

## Importance of Tubercle of Zuckerkandl in Thyroid Surgery

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### ABSTRACT

**Aim and objective:** To study the incidence, grading, classification of Zuckerkandl tubercle and its relation to recurrent laryngeal nerve during thyroid surgery.

**Methodology:** A prospective study was carried out on 50 patients undergoing thyroidectomy between 17-58 years of age in the Department of General Surgery of SCB Medical College and Hospital, Cuttack during the period from July 2014 to January 2016. All the patients were subjected to detailed history taking followed by thorough clinical examination. Patients were investigated by routine biochemical test, Thyroid Function Test (TFT), Ultrasound (USG) of neck, X-Ray of neck, X-Ray of chest, fine needle aspiration and cytology (FNAC). In some cases CT Scan of neck was done. Surgical anatomy was evaluated and documented in each case. Zuckerkandl Tubercle (ZT) was dissected and its relation with recurrent laryngeal nerve (RLN) was determined.

**Results:** There were 34 female and 16 male patients. Out of 50 cases we have 16 no. Of total thyroidectomies, 20 right hemithyroidectomies and 14 left hemithyroidectomies. ZT was identified in 34 cases, 20 on right lobe and 14 on left lobe. Out of 16 total thyroidectomy 8 had bilateral ZT, 2 right ZT and 2

left ZT. Out of 20 right hemithyroidectomy 12 had right ZT. Out of 14 left hemithyroidectomy 10 had left ZT.

**Conclusion:** Recurrent Laryngeal Nerve was identified with the help of inferior thyroid artery (ITA) and Zuckerkandl tubercle in 68% of cases for safety. RLN could be safeguarded with the help of ZT in this series of cases along with ITA.

**KEY WORD:** Zuckerkandl's tubercle, Recurrent Laryngeal Nerve, Thyroidectomy, Inferior thyroid artery.

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### INTRODUCTION

Thyroid surgery is a common practice amongst general surgeons and more specifically endocrine surgeons. It requires thorough anatomical and embryological knowledge to safely perform this surgery. Safety and adequacy of thyroid surgery has always been a topic of discussion and concern for surgeons engaged in thyroidectomy. Structures of embryological importance such as remnant of thyroglossal duct, pyramidal lobe, ZT, ligament of berry, thyrothymic rest are all important parts of thyroid gland. Each has its importance in performing thyroid surgery and also safeguarding important structures. ZT is an anatomical structure which is constantly encountered in thyroid surgery but very little significance has been attached to this important thyroidal structure, though it is helpful as a pointer in finding out RLN in early part of surgery. Also in the vicinity of ZT the RLN is superficial, lateral or embedded in thyroid tissue.

Emil Zuckerkandl (1849- 1910) an Austrian anatomist described Zuckerkandl tubercle. Zuckerkandl's tubercle (ZT) is defined as posterior extension of lateral lobes, composing of thyroid tissue only [1]. Identification of recurrent laryngeal nerve is the important step in present day thyroid surgery.

Earlier inferior thyroid artery was taken into consideration for identification of RLN. Nowadays researchers have studied

Zuckerkandl tubercle elaborately and its relation with RLN and parathyroid gland has been established. The surgical importance of ZT can be summarized as:

1. Dissection and excision of ZT for total thyroidectomy.
2. Close relationship between ZT and RLN.

In our study we have attempted to record the data of the ZT as regards to its size, shape, lobe and proximity and relation to RLN. Besides, safe thyroid surgery requires preservation of RLN, which is possible by identification of RLN and ZT acts as pointer in identifying RLN due to its location and its relationship with RLN.

### MATERIALS AND METHODS

A prospective study about surgical anatomy of thyroid was conducted on 50 patients undergoing thyroidectomy between July 2014 to January 2016 in the department of surgery, SCB Medical college and hospital, Cuttack. A detailed history and physical examination was carried out followed by haematological and radiological studies. FNAC was performed in all the cases. Patients also underwent ultrasonography of neck. In some cases CT scan of neck was also carried out. Patients underwent thyroid surgery (lobectomy, hemithyroidectomy, total thyroidectomy, total

thyroidectomy with modified radical neck dissection) for various thyroid pathology i.e., Solitary thyroid nodule. Multinodular goitre, colloid goitre, papillary carcinoma and follicular carcinoma. All operations were performed by a single surgeon in order to provide a standard dissection. The significant objectives of this study are the presence and incidence of ZT and its relation with RLN. After medially mobilizing the lateral lobes of thyroid gland with classical surgical approach, inferior thyroid artery was identified.

During surgical dissection of posterolateral aspect of thyroid presence of distinct and prominent ZT was noted. Anatomical aspects of ZT were studied i.e., size, shape, lobe, position, grade and its positional relationship with RLN.

RLN was identified and its relation with ZT was established. During these surgeries special emphasis was given to identification of RLN with the help of ZT and the relation of Tubercle of Zuckerkandl with RLN were studied.

**Table 1: Patient Data.**

<b>TOTAL NO OF PATIENTS</b>	<b>50</b>
<b>FEMALE</b>	34
<b>MALE</b>	16
<b>AGE RANGE</b>	17-68 YEARS
<b>NO OF TOTAL THYROIDECTOMY</b>	16
<b>NO OF HEMITHYROIDECTOMY</b>	34
<b>LEFT HEMITHYROIDECTOMY</b>	14
<b>RIGHT HEMITHYROIDECTOMY</b>	20

**Table 2: Grading Of ZT On The Basis Of Classification By Pelizzo et al.**

<b>GRADING</b>	<b>RIGHT(n=22)</b>	<b>LEFT(n=14)</b>
<b>GRADE 0 (unrecognizable)</b>	3(13.6%)	2(14.3%)
<b>GRADE I (= &lt;5 mm)</b>	2(9.1%)	1(7.1%)
<b>GRADE II (6-10 mm)</b>	9(40.9%)	6(42.9%)
<b>GRADE III (&gt;10 mm)</b>	8(36.4%)	5(35.7%)

**Table 3: Incidence Of ZT**

<b>Operation</b>	<b>Right ZT</b>	<b>Left ZT</b>	<b>Bilateral ZT</b>	<b>Total</b>
<b>Right hemi thyroidectomy n= 20</b>	12(60.0%)			12(60.0%)
<b>Left hemi thyroidectomy n=14</b>		10(71.4%)		10(71.4%)
<b>Total thyroidectomy n=16</b>	8(50%)	2(12.5%)	2(12.5%)	12(75%)
<b>Rt lobe n=(20+16)36</b>	22(61.1%)	14(46.7%)		
<b>Lt lobe n=(14+16)30</b>				

**RESULTS**

**Incidence of ZT in our study:**

Total right hemithyroidectomy were done in 20 cases. Left hemi thyroidectomies were done in 14 cases. Total thyroidectomy was performed in 16 cases. Zuckerkandl tubercle was identified in 34 cases. Right ZT was seen in 22 cases and Left ZT was seen in 14 cases. Bilateral ZT were seen in 2 cases. Right lobe n = (20 +16) 36 And Left Lobe n = (14+16) 30.

Out of 50 cases, Successful identification of ZT was possible in 34 cases and its relation with RLN was established.

RLN was present Posteromedially in all but one case where it was found lateral to ZT. It is in accordance with finding of other researcher. 3 cases had large nodules in which, ZT could not be identified. Hence, capsular dissection was performed to safeguard the total structures.

**DISCUSSION**

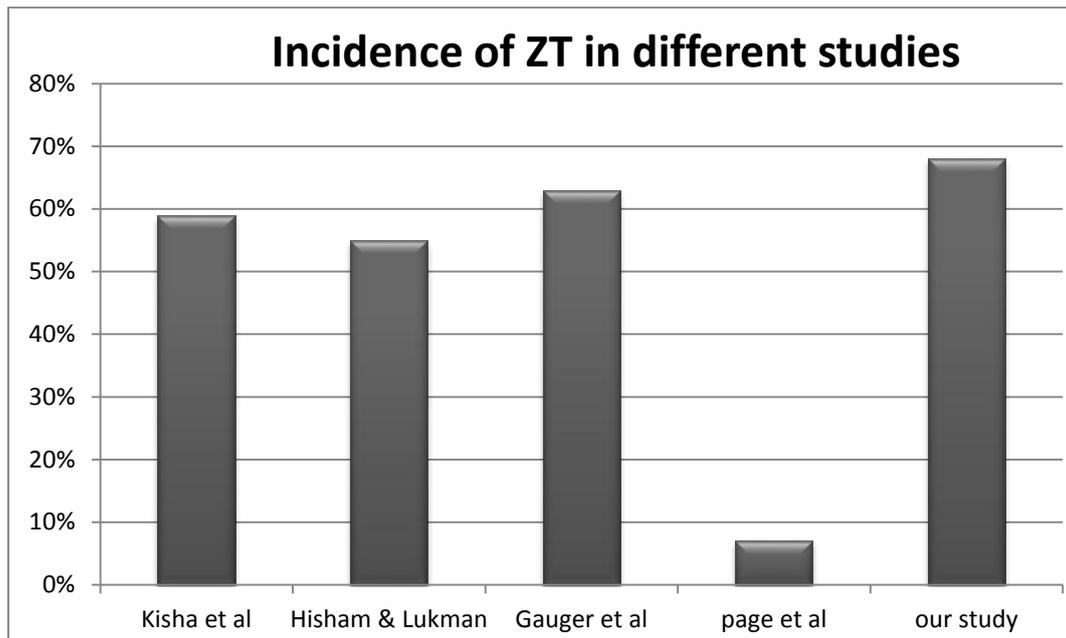
Completeness of resection requires an awareness of thyroid development including attention to pyramidal remnants, to abnormalities associated with ZT. It makes surgical dissection challenging at posterior site of lateral lobes around RLN and Inferior thyroid Artery. Therefore in the majority of patients the tubercle can affect completeness of thyroidectomy especially for

less experienced hands. Secondly, surgical importance of ZT arises from its relations with RLN. So an understanding of this relationship is essential for safety of thyroid operations.

Though, Inferior thyroid Artery was the main landmark in thyroid surgery to identify the RLN but these days the tubercle of Zuckerkandl has been studied elaborately and the relation of tubercle of Zuckerkandl with RLN has been studied by different researches<sup>2,6,8</sup> and laid importance for safeguarding RLN during thyroid surgery.

According to Delbridge et al ZT's are present in almost 2/3<sup>rd</sup> of patients undergoing thyroid surgery<sup>5</sup>. Kaisha et al reported ZT in 58%<sup>2</sup>, Hisham And Lukman reported it in 55%<sup>6</sup>, Gauger et al reported in 63%<sup>7</sup>, page et al reported it in 7%<sup>3</sup> while in our study the incidence of ZT was 68%.

According to our study grade 0 ZT is 13.6% on right side and 14.3% on left side, grade I ZT is 9.1% on right side and 7.1% on left side, grade II ZT is 40.9% on right side and 42.9% on left side, grade III ZT is 36.4% on right side and 35.7% on left side as mentioned in table 3, while J-S Yun et al<sup>4</sup> reports grade 0 ZT to be 10.7% on right side and 14.4% on left side, grade I ZT to be 7.9% on right side and 11.1% on left side, grade II ZT to be 43.5% on right side and 38.5% on left side, grade III ZT to be 37.9% on right side and 35.5% on left side.



### CONCLUSION

ZT is a common anatomical structure found in majority of cases (68%). RLN identification was made in all the thyroid surgeries. ZT's could be identified in 34 out of 50 cases which helped in safeguarding RLN and parathyroid gland during thyroidectomies. ZT along with inferior thyroid artery is an important anatomical land mark for identification of vital structures i.e., RLN and parathyroid gland. In some cases where the nodule was very large and almost replaced the thyroid tissue, ZT's could not be defined. In such situation capsular dissection was being done for safeguarding RLN.

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