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

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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.

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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 en bloc 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.

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<tr>
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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.Scandalakis’ 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].

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


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