the recurrent laryngeal nerves run up to the larynx.

The vagus nerves exit the skull through the jugular foramen and travel within the carotid sheath dorsal to the carotid artery. After arising from vagus the RLN hooks around the aortic arch on the left side and the subclavian artery on the right side.[11]

Both RLN and ITA may be branching or non branching mostly branching of RLN occurs after crossing the ITA 1 cm below the cricothyroid joint. RLN may be related dorsally, ventrally or in between branches of ITA.

Materials and methods:

This descriptive study based on the retrospective data was conducted at Combined Military Hospital, Rangpur during the period of July 2021 to June 2023. Total 50 cases were studied. Approval of the Institutional Ethical committee was obtained for publishing the study. All patients gave informed written consent prior to study. Patients who were operated for benign goitres including toxic goitres and thyroid cancers were included. The surgical findings were recorded in predesigned "Operation notes" register. Charts of the patients both male and female in the age range from 12 to 74 years were reviewed and operation notes analyzed. Required data regarding exploration of RLN and its relationship to ITA were retrieved. Data thus obtained were analyzedusing SPSS - 16 for testing the significance of data, Pearson chi square was used as test of significance. A p - value of <0.05 was considered statistically significant.

Results:

Out of total 50 patients operated, 18 were male and 32 were female. The age range of the patients was 12–74 years.

Table-I: Shows branching pattern of RLN and ITA

	Right		Left	
	Non branching	Branching	Non branching	Branching
RLN	82%	18%	86%	14%
ITA	56%	44%	58%	42%

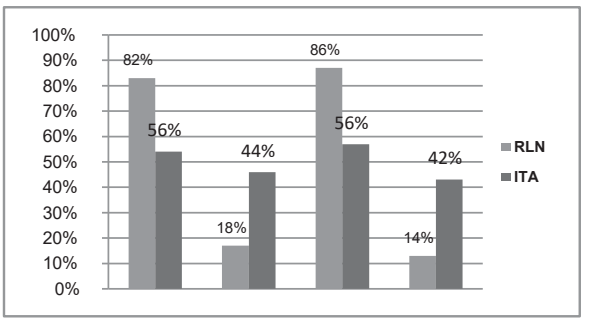

Figure-1: Bar diagram of branching pattern of RLN and ITA

Table-II RLN ventral to the ITA 20% in right side and 8% in left side, dorsal to ITA 78% in right side and 88% in left side, In between branches of ITA 2% inright side and 4% on left side.

RLN	Non branching ITA	
	Right (%)	Left (%)
Ventral to ITA	20	8
Dorsal to ITA	78	88
Between branches of ITA	2	4

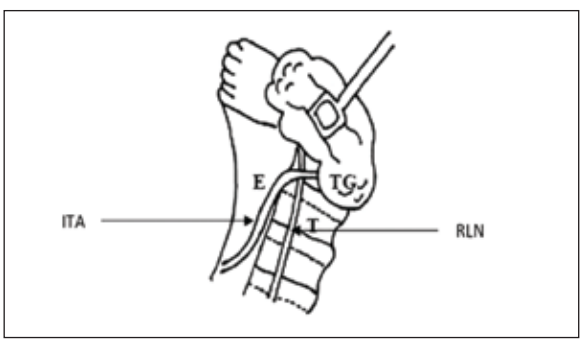

Figure-2: Showing non branching RLN dorsal to ITA

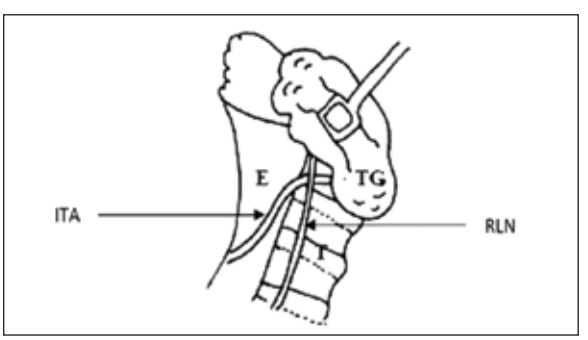

Figure-3: Showing non branching RLN ventral to ITA

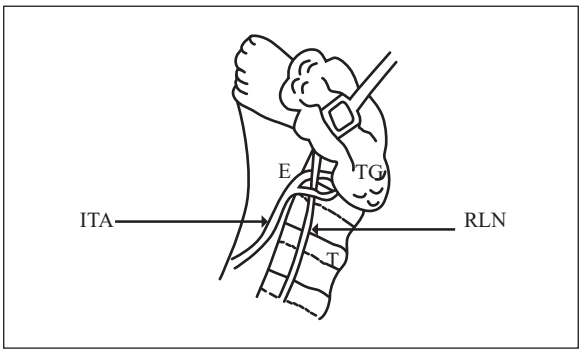

Figure-4: Showing non branching RLN in between ITA

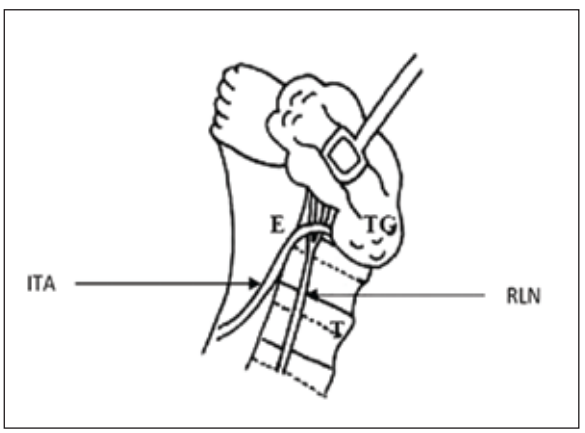

Figure-5: Showing non branching RLN in between ITA

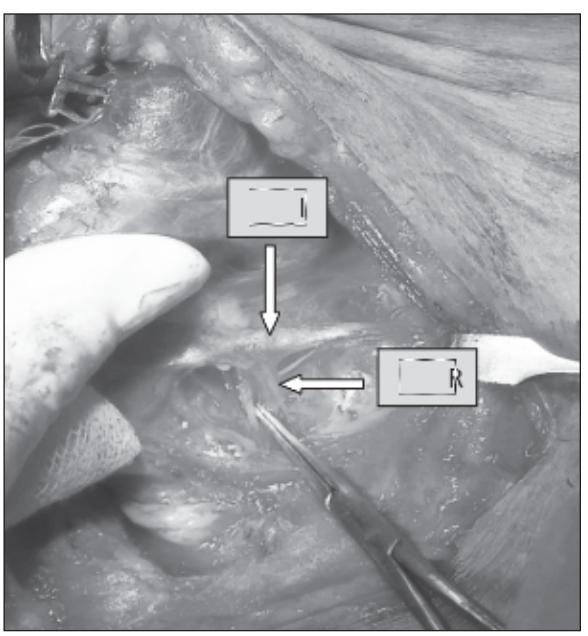

Figure-6: Showing RLN passing dorsal to ITA (left side).

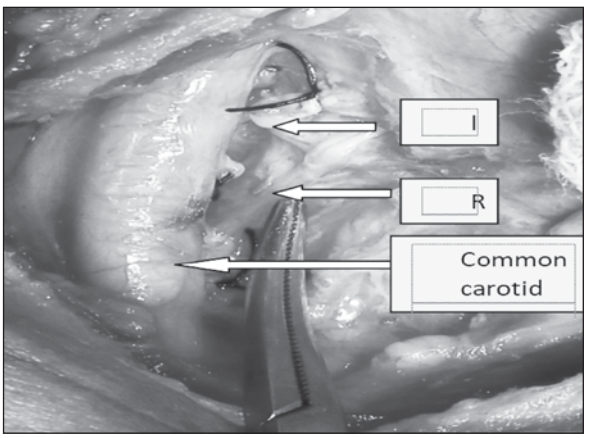

Figure-7: Showing RLN passing ventral to ITA (right side).

Discussion:

Due to high associated morbidity and mortality, thyroid surgery was limited to very few indications in the initial days of nineteenth century. Great evolution occurred with advent general anaesthesia and improved antiseptic measures. Also anatomical knowledge about the vital structures related to the gland improved. This brought down the complication rate associated with thyroid surgery. The morbidity of thyroid surgery has decreased to less than 1%.

Most authors recognize 3 types of relationships between the RLN
and the ITA, as follows:[2,12,13]
a) RLN anterior to ITA
b) RLN posterior to ITA
c) RLN between branches of ITA.

The relationship of the RLN and inferior thyroid artery has shown a regional variation.[14]A study from China showed that 80% of right and 91.5% of left RLNs to travel posterior to inferior thyroid artery.[15] A Brazilian study observed that in most instances RLN travel through the branches of inferior thyroid artery.[16] Furthermore, absent inferior thyroid artery was detected in 4% instances.[17]

Another variation described is a double inferior thyroid artery. Jiri Sedy reported a case of doubled inferior thyroid artery on the right side. He also found an accessory thyroid artery arises from subclavian artery.[18]In present study no such variation was observed.

In our study we found RLN has non branching pattern in 82% in right side and 86% in left side. It is branched in 18% in right side and 14% in left side. ITA has non branching pattern in 56% in right

side and 58% in left side. It is branched in 44% in right side and 42% in left side. We found RLN ventral to the ITA 20% in right side and 8% in left side, RLN dorsal to ITA 78% in right side and 88% in left side, finally we observed RLN in between branches of ITA 2% in right side and 4% in left side.

Conclusion:

The gold standard for preservation of the recurrent laryngeal nerve during thyroid surgery is still visual anatomical identification. Other techniques may be used only as an adjunct to the gold standard. Identification of the RLN and its branches should be done prior to the clamping of the ITA and all its branches. It can be idenfied in Beahr,s triangle, by tubercle of Zuckerkandle or in triangle of Lore.[19,20]. In a setting where advances in technology are not readily available, the surgeon must have adequate knowledge about the variations in the neurovascular anatomy of the thyroid gland as well as necessary skill to prevent complications of surgery.

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