

Research Article

A study of neurovascular variations of the thyroid gland

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Abstract :

Thyroid gland with all its varied presentations makes an interesting subject to compare and study its anatomical variations. The neurovascular structures around the thyroid gland is complex to understand and it is worthwhile to spend time to get around this complexity and to debunk certain myths about the middle thyroid vein and its impact in clinical practice. Careful evaluation of the course and relations of the recurrent laryngeal nerve goes a long way in prevention of dreaded recurrent laryngeal nerve injury during surgery.

Key words – middle thyroid vein, recurrent laryngeal nerve, thyroidectomy, variations

INTRODUCTION

Historically thyroid surgeries were known to have disastrous effects and not to mention a high mortality rate. The main concerns those days were intraop and postop bleeding, infections and injury to the recurrent laryngeal nerve. The recent years represent an industrious period of relentless technical research and improvement in endocrine surgery. As volumes have been written on thyroid surgeries, the first step is to ligate the middle thyroid vein (MTV) and then proceed with the rest of the surgery. In practice, how often does one come across a middle thyroid vein? A knowledge of the path and anatomical variations of the recurrent laryngeal nerve (RLN) helps in eliminating a possible nerve injury. The scope of this study is to bring out the incidence of a middle thyroid vein and the varied presentation of the RLN.

AIM

To bring out the actual incidence of the middle thyroid vein and the variations of the recurrent laryngeal nerve in terms of its relative position and relation to the inferior thyroid artery (ITA) in patients undergoing thyroid surgeries

METHODOLOGY AND RESULTS

The study materials were all patients who underwent thyroid surgeries (sub-total and total) in our hospital. Patients with a history of previous surgeries in the neck, including history of previous thyroid surgeries were excluded from the study. Total number of patients in the study was 125. The study was conducted in a single center, and cases were all those operated in the department of general surgery. A single observer would investigate and enter the intraoperative findings of presence or absence of MTV, identify the RLN and make observations regarding its course and relation to the trachea and inferior thyroid artery.

Of the total 125 patients, 73 underwent total thyroidectomy and 52 underwent sub-total thyroidectomy. The findings were as follows, the MTV was seen on both sides in 17 patients (13.6%) of the 125. It was present unilaterally in 25 (20%) patients. Of these 25 patients with unilateral MTV, 11 were on the right side and 14 on the left. The MTV was absent in 83 (66.4%) out of 125 patients in the study. Considering that there should be at least two MTVs in each patient, in 125 patients it mounts to 250 in number, the total number of veins found was 59 (23.6%). Of this 59 veins encountered only 6 veins were short and broad with an incidence of 10.1%. The RLN on the right side with respect to the trachea was seen running in the tracheoesophageal groove (TEG) in 72 patients (57.6%), lateral to trachea in 50 patients (40%) and anterior to trachea in 3 (2.4%). In relation to the ITA it was seen running behind the artery in 85 patients (68%), in front in 35 patients (28%) and through the terminal branches of the artery in 5 patients (4%). The RLN on the left side had similar findings, in 78 patients (63.4%) running in the TEG, lateral to trachea in 43 (34.4%) and anterior to trachea in 4 patients (3.2%). In relation to ITA it was behind the artery in 95 patients (76%), in 27 patients (21.6%) and 3 patients (2.4%) of the nerve running through the terminal branches of ITA.

DISCUSSION

It is now evident that the thyroid gland is known to have anatomical variations. The MTV is a short thin walled vessel (fig 3) leaving the middle of the gland to run horizontally to join the internal jugular vein¹. The MTV is not known to have an exhaustive list of variations. Literature has it that one may come across a double MTV, more importantly its also been documented that the MTV is not present in all individuals. The MTV is the first vascular structure to be encountered just at the commencement of mobilization of the gland during thyroidectomy¹. The thyroid gland is retracted anteriorly and medially, this maneuver (fig 2) brings the vein into a full view, making it taut hence facilitating dissection and ligation after. The current known incidence is just over half the patients have a MTV². Considering all the variations of the MTV, the vein being absent in most occasions, there is no reason for the surgeon to be devoted in identifying the MTV, if the actual incidence is going to be as low as 23.6%. The occurrence of a short and stout vein was only 10.1% of all sightings of the middle thyroid vein. Hence it can be boldly advocated that the thyroid gland be delivered by the finger swipe technique (fig 1) and the surgeon need not be too worried about bleeding. The MTV has been given the importance of the first major vessel to be ligated during thyroidectomies; all for a theoretically safer operating field as far as bleeding is concerned. It was also noted that there was no significant increased bleeding either intraop or postop in those cases in which the MTV was absent thereby excluding the faint possibility of a missed vein.

The RLN often lays posterolateral to the ligament of Berry, but it is not infrequent that it is embedded in the fibrous connections of the ligament itself. Pelizzo has described the tubercle of Zuckerkandl as a constant anatomical landmark to facilitate identification of the RLN during surgery³.

In the standard anatomical relationship the tubercle of Zuckerkandl is lateral to the RLN. An uncommon, but high risk anatomic arrangement occurs when the RLN is lateral to the tubercle. During retraction of the thyroid lobe medially during surgery, the RLN may be visualized anterolateral to the tubercle. If the surgeon is unaware of this possibility (which often exists when the tubercle has undergone nodular enlargement), the nerve is subject to iatrogenic injury.

According to Titcher⁴ thyroidectomy accounts for 35.7% of surgical causes of injury to RLN and 3.7 % of all causes. The incidence of injuries ranges from 0-12 % in various

published series. Some authors ⁵ defend the display of RLN only in specific situations; most agree that the routine display of the nerve is essential for its protection. There was no report of any injury to the RLN during this study, confirmed by checking the mobility of the vocal cords during extubation and postoperative hoarseness of voice. This study was based on a routine identification of the RLN. Though there was no study group where the nerve was not exposed, the absence of any sort of nerve injury is convincing that it is safer for the RLN to be identified, thereby giving the surgeon a real time area of caution. Lahey ⁶ routinely displayed the RLN in 3000 cases obtaining a reduction in incidence to just 0.3 %.

The knowledge of the relationship between the RLN and ITA is important for the exteriorization of the thyroid lobe. Most authors beyond the classic anatomy textbooks, recognize three types of relationship between the RLN and the ITA⁷, the same was incorporated in this study. Analysing 17 studies, which reported this relationship, 16 showed that the RLN is more frequently located posterior to the ITA. The incidence of the nerve running thorough the terminal branches of the artery was much less compared to the results of other authors ^{8,9}.

As noted in the study the nerve has a variable course with respect to the trachea. The results of right and the left sides where comparable. The highest incidence was noted with the nerve running in the TEG and to a lesser extent laterally along the trachea. It is uncommon to see the RLN running anterior to the trachea. It has to be noted that it is rather uncommon but not impossible to find the nerve anterior to trachea. These results where similar to the available data published ¹⁰.

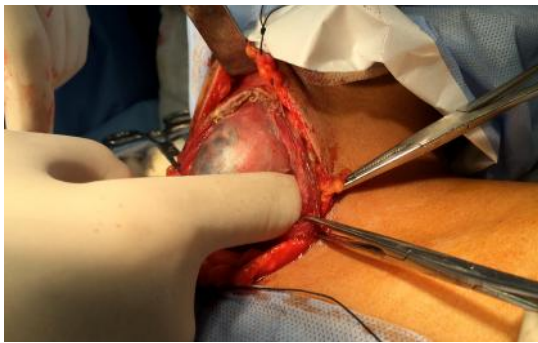


Fig 1: finger swipe technique to deliver the goitre

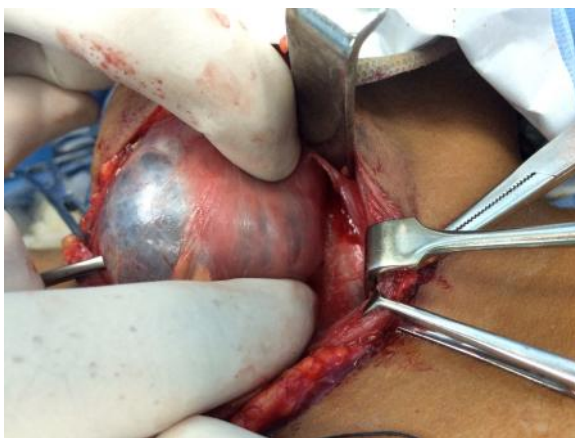


Fig 2: maneuver to visualize the posterolateral aspect of the gland

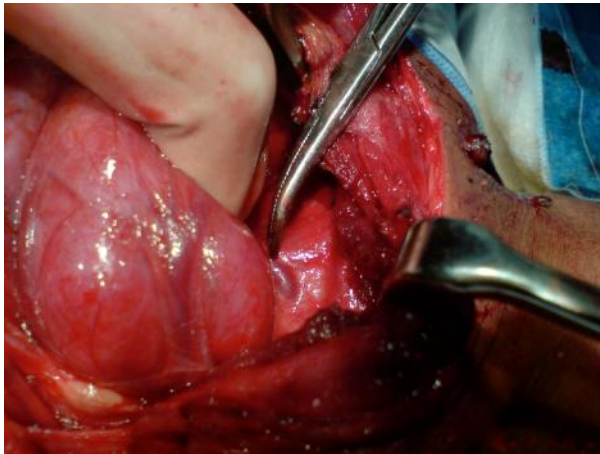


Fig 3: short broad middle thyroid vein draining into the IJV

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