

Superiority of Total Thyroidectomy Using Capsular Dissection Over Subtotal Thyroidectomy

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Abstract:-

➤ **Background:**

Total thyroidectomy involves the removal of the whole thyroid gland. Capsular dissection is a special technique in which the gland is removed with its capsule intact while avoiding nearby structures. While this unique technique has not been widely practiced, it reduces risk of iatrogenic damage to close structures especially recurrent laryngeal nerve with minimal disease recurrence consequent surgical re-intervention. This Study intends to demonstrate the Superiority of Capsular Total thyroidectomy over Subtotal Thyroidectomy.

➤ **Methodology:**

This is a Retrospective clinical study conducted in the Department of General Surgery in General Hospital Lagos (January 2007-January 2016) and General Hospital Isolo (January 2021- January 2024). No statistical analysis was used in this study.

➤ **Results:**

One out of the 35 patients included in our study developed complication of Recurrent Laryngeal nerve palsy representing only 2.8%. There was no record of surgical hypocalcemia or recurrence of disease. The study demonstrates the safety of neighbouring structures which is the major concern in Total thyroidectomy.

➤ **Conclusion:**

The study revealed that Capsular dissection surgery is superior to Subtotal thyroidectomy in terms of preservation of close structures and minimal or no disease recurrence. Based on findings from our study, it is recommended that Capsular dissection should be practiced for Thyroid cases amenable to surgical care.

Keywords:- Thyroidectomy, Capsular Dissection, Recurrent Laryngeal Nerve, Subtotal Thyroidectomy

I. INTRODUCTION

The thyroid gland is a butterfly-shaped gland situated in the lower part of the anterior neck in the midline between C5 and T5 vertebra.¹ It has two symmetrical lobes united by isthmus whose extent is the second to fourth tracheal rings, each lobe has a pyramidal extension on its posterior-most aspect (organ of Zuckerkandl).² The gland is enclosed by a capsule (pretracheal fascia), the condensation of the pretracheal fascia (ligaments of berry) attach each lobe of the thyroid gland to the trachea posteriorly,¹ it is related anteriorly to the muscles of the neck (sternohyoid and sternothyroid),³ medially to the larynx and upper trachea and posteriomedially to upper oesophagus. The parathyroid glands lie directly posteriorly on the thyroid gland.⁴

The recurrent laryngeal nerve, a branch of the vagus nerve recur around the subclavian artery on the right and ligamentum arteriosum on the left,⁵ run through the tracheoesophageal groove with some variations on both sides before entering the larynx and innervating all the muscles of the larynx except the cricothyroid muscle.⁶ The thyroid gland is well vascularised by the superior and inferior thyroid arteries branches, the superior thyroid arteries run in close proximity to the external branch of the superior laryngeal artery at the superior pole of the thyroid gland⁷ and inferior thyroid arteries branch of thyrocervical trunk passing behind the carotid sheath before dividing into its primary branches to the thyroid gland and the parathyroid gland, through which pass the recurrent laryngeal nerves lateral to the thyroid gland.^{8,9}

Thyroidectomy, the surgical removal of whole or part of the thyroid gland is a common procedure used in the treatment of diseases of the gland.¹⁰ It accounts for 1.24% of total General Surgery procedures in parts of West Africa.¹¹

In total thyroidectomy, the whole gland is excised without leaving behind a remnant. It ensures that there is minimal risk of recurrence of disease or risk of re-intervention.¹² Capsular dissection is a technique in total thyroidectomy in which the gland is removed with its capsule after dissecting off the tertiary branches of thyroid arteries

close to the capsule without damage to the primary branches of the inferior thyroid artery to the parathyroid.¹³ here the aim is not to look for the recurrent laryngeal nerve but if it comes into view during dissection, particularly in large glands, it is carefully avoided with minimal manipulation.⁷ This ensures minimal handling and safety of the neighboring structures and reduced risk of iatrogenic injury. Patients are required to take oral thyroxin for life after surgery.^{9,11}

Subtotal thyroidectomy involves removal of most of but not all of the thyroid gland. About 3-5 grams of the normal lobe is left behind¹ which is usually enough to produce thyroid hormones. The recurrent laryngeal nerve is visualized before ligating the trunk of the inferior thyroid arteries in continuity as they run in close proximity.^{3,4,9} Looking for recurrent laryngeal nerve and ligation of the trunk of inferior thyroid arteries increase the chances of nerve injury and consequent palsy and devascularisation of the parathyroid glands.^{8,13}

This study aims to emphasise with convincing results the superiority of Capsular dissection as a technique in Total thyroidectomy.

II. METHODS AND MATERIALS

➤ Study Design and Population

This study was a retrospective clinical study conducted among 35 patients in the Department of General Surgery, General Hospital Lagos (January 2007-January 2016) and General Hospital Isolo(January 2021- January 2022) General Hospital Lagos is a state-owned tertiary institution located at Odan, Lagos Island, south-western Nigeria. General Hospital Isolo is a State -owned secondary institution located in Isolo, Lagos Mainland, south-western Nigeria. Both facilities offer specialised surgical care. The surgery clinic is held weekly in the outpatient department where data were obtained for this study.

➤ Selection Criteria

All benign thyroid cases treated surgically within the stated duration were included in the study

Malignant thyroid diseases and Cases treated outside the stated duration were excluded from this study.

➤ Procedure

Pre-operative evaluations routinely carried out for all the patients included Neck ultrasound scan, FNAC, Thyroid function tests (TSH, free T3 and free T4).

The patient is placed in supine position. Under general endotracheal intubation, the neck is prepared with antiseptic solution. With sandbags under the scapular and ring under the occiput the neck is slightly extended 15-25 degrees to expose the anterior neck. Special arrangement of drapes to isolate the sterile operation field and with good lighting, an adequate collar incision is made up to the lateral border of the sternocleidomastoid muscle. The collar incision is deepened behind the platysmal muscle and subplatysmal flap is raised

up to the thyroid notch superiorly and down to the sternal notch and held in position with Joll's retractor exposing the deep cervical fascia which is incised in the midline from the cricoid cartilage to the thyroid notch. The strap muscles are retracted laterally to expose the thyroid gland enclosed by the pretracheal fascia. With Lahey's swabs the lateral dissection is commenced, the thyroid gland is retracted medially with gauze by the surgeon while the assistant retract the strap muscles with lagenbeck retractors and gently the carotid sheath laterally and carefully ligating the middle thyroid vein and then the tertiary branches of inferior thyroid artery on the surface of the pretracheal fascia (the thyroid capsule). If the recurrent laryngeal nerve comes into view it is gently retracted laterally. The inferior pole is similarly dissected, the inferior thyroid vein ligated and any tertiary branches of inferior thyroid artery ligated as they are encountered.

Attention is shifted to the superior thyroid pole. Here the superior thyroid artery is sclerotised and separately ligated at the superior pole avoiding inclusion of the external branch of superior laryngeal nerve. While dissecting very close to the thyroid capsule the parathyroid gland would fall away from the thyroid gland. The whole thyroid gland is now shaved off from the trachea taking care of other bleeding vessels.

- Ethical Approval: Not Required
- Statistical Analysis: No statistical analysis was used for this study due to the small sample size of 35 patients.

III. RESULTS

35 cases are included in this study. 32 had simple goiter(91.4%) while there were three cases of toxic goiter (8.6%)

Common complications of Thyroidectomy includes recurrent laryngeal nerve injury, hemorrhage, airway obstruction and hypocalcemia .

One out of the 33 patients who had Total thyroidectomy using capsular dissection developed recurrent laryngeal nerve injury and transient nerve palsy. This represents about 3% of the total thyroidectomy cases.

None of the patients had hypocalcemia or recurrence.

Only 2 of the 35 patients had subtotal thyroidectomy with no complications recorded.

Table 1: Data Showing Patients' Clinical History, Type of Surgery and Complications of Surgery

Variables	Frequency (n=35)	Percentage (100%)
Age (years)		
0 -10	-	-
11-20	-	-
21-30	3	8.5
31-40	11	31.4
41-50	13	37.1
51-60	7	20
61-70	1	2.8
Gender		
Male	2	5.7
Female	33	94.3
Diagnosis		
Simple Goiter	32	91.4
Toxic Goiter	3	8.6
Treatment		
Total Thyroidectomy	33	94.2
Subtotal Thyroidectomy	2	5.7
Complications		
No Complications	34	97.1
Recurrence	-	-
Recurrent Laryngeal Nerve palsy	1	2.9
Hypocalcemia	-	-

IV. DISCUSSION

Thirty-five patients out of which 33 underwent Total thyroidectomy using capsular dissection technique were studied to emphasize the superiority of this technique and its advantages over subtotal thyroidectomy.

A major area of concern in Total thyroidectomy is damage to close structures including Recurrent laryngeal nerve and parathyroid glands due to close proximity of these structures to the thyroid gland.^{2,5} Capsular dissection technique however has been shown to significantly reduce the risk of these complications.⁹ This is because the recurrent laryngeal nerve is not specifically looked for along its course but if encountered as the tertiary branches of inferior thyroid artery are being dissected off close to the gland, they are carefully retracted away.^{5,7,12} The blood supply to parathyroids glands are preserved by dissecting very close to the thyroid capsule therefore leaving the gland behind and avoiding damage to the primary branches of the inferior thyroid gland to the parathyroid thus ensuring safety of the glands.^{9,11,13}

In our study, only one patient had a transient RLN palsy which was treated by the ENT surgeon conservatively till complete recovery, this damage was probably because of cloateral damage from the use of ligasure small jaw equipment. This represents 3% of the total thyroidectomy cases and 2.9% of the total cases of thyroidectomy in our study. In a similar study the reported incidence of RLN palsy and hypocalcemia using capsular dissection were 0% as against 0.9% in extracapsular thyroidectomy.⁴

There were no complications of recurrence or surgical re-intervention from our study. Similarly, *Roberto Cirocchi et al* recorded reduced incidence of recurrence and re-intervention³.

The limitation to this study is the small sample size of 35 patients. This is due to transition of hospital records from paper files to Electronic Records. Data of patients prior to time frame of the study could not be retrieved.

V. CONCLUSION

The low incidence of recurrent laryngeal nerve palsy and parathyroid gland injury as per our study stresses the superiority and safety of capsular dissection technique of Total thyroidectomy over subtotal thyroidectomy. Capsular dissection avoids the risk of recurrence and revision of surgery.

➤ Declaration

- Funding: None
- Conflict of interest: None declared
- Ethical approval: Not required

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