



CAPSULAR DISSECTION TECHNIQUE OF TOTAL THYROIDECTOMY FOR REDUCING RECURRENT LARYNGEAL NEUROPRAXIA AND HYPOCALCEMIA

General Surgery

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ABSTRACT

Background: Thyroidectomy is a common surgical procedure performed all over the world. The incidence of recurrent laryngeal nerve palsy and parathyroid injury is high on conventional method of thyroidectomy. By capsular dissection technique where dissection lie close to the gland only the tertiary branches of vessels close to gland are ligated. **Aim:** This study aims at reducing the recurrent laryngeal nerve and parathyroid injury by using Capsular dissection technique rather than conventional method of total thyroidectomy **Objectives Of The Study:** 1. To study the incidence of Recurrent laryngeal nerve palsy and Parathyroid injury after Capsular dissection technique of total thyroidectomy 2. To study the patient characteristics associated with Recurrent laryngeal nerve palsy and hypocalcemia like (Age 20-40,41-60,61-70; Benign and Malignant thyroid disease) **Materials and methods:** 1. All 50 patient's met with inclusion criteria are selected by Random selection method for the study. 2. The patients history, operative notes and immediate postoperative status of the selected patients of study are taken from the patients case sheet in Medical records department during a period of 1st July 2019 to 31st December 2019. 3. These 50 patients are called for follow up in outpatient department and evaluated for vocal cord examination by Indirect laryngoscopy and Serum calcium assessment in 3rd and 6th month after surgery **Results:** In my study total of 50 patients included in study only one person had Temporary hypocalcemia with 2% incidence and this patient is managed with oral calcium and returned to normocalcemia after 4 months and no one in the study had permanent hypocalcemia. And only one person developed hoarseness of voice but patient had no respiratory distress or no recurrent respiratory infections. Hoarseness recovers in 3 months time with 2% incidence for Temporary Recurrent laryngeal nerve palsy. During this period patient was followed up with Video laryngoscopy. No one in study population developed Permanent Recurrent laryngeal nerve palsy. The temporary hypocalcemia and temporary Recurrent laryngeal nerve palsy occurred in patients who had malignant disease of thyroid. **Conclusion:** Capsular dissection is better in reducing Recurrent laryngeal nerve and Parathyroid injury than Conventional method of thyroidectomy

KEYWORDS

Capsular dissection, permanent and temporary hypocalcemia and Recurrent laryngeal nerve palsy

NEED FOR THE STUDY:

Thyroidectomy is a common surgical procedure performed all over the world. The incidence of recurrent laryngeal nerve palsy and parathyroid injury is high on conventional method. Mechanisms of injury in conventional methods are complete or partial transection, traction, contusion, crushing, electrocautery burns, clamping, misplaced ligatures, compromised blood supply. Also ligation of inferior thyroid artery at stem leads to devascularization of inferior parathyroid gland. By capsular dissection technique where dissection lie close to the gland only the tertiary branches of vessels close to gland are ligated. Dissection of parathyroid and its vascular pedicle from thyroid surface gives a better chance of reducing nerve injury and parathyroid injury.

AIM OF THE STUDY:

This study aims at reducing the recurrent laryngeal nerve and parathyroid injury by using Capsular dissection technique rather than conventional method of total thyroidectomy

OBJECTIVE :

1. To study the incidence of Recurrent laryngeal nerve palsy and Parathyroid injury after Capsular dissection technique of total thyroidectomy
2. To study the patient characteristics associated with Recurrent laryngeal nerve palsy and hypocalcemia like (Age 20-40,41-60,61-70; Benign and Malignant thyroid disease)

MATERIALS AND METHODS

The study was conducted on Government Kilpauk medical college Department of general surgery

Study Design:

Retrospective cohort study

Sample Size:

A total of 50 patients

Sampling Method:

A Simple Random sampling technique was used and sample size was

calculated using THURSHFIELD FORMULA:

Sample size (n) = $z^2 \times P(1-P) / d^2$

Where n = sample size

Z = 1.96 - 2 (considering confidence as 95%)

P = Incidence rate (taken as 3% as exact incidence is not known)

D = is desired precision of 5%

Study Period:

All patients who had undergone Total thyroidectomy by capsular dissection technique in Government Kilpauk medical college and hospital between 1 July 2019 to 31 December 2019 and these patients are followed up for 6 months till 31st July 2020

Selection Criteria:

Inclusion criteria:

Patients between the age group of 20-70, who are undergone total thyroidectomy by capsular dissection technique

Exclusion criteria:

1. Patients with vocal cord palsy
2. Patients with parathyroid diseases
3. Patients with preoperative irradiation to neck
4. Patients with preoperative calcium supplementation

Source Of Data:

1. All 50 patient's met with inclusion criteria are selected by Random selection method for the study.
2. The patients history, operative notes and immediate postoperative status of the selected patients of study are taken from the patients case sheet in Medical records department during a period of 1st July 2019 to 31st December 2019.
3. These 50 patients are called for follow up in outpatient department and evaluated for vocal cord examination by Indirect laryngoscopy and Serum calcium assessment in 3rd and 6th month after surgery

Preoperative Protocol:

Thorough history was obtained from the patients like, how long the swelling was present, are they having any pressure symptoms, is there any recent change in voice, is there any sudden increase in size and any

associated symptom of hypothyroidism or hyperthyroidism are present. Clinical examination of the swelling was then made to know about the size of the thyroid swelling, nodularity in one or both the lobes, presence of nodes and any other swelling. All the patients had undergone video laryngoscopy examination pre operatively and the status of their vocal cord was noted. Any patients who had palsy of recurrent laryngeal nerve with deviation of vocal cords were excluded from the study. Thyroid function test including free T4, free T3 and TSH were done to know about the functional status of thyroid. USG neck was taken to know more about the thyroid swelling and presence of nodules and nodes. FNAC of the swelling was then done to know about the pathology of the swelling. If the cytology came as Papillary carcinoma, CT scan of the neck was taken to know about the nodal status. If the cytology revealed anaplastic cells they were excluded from the study. X RAY of chest and cervical spine were then taken. Baseline investigations like complete blood count and renal function test with blood sugar were taken. Anaesthetic assessment for surgery was then obtained. The procedure was then explained to the patient and a close relative and written consent was obtained from each and every patient.

Per Operative Procedure:

All 50 patients selected, have undergone total thyroidectomy by capsular dissection method by preserving the parathyroids and Recurrent laryngeal nerve. Mainly the distal branches of inferior thyroid artery are dissected and ligated Or cauterised close to capsule avoiding devascularisation of parathyroids

Steps Of Capsular Dissection:

Positioning and Draping:

Patient is placed in supine position with neck extended. Extension is achieved by placing a sandbag or folded towel in between the shoulder blades. Head was supported with head ring under the occiput. This position will make thyroid come anteriorly and strap muscles will be displaced laterally.

Skin Incision And Creation Of Skin Flaps:

Kocher's curvilinear skin crease incision was made. Subplatysmal skin flaps are raised superiorly and inferiorly. The limit of raising the flap is superiorly till thyroid cartilage and inferiorly till sternal notch.

Exposure Of Thyroid:

Deep cervical fascia was identified by anterior jugular veins running on it. Midline raphe identified between sternohyoid muscles. The raphe is divided in an avascular plane from the thyroid cartilage superiorly to the sternal notch inferiorly. The separation of sternothyroid muscles from lateral aspect of gland is done using peanut pusher. If any bleeding occurs it should be held by dissection forceps and cautery

Middle Thyroid Vein:

After retracting the strap muscles the thyroid was hooked out and brought anteriorly into the open surgical field. The middle thyroid vein which comes out from the lateral surface of the thyroid should be identified first and ligated. The middle thyroid vein is short stout and thin structure which could be easily torn during mobilisation of the thyroid and cause troublesome bleeding. So, it should be always ligated first.

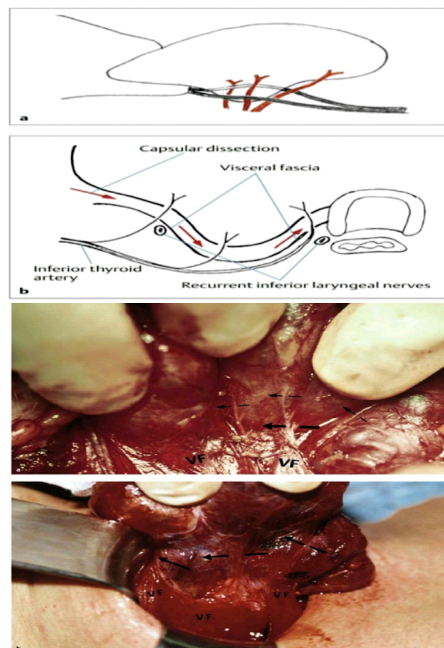
Dissection Of Superior Pole:

The thyroid was held with right hand and traction applied inferiorly and medially to make superior pole more prominent. Using a blunt tipped right angled instrument the superior pole containing the superior thyroid vessels is hooked out by blunt dissection, as close to the gland as possible. The arteries should be double ligated proximally.

Capsular Dissection:

Capsular dissection is technique of dissection of thyroid where ligation of arteries is done as close to the gland as possible, on the thyroid capsule itself. A plane is created between the terminal branches of inferior thyroid artery and the true capsule of the gland. The arteries are ligated individually on the surface of the gland as they enter the capsule in to the substance of the gland. This helps to preserve the vasculature of the parathyroid and also by this method we are away from recurrent laryngeal nerve. So injury to nerve and parathyroid is much less by this method than conventional technique. It literally means hugging the thyroid. Once lateral dissection is done we go on for dissection of tubercle of zuckerandall which is related to upper part of recurrent

laryngeal nerve and superior parathyroid gland. Superior parathyroid is mostly supplied by Inferior thyroid artery. Hence we have go for ultra ligation of branches close to tubercle to preserve branch for superior parathyroid. Also RLN will pass in between the branches of inferior thyroid artery in tracheoesophageal groove. Hold the tubercle and pull anteriorly to visualise the RLN dissection close to capsule separates gland form RLN and superior parathyroid gland.



Preservation Of Parathyroids:

The inferior parathyroid is usually visualised first. It is situated anterior to recurrent laryngeal nerve approximately 1 cm inferior to the point where inferior thyroid artery crosses recurrent laryngeal nerve. The superior parathyroid is usually more dorsal than the inferior parathyroid and is typically found posterior to the thyroid gland and posterior and medial to the recurrent laryngeal nerve at the level at which the nerve enters just posterior to the cricothyroid muscle at the level of cricoid cartilage. The superior gland is often easier to dissect from the thyroid gland on a vascular pedicle. The lateral parathyroid containing tissue is swept of the thyroid gland in a plane between the thyroid capsule and the inferior thyroid artery, ligating and dividing the tertiary branches of inferior thyroid artery on the capsule of thyroid gland.

Resection Of The Gland:

After clear identification and preservation of parathyroid glands and recurrent laryngeal nerve the thyroid lobe can be safely resected. The thyroid gland is now rotated more medially and anteriorly and the remaining attachments from the trachea are divided. The dissection at ligament of berry may prove challenging. A small artery and vein almost always crosses Berry's ligament. If bleeding occurs it should be controlled with gentle pressure. Clamps should not be applied blindly and diathermy use at this point is condemned. The thyroid lobe can be resected sharply from its attachment to the trachea.

Closure:

Thorough hemostasis should be secured before wound closure.

Post Operative Follow Up:

Patient had a video laryngoscopy examination immediately after extubation and checked for position of vocal cords. On the first post op day any change in voice or hoarseness is elicited from the patient. Patient had laryngoscopic examination on the 5th post operative day before discharge. Patient was advised to follow up for change in voice and any deviation of vocal cords by laryngoscopy at third and sixth month.

Any hoarseness of voice associated with a documented shift of vocal cords persisting after sixth month is taken as permanent recurrent nerve injury. In case of recurrent laryngeal nerve injury there will be change in voice in the immediate post op period. Hoarseness of voice occurring in the 1st or 2nd post op day is mostly due to edema caused by inflammation & dissection of nerves & it is temporary.

Serum calcium levels are estimated at 3rd post operative day. Patient is also asked for symptoms of perioral numbness, tingling sensation, carpal pedal spasm and examined for chevostoks and trousseau sign. All patients are followed up in 3rd and 6th month with serum calcium levels. If it's temporary hypocalcemia it will resolve in 6months . Even after 6 months serum calcium is below 9mg/dl then patient will have permanent hypocalcemia

Statistical Methods:

Descriptive analysis: Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Data was also represented using appropriate diagrams like bar diagram, pie diagram.(1)

1. IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.

RESULTS:

A total of 50 subjects were included in the final analysis.

Table 1: Descriptive analysis of age group in the study population (N=50)

Age Group	Frequency	Percentages
20 to 40	11	22.00%
41 to 60	29	58.00%
>60	10	20.00%

Among the study population, 11 (22%) participants were aged between 20 to 40 years, 29 (58%) were aged between 41 to 60 years and 10 (20%) participants were aged between >60 years. (Table 1 & Figure 1)

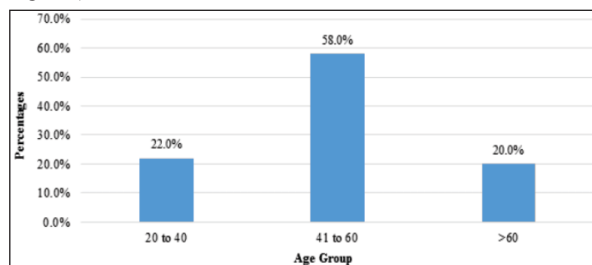


Figure 1: Bar chart of age group in the study population (N=50)

Table 2: Descriptive analysis of sex in the study population (N=50)

Gender	Frequency	Percentages
Male	6	12.00%
Female	44	88.00%

Among the study population, 6 (12%) were participants male and remaining 44 (88%) participants were female. (Table 2 & Figure 2)

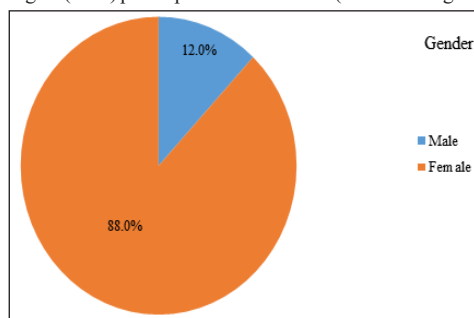


Figure 2: Pie chart of gender in the study population (N=50)

Table 3: Descriptive analysis of diagnosis in the study population (N=50)

Diagnosis	Frequency	Percentages
Colloid goiter	22	44.00%
Lymphocytic thyroiditis	14	28.00%
Toxic goiter	11	22.00%
Malignancy	3	6.00%

Among the people with diagnosis, majority of 22 (44%) participants had Colloid goiter, followed by Lymphocytic thyroiditis was 14 (28%), Toxic goiter was 11 (22%) and malignancy was 3 (6%) respectively. (Table 3 & Figure 3)

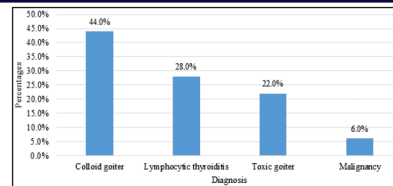


Figure 3: Bar chart of diagnosis in the study population (N=50)

Table 4: Descriptive analysis of temporary RLN palsy in the study population (N=50)

Temporary RLN Palsy	Frequency	Percentages
Yes	1	2.00%
No	49	98.00%

Among the study population, only 1 (2%) participant was Temporary RLN Palsy. (Table 4 & figure 4)

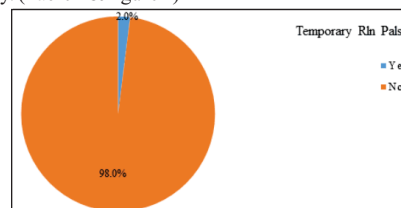


Figure 4: Pie chart of temporary RLN palsy in the study population (N=50)

Table 5: Descriptive analysis of permanent RLN palsy in the study population (N=50)

Permanent RLN Palsy	Frequency	Percentages
No	50	100.00%

Table 6: Descriptive analysis of permanent hypocalcemia in the study population (N=50)

Permanent Hypocalcemia	Frequency	Percentages
No	50	100.00%

Table 7: Descriptive analysis of temporary hypocalcemia in the study population (N=50)

Temporary Hypocalcemia	Frequency	Percentages
Yes	1	2.00%
No	49	98.00%

Among the study population, only 1 (2%) participant was Temporary Hypocalcemia. (Table 6 & figure 5)

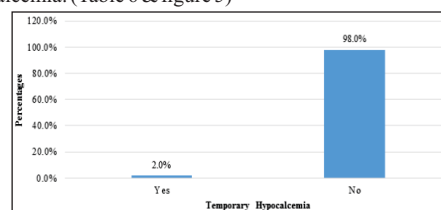


Figure 5: Bar chart of temporary hypocalcemia in the study population (N=50)

DISCUSSION :

This technique of Capsular dissection was described by Delbrige et al . Based on their study of 825 cases with this technique showed incidence rate of 0.6 % for Permanent hypocalcemia and 0.5% for Permanent Recurrent laryngeal nerve palsy. In this study they mentioned it as an ideal procedure for Re do surgery for recurrence in malignancy.

In a Retrospective study conducted in Trivandrum medical college using Capsular dissection technique for total thyroidectomy showed incidence of permanent nerve damage zero and permanent hypocalcemia is .0.2% In a study conducted in DM WIMS hospital Wayanad, Kerala with 130 patients using Capsular dissection method showed incidence of 1.5% and 2.3% for Permanent RLN palsy and Permanent hypocalcemia respectively In another study conducted in Karnataka with 80 patients overall incidence of permanent and temporary RLN palsy is 5% and 1.25% respectively.

In my study total of 50 patients included in study only one person had

Temporary hypocalcemia. With 2% incidence and this patient is managed with oral calcium and returned to normocalcemia after 4 months and no one in the study had permanent hypocalcemia.

And only one person developed hoarseness of voice but patient had no respiratory distress or no recurrent respiratory infections. Hoarseness recovers in 3 months time with 2% incidence for Temporary Recurrent laryngeal nerve palsy. During this period patient was followed up with Video laryngoscopy. No one in study population developed Permanent Recurrent laryngeal nerve palsy.

The temporary hypocalcemia and temporary Recurrent laryngeal nerve palsy occurred in patients who had malignant disease of thyroid.

CONCLUSION:

Based on my present study,

There's very low incidence of Recurrent laryngeal nerve and Parathyroid injury hence meticulous Capsular dissection technique of total thyroidectomy is superior in Reducing recurrent laryngeal injury and parathyroid injury even in hands of surgical trainees. Capsular dissection technique is now increasingly preferred by surgeons over conventional method.

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