

A STUDY ON THE VARIATIONS IN THE RELATIONSHIP BETWEEN THE RECURRENT LARYNGEAL NERVE AND THE VASCULAR PEDICLE OF THE THYROID GLAND

J. Thilagavathi ^{*1}, V. Anandhi ², Sudha Seshayyan ³.

^{*1} Associate Professor of Anatomy, Government Stanley Medical College, Chennai, Tamil Nadu, India.

² Associate Professor of Anatomy, KAPV Government Medical College, Tiruchirappalli, Tamil Nadu, India.

³ Director of Anatomy, Madras Medical College, Chennai, Tamil Nadu, India.

ABSTRACT

Background: A sound knowledge of normal human anatomy and common variations in it is very important for a surgeon operating on the neck because it is one of the most difficult areas to operate upon, there being very little space in this region. The recurrent laryngeal nerve (RLN) and inferior thyroid artery (ITA) are in close proximity to each other, and are greatly liable to be included in a ligature, crushed by an instrument or stretched during mobilization of the thyroid gland. Hence this study was carried out to observe the variations in the relationship of the recurrent laryngeal nerve to the vascular pedicle of the thyroid gland.

Materials and Methods: The recurrent laryngeal nerve was dissected in 20 embalmed cadavers from the department of Anatomy, Government Stanley Medical college and 15 post-mortem en-bloc specimens, from the Institute of Forensic medicine, Government Stanley medical college. The origin of 70 recurrent laryngeal nerves and their relation with inferior thyroid artery and its branches were dissected and noted. The results were tabulated and analyzed by tests for the significance of the difference in the proportions.

Results: On the right side, the recurrent laryngeal nerve was found in between the branches of the inferior thyroid artery in 51%, posterior to the inferior thyroid artery in 37% and anterior to the inferior thyroid artery in 11% of specimens. And on the left side, the recurrent laryngeal nerve was found 51.4% posterior to the inferior thyroid artery, 28.6% in between the branches of the inferior thyroid artery and 20% anterior to the Inferior thyroid artery. The Chi – Square test, showed statistically significant difference in the relationship of the recurrent laryngeal nerve to the Inferior thyroid artery in the right and left side. ($P < 0.003$)

Conclusion: The significant variations observed in the relationship of the recurrent laryngeal nerve to the Inferior thyroid artery on the right and left side would be important for surgeons who are doing thyroidectomy and any vascular surgery in the neck. A thorough knowledge of the laryngeal nerves and anatomical variations is necessary for safe thyroid surgery.

KEY WORDS: Recurrent laryngeal nerve, Vagus nerve, Inferior thyroid artery, Chi-square test.

Address for Correspondence: Dr. J. Thilagavathi, Associate Professor of Anatomy Government Stanley Medical College, Chennai, Tamil Nadu, India. Mobile: +919941239977

E-Mail: anatomydrthilaga@yahoo.com

Access this Article online

Quick Response code



DOI: 10.16965/ijar.2016.307

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 11 Jul 2016	Accepted: 09 Aug 2016
Peer Review: 11 Jul 2016	Published (O): 31 Aug 2016
Revised: None	Published (P): 31 Aug 2016

INTRODUCTION

Recurrent laryngeal nerve is a branch from vagus nerve which supplies all intrinsic

muscles of the larynx except cricothyroid and the mucous membrane below the level of the vocal cord. It also gives off cardiac branches

near its origin and supplies the trachea, oesophagus and the inferior part of the pharynx [1].

At the root of the neck, right recurrent laryngeal nerve arises from the vagus anterior to the first part of the right subclavian artery and curves backwards below and then behind it to ascend obliquely to the side of the trachea. Left recurrent laryngeal nerve arises from the left vagus on the left of the aortic arch, curves below it immediately behind the attachment of the ligamentum arteriosum and ascends to the side of the trachea or in the tracheo-oesophageal groove. The nerve then passes among the branches of Inferior thyroid artery to the lobe of the thyroid gland and enters the larynx deep to the inferior border of the inferior constrictor muscle.

At the lower pole of the thyroid gland, the recurrent laryngeal nerve is intimately related to the terminal branches of the inferior thyroid artery. Variations in the relationship are of surgical importance [2].

The course and relationship of the recurrent laryngeal nerve with Inferior thyroid artery and its branches depends on the pattern of development of the arteries [3]. The relation of the recurrent laryngeal nerve with inferior thyroid artery and its branches is highly variable making it vulnerable to injury during surgical manipulation of the neck, especially in the surgeries involving the thyroid gland[4]. Nowadays surgeons do routine identification and dissection of recurrent laryngeal nerve to reduce its injury risk [5]. This is one of the important criteria for operating surgeons because of the serious functional sequelae that include voice changes with respiratory embarrassment.

The current evaluation of outpatient short stay thyroid surgery and minimally invasive video assisted thyroid lobectomy using laparoscope to avoid scar in the neck requires a very precise knowledge of the normal and variant anatomy [6,7]. Hence a study of the recurrent laryngeal nerve and its variations was undertaken.

MATERIALS AND METHODS

Recurrent laryngeal nerve was dissected in 20 cadavers used for routine dissection by MBBS students in the department of Anatomy, Govt

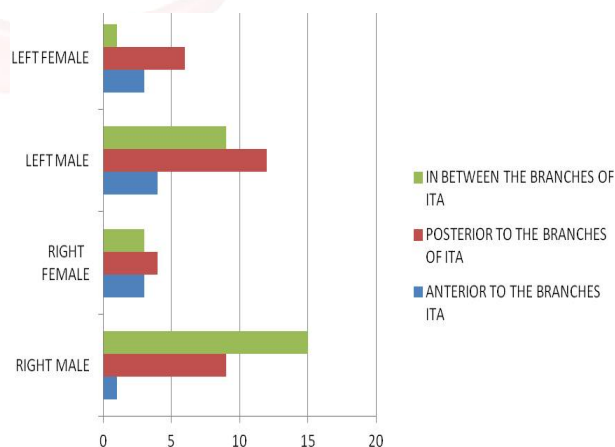
Stanley medical college and 15 post-mortem enbloc specimens, from the Institute of Forensic medicine, Government Stanley medical college. The dissection was carried out according to the methodology prescribed in the Cunningham's practical manual. The skin was incised, reflecting superficial fascia, platysma, deep cervical fascia and exposing sternothyroid, omohyoid, sternomastoid, the origin of recurrent laryngeal nerve was noted. Its relation with inferior thyroid artery and its branches observed. Statistical analysis was done using chi-square test.

RESULTS

Table 1: Relation of the recurrent laryngeal nerve to the inferior thyroid artery and its branches.

SIDE OF THE NECK	SEX	FREQUENCY	Anterior to the branches of the inferior thyroid artery	Posterior to the branches of the inferior thyroid artery	In between the branches of the inferior thyroid artery
RIGHT SIDE	Male	25	1	9	15
	Female	10	3	4	3
LEFT SIDE	Male	25	4	12	9
	Female	10	3	6	1

Graph 1: Graph showing the relation of the recurrent laryngeal nerve to the inferior thyroid artery and its branches in the present study.



Out of 70 recurrent laryngeal nerves dissected, it was noted that on the right side, the recurrent laryngeal nerve was found 51% in between the branches of the inferior thyroid artery, 37% posterior to the inferior thyroid artery and 11% anterior to the inferior thyroid artery. And on the left side, the recurrent laryngeal nerve was found 51.4% posterior to the inferior thyroid artery, 28.6% in between the branches of the inferior thyroid artery and 20% anterior to the Inferior

thyroid artery. The Chi – Square test, showed statistically significant difference in the relationship of the recurrent laryngeal nerve to the Inferior thyroid artery in the right and left side. ($P < 0.003$). The rare anomalies viz., non recurrent laryngeal nerve, absence of inferior thyroid artery were not seen in any cases in the present study.

DISCUSSION

The present study was done with 35 cadavers from the Department of Anatomy & Institute of forensic medicine, Government Stanley medical college, to observe the variations of the recurrent laryngeal nerve and its relation with inferior thyroid artery and its branches.

The findings of the study have been found to be on par with most of the studies which were conducted in various set ups in India and other parts of the world.

On the right side, recurrent laryngeal nerve was seen in between the branches of inferior thyroid artery in 51.4% (18 out of 35), posterior to the inferior thyroid artery in 37.1% (13 out of 35) and anterior to the inferior thyroid artery in 11.4% (4 out of 35) – Table 1 & Graph.

On the left side, recurrent laryngeal nerve was seen posterior to the inferior thyroid artery in 51.4% (18 out of 35), was seen in between the branches of inferior thyroid artery in 28.6% (10 out of 35) and anterior to the inferior thyroid artery in 20% (7 out of 35) – Table 1 & Graph.

There was no case of “Absence of recurrent laryngeal nerve” in the present study, which is a very rare anomaly.

When both sides are compared out of 70 recurrent laryngeal nerves, 11(15.7%) were found anterior to ITA, which coincides with John.E.Scandalaki’s et al., study(1976)[4] 31(44.3%) out of 70 RLN were found posterior to ITA which coincides with Fowler and Hansen study (1929)[8] and John.E.Scandalakis et al.,study(1976)[4], Takkallapalli Anitha study (2014)[9], Saadeldin A. Idris (2013) [10].

28(40%) out of 70 RLN were found in between the branches of ITA which coincides with Fowler and Hansen study (1929)[8] and John.E.Scandalaki’s et al., study(1976)[4].

CONCLUSION

There was no non-recurrent laryngeal nerve in any case in the present study. The recurrent laryngeal nerve is at high risk when it is posterior to or in between the branches of the inferior thyroid artery. 44.3% RLN lies posterior to ITA and 40% in between the branches of ITA. This knowledge is very valuable in preventing iatrogenic injury to RLN and ITA.

Conflicts of Interests: None

REFERENCES

- [1]. Susan Standring, Gray's Anatomy. The Anatomical basis of clinical practice, 39th edition. 1858; p-557.
- [2]. Sudha Seshayyan, IB Singh's text book of anatomy 2016; 6th edition-vol 3, p-309.
- [3]. Gray SW, Skandalakis JE, Akin JT; Embryological considerations of thyroid surgery: developmental anatomy of the thyroid, parathyroid and the recurrent laryngeal nerve. *Am surg.* 1976;42:621-628.
- [4]. John E. Scandalaki's M.D., et al. The recurrent laryngeal nerve; *American journal of surgery*, Sep(1976), vol.42:629-634.
- [5]. Chiang FY, Wang LF, Huang YF, Lee KW, Kuo WR Recurrent laryngeal nerve palsy after thyroidectomy with routine identification of recurrent laryngeal nerve. *Surgery*, 2005;137(3):342-347
- [6]. Idris SA, Shalayel MH, Idris TA, Qurashi AM. Outcomes and complications of thyroid surgery among the Sudanese patients. *Sudan Medical Monitor*, 2008;3:143-148.
- [7]. Hisham AN, Lukman MR; Recurrent laryngeal nerve in thyroid surgery: A critical appraisal. *ANZ J Surg.*, 2002;72(12):887-889.
- [8]. Fowler H, Hanson W. Surgical anatomy of the thyroid gland. *Surg Gynecol Obstet.*, 1929;49:59-65.
- [9]. Takkallapalli Anitha. Clinically Relevant Variations of Recurrent Laryngeal Nerve. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 2014;13(9)Ver. II:59-62.
- [10]. Saadeldin A. Idris study-Incidence and Variations in the Relationship Between the Recurrent Laryngeal Nerves to the Inferior Thyroid Arteries in Sudanese Subjects -Sch. J. App. Med. Sci., 2013;1(5):575-580.

How to cite this article:

J. Thilagavathi, V. Anandhi, Sudha Seshayyan. A STUDY ON THE VARIATIONS IN THE RELATIONSHIP BETWEEN THE RECURRENT LARYNGEAL NERVE AND THE VASCULAR PEDICLE OF THE THYROID GLAND. *Int J Anat Res* 2016;4(3):2689-2691. DOI: 10.16965/ijar.2016.307