

**A FOLLOW UP STUDY BY FINE NEEDLE
ASPIRATION CYTOLOGY IN SOLITARY
NODULAR GOITRE IN GVMCH**

Dissertation submitted to



THE TAMIL NADU DR.MGR MEDICAL UNIVERSITY

In the partial fulfilment of the regulations for the award of

M.S. General Surgery

Branch I



GOVT. VELLORE MEDICAL COLLEGE

VELLORE-11.

MAY-2018

CERTIFICATE

Certified that this is the Bonafide dissertation done by **Dr.R.BALAKRISHNAN** and submitted in partial fulfilment of Requirement for degree of **MASTER OF SURGERY** Branch-1 of **General Surgery of the Tamilnadu Dr.M.G.R. Medical University, Chennai.**

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Ethical Committee No.0213/2016 Dt.06-10-2016

- Title of the Study** - The followup study by fine needle aspiration Cytology in Solitary nodular Goitre in GVMCH
- Principal Investigator** - Dr.R.Balakrishnan.,
- Designation** - Post Graduate, MS General Surgery, GVMC, Vellore

The request for an approval from the Institutional Ethical committee (IEC) was considered on the IEC meeting held on 06.10.2016 at the Conference Hall, Govt. Vellore Medical College, Vellore-11.

The members of the committee, the secretary, the convenor and the president are pleased to approve the proposed work mentioned above submitted by the Principal Investigator.

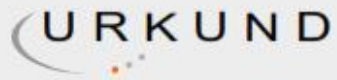
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DECLARATION

I whole heartedly declare that the Dissertation titled “**A FOLLOW UP STUDY BY FINE NEEDLE ASPIRATION CYTOLOGY IN SOLITARY NODULAR GOITRE IN GVMCH**” was done by me at Govt. Vellore Medical college and Hospital, Vellore during the period of October 2016 to September 2017 under the guidance of eminent professor **Dr.R.Rajavelu MS.FRCS.**

The dissertation submitted to The Tamil Nadu DR.MGR Medical University towards the Partial Fulfilment of the requirement for the award of **MS DEGREE IN GENERAL SURGERY BRANCH I**

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Place:

Date:

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DR.BALAKRISHNAN.R

PLACE :

DATE :

LIST OF ABBREVIATIONS

1. HPE- HISTOPATHOLOGY EXAMINATION
2. FNAC- FINE NEEDLE ASPIRATION CYTOLOGY
3. RLN- RECUURENT LARYNGEAL NERVE
4. TSH- THYROID STIMULATING HORMONE
5. CEA- CARCINO EMBRYONIC ANTIGEN
6. USG- ULTRASONOGRAM
7. PTC- PAPILLARY THYROID CARCINOMA
8. MTC- MEDULLARY THYROID CARCINOMA
9. Ca- CARCINOMA
10. CT- COMPUTERISED TOMOGRAM
11. RHT- RIGHT HEMI THYROIDECTOMY
12. LHT- LEFT HEMITHYROIDECTOMY
13. MNG- MULTINODULAR GOITRE
14. SNG- SOLITARY NODULAR GOITRE
15. TSH- THYROID STIMULATING HORMONE
16. TC-TOTAL COUNT
17. HB- HAEMOGLOBIN
18. DC- DIFFERENTIAL COUNT

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ABSTRACT

BACKGROUND

The solitary thyroid nodule are common in outpatient surgical department of our institution, it may be benign or malignant, it has to be characterised properly for optimal management.

AIM AND OBJECTIVE

The aim of our study is

1. To stress the importance of FNAC as diagnostic tool
2. To study the age, sex distribution of cases in our institution
3. To study percentage of benign and malignancy in solitary nodular goitre.

METHODS

In this study we analysed our institutional surgical OPD patient for one year October 2016-sptember 2017. All the patient presented with solitary thyroid nodule included in the study, all the patient individually assessed investigated with FNAC and Ultrasound.

The patient were treated appropriate therapeutically and surgically like hemithyroidectomy or total thyroidectomy with or without neck dissection.

RESULTS

In our study of 100 patients 8 (8%) were male and 92 (92%) females, patient with solitary nodular goitre age wise <30 yrs 2 (8%) males and 22 (90%) females, 30-60 yrs 5 (7%) males and 61 (92%) females >60 yrs 1 (10%) male and 9 (90%) female. The most common age group of both male and female is 30-60 yrs. The nodule were found more in right lobe of thyroid 48 (48 %) out of 100 patients, 47 (47%) of left lobe and in isthmus for 5 (5%) patients.

Incidence of malignant nodule out of 100 were 21 (21%) of which 3 (15%) male patient and 18 (88%) female patient. In male out of 3 (33%) one papillary carcinoma and 2 (66%) follicular carcinoma. In females out of 18, 13 (72%) papillary carcinoma and 5 (27%) follicular carcinoma. Rest of 79 cases were benign lesion, the solitary nodule in males are proportionately more malignant.

All malignant patient underwent total thyroidectomy with lymphnode dissection while patient with benign lesion underwent Hemithyroidectomy.

CONCLUSION

- ✓ The best modality of investigation for thyroid based on our study found to be Fine needle aspiration cytology, easy to perform and cheaper.
- ✓ In our study conducted among the patient visiting our Hospital the commonest thyroid disease is solitary nodular goitre
- ✓ Out of 100 patients 92 females and 8 males were affected which shows disease of female predominance
- ✓ Most of affected people were middle aged 30-60 years, which shows disease of mid age group
- ✓ Most of lesion benign 79 cases out of 100 which proves benign nodules are common presentation
- ✓ The reported 21 malignant cases papillary carcinoma of 14 cases and 7 follicular carcinoma, which show the common thyroid malignancy is papillary carcinoma
- ✓ The reported 8 cases in males 3 were malignant which shows proportionately solitary nodule in male are more malignant
- ✓ The patients with benign lesion underwent hemithyroidectomy of 79 cases, while patient with malignant and suspicious underwent total thyroidectomy with lymphnode dissection.

KEY WORDS :

Solitary nodular goitre, hemithyroidectomy, total thyroidectomy, fine needle aspiration cytology, papillary carcinoma, follicular carcinoma, recurrent laryngeal nerve.

INTRODUCTION

Thyroid is the Greek word meaning “shield shaped” In our body thyroid gland maintains level of metabolism in the tissues that is optimal for their normal function. Thyroid hormone stimulates oxygen consumption of most of cells of our body. It regulates metabolism of lipids, carbohydrate and necessary for normal growth and maturation. More number of thyroid nodules are found incidentally .i.e.1% in men and 5% in women. Ultrasound detects 20-70% of patient with thyroid nodule. Most of them are Benign but 5-15% are malignant. The modality of investigation in this study is Fine needle aspiration cytology which has 86% sensitivity and 90% specificity. Thyroid cancer represents about three percent of all malignancies. The frequency of malignancy is higher in children than in adult. The use of external beam ionising radiation for acne, tonsillitis as shown increase incidence of thyroid malignancy after 5 years of exposure in children.

THE AIM OF OUR STUDY IS

1. To stress the importance of FNAC as diagnostic tool
2. To study the age, sex distribution of cases in our institution
3. To study percentage of benign and malignancy in solitary nodular goitre.

MATERIALS AND METHODS

This follow up study by fine needle aspiration cytology was conducted between October 2016-september 2017 In Government Vellore medical college of both General surgery and Pathology department.

Fine needle Aspiration cytology in solitary nodular goitre include all age group of male and female. All screened cases were studied detail with clinical examination and investigation, when FNAC/clinical examination gave suggestion of malignancy special care has been taken.

STUDY PERIOD:

One year

STUDY DESIGN:

It's a Prospective study

MATERIAL USED FOR FNAC:

10CC syringe,

22-24 gauge needle,

Syringe holder

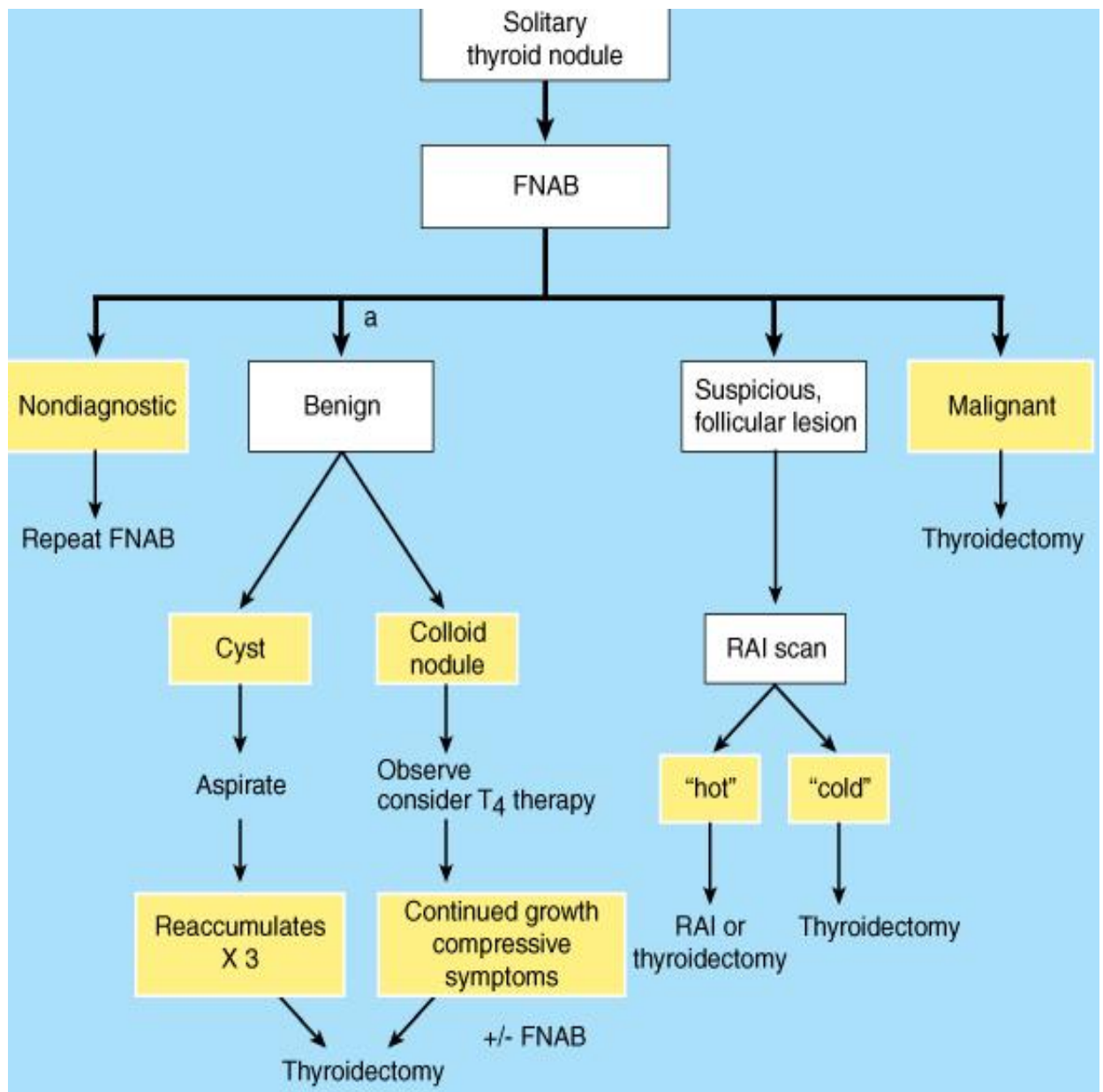
Glass slides

Alcohol

Gauze pad

Adhesive bandage.

PROCEDURE:



Patient underwent clinical examination and patient with solitary nodular goitre included for study and proceeded with fine needle aspiration cytology. It has been done in supine position with pillow under the neck in same position minimum 2-4 aspiration has been carried out, the aspirant transferred to glass slide and some immersed in 70% alcohol and some air dried. The most common stain used is papanicolaou or wright stain, the interpretation classified as benign, suspicious of malignancy or malignancy. Further investigation including thyroid profile (TSH, T3, T4), ultrasound neck, routine blood investigation were carried out. All patient were before surgery screened by ENT surgeon to rule out vocal cord paralysis. In malignancy metastasis workup done includes skeletal survey, liver function test.

The patient were grouped based on FNAC study into

GROUP 1 – BENIGN:

All patients whose both FNAC and clinical examination shows features of benign lesion were grouped-1, they may be colloid or adenomatous goitre.

GROUP II- SUSPICIOUS MALIGNANCY:

The lesion which comes as follicular adenoma which was differentiated from malignancy by FNAC were classified under II

GROUP III- MALIGNANT:

- The FNAC proved malignancy
- Hard swelling
- Voice change
- Regional lymphnode involvement
- Swelling fixed to underlying structure
- Difficulty in swallowing
- Difficulty in breathing
- All patient -100 were grouped under this categories based upon the clinical examination and Fine needle aspiration cytology and management such as thyroidectomy planned as per diagnosis.

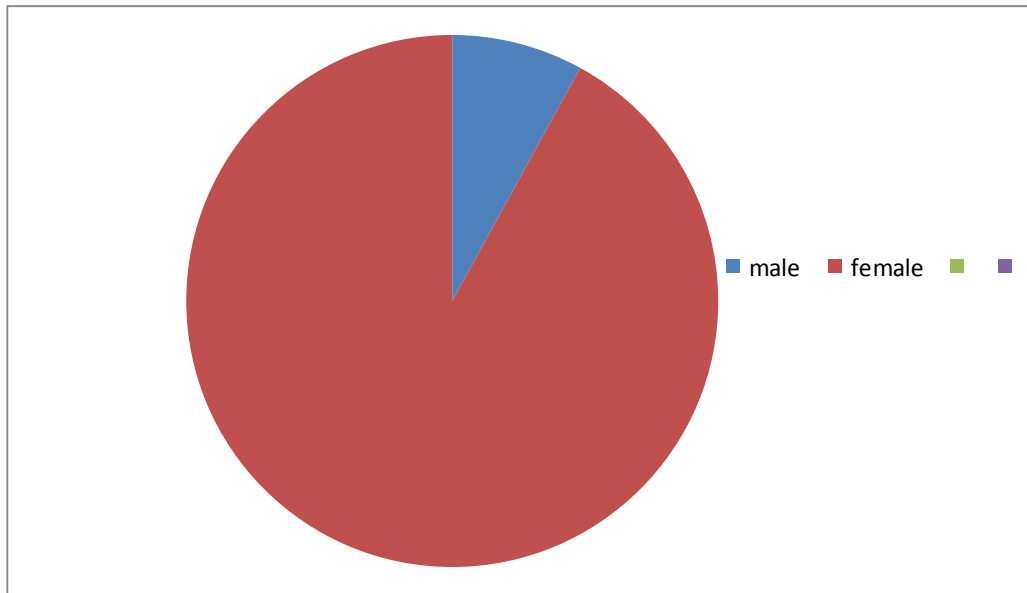
RESULTS

In our study of 100 patients 8 (8%) were male and 92 (92%) females, patient with solitary nodular goitre age wise <30 yrs 2 (8%) males and 22 (90%) females, 30-60 yrs 5 (7%) males and 61 (92%) females >60 yrs 1 (10%) male and 9 (90%) female. The most common age group of both male and female is 30-60 yrs. The nodule were found more in right lobe of thyroid 48 (48 %) out of 100 patients, 47 (47%) of left low and in isthmus for 5 (5%) patients.

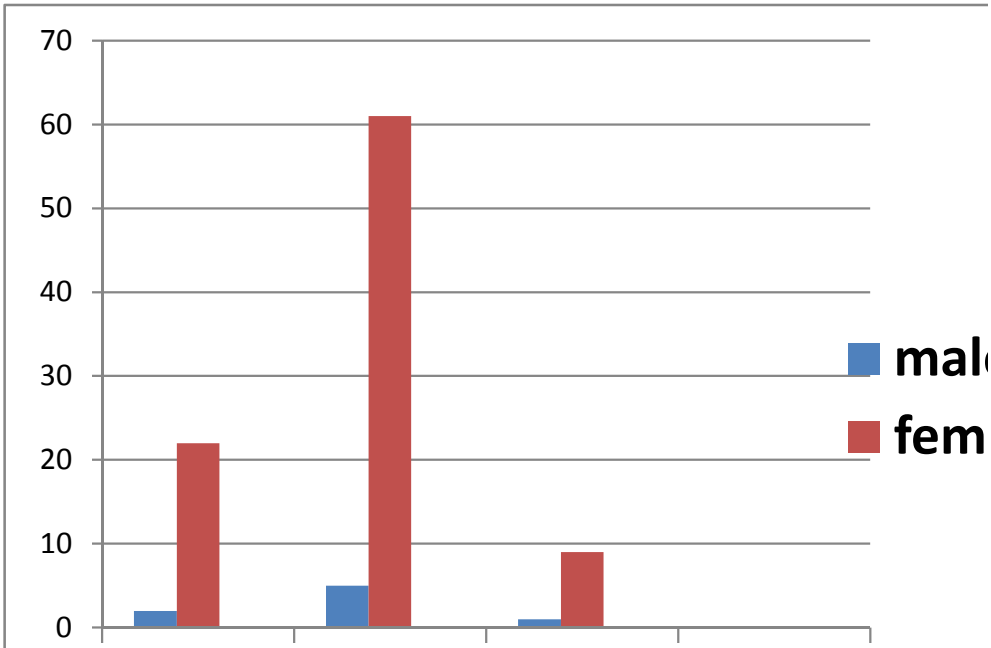
Incidence of malignant nodule out of 100 were 21 (21%) of which 3 (15%) male patient and 18 (88%) female patient. In male out of 3 (33%) one papillary carcinoma and 2 (66%) follicular carcinoma. In females out of 18, 13 (72%) papillary carcinoma and 5 (27%) follicular carcinoma. Rest of 79 cases were benign lesion, the solitary nodule in males are propionately more malignant.

All malignant patient underwent total thyroidectomy with lymphnode dissection while patient with benign lesion underwent Hemithyroidectomy.

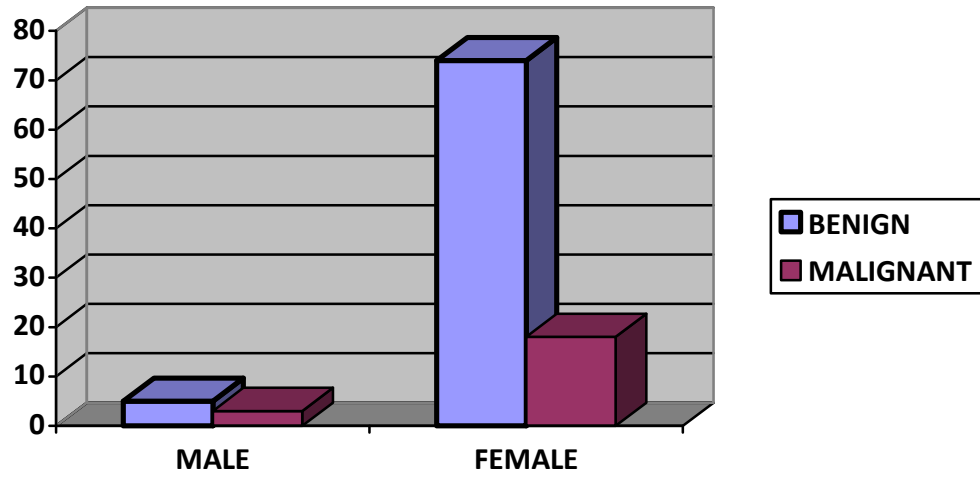
SEX WISE INCIDENCE OF SOLITARY NODULAR GOITRE



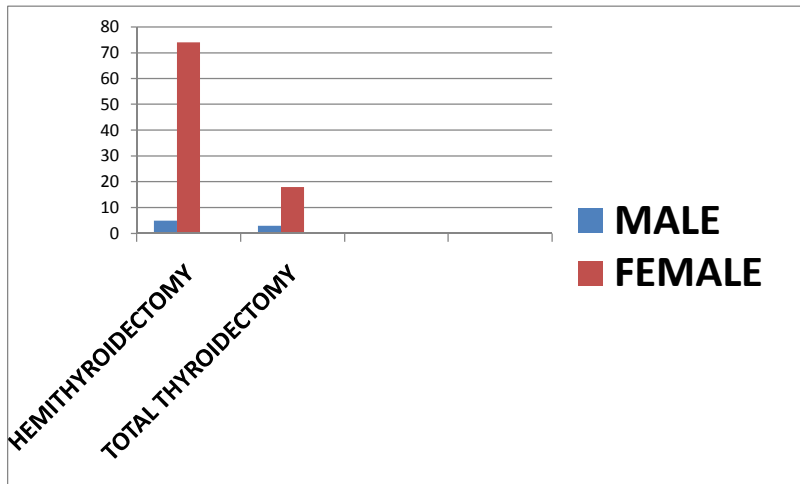
AGE WISE DISTRIBUTION OF SOLITARY NODULAR GOITRE



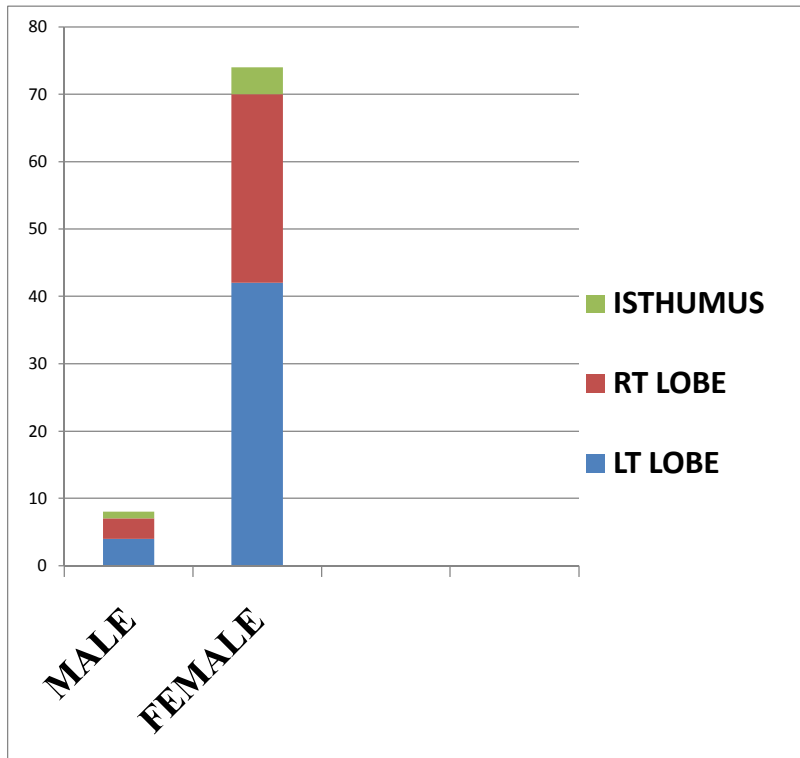
INCIDENCE OF BENIGN AND MALIGNANT LEISION



HEMI AND TOTAL THYROIDECTOMY IN SNG



LOCATION OF NODULE IN THE THYROID GLAND



DISCUSSION

The best and easy modality of investigation with minimum complication is FNAC the adequate specimen has been taken by 3-6 aspiration, in our study only the solitary nodule has been taken which was confirmed by USG and clinical examination. On FNAC basis grouped to benign, malignant and suspicious of malignancy, the suspicious cases FNAC repeated and confirmed. The FNAC proved malignant cases planned for total thyroidectomy with lymphnode dissection. The Solitary nodular goitre patient with Hypothyroidism or Hyperthyroidism treated and followed accordingly. The sensitivity of FNAC in diagnosing Papillary carcinoma is 98% but for follicular carcinoma 90% . In our study the benign lesion follow up HPE report also proved same and Malignant lesion follow up HPE report malignant.

(1) Fine-Needle Aspiration of the Thyroid: Correlating Suspicious Cytology Results with Histological Outcomes

Preoperative FNAC was undertaken in 2,692 patients, and the FNAC result was 'suspicious for malignancy' in 94 (3.5 %) patients. Of these, 53 (56.4 %) were malignant, with the majority 44 (83.0 %) being papillary thyroid cancer. 48 patients went straight to total thyroidectomy, 40 patients had an initial diagnostic hemithyroidectomy, and 1 patient had a diagnostic

isthmusectomy. 5 patients required reoperative total thyroidectomy as an initial procedure. Of the 94 suspicious cases, 55 were reported by an unknown, presumably non-expert, thyroid cytopathologist. 38 of these cases were available for review and re-reporting by an experienced cytopathologist. On review, 28 (73.7 %) were reclassified as cytologically malignant, and all of these were confirmed as malignant on subsequent histopathology.

2.(2) Thyroid nodules are commonly diagnosed in adults. Although rare in children, the risk for thyroid cancer is much higher in the pediatric population compared with adults. Presenting as either a solitary nodule or a multinodular goiter, thyroid nodular disease in children requires a thorough workup that includes a detailed clinical examination comprised of prior history of thyroid disease in the patient or in their family, history of radiation exposure, careful palpation of the thyroid and lymph nodes, blood tests, ultrasonography, and cytological assessment. Thyroid surgery is the gold-standard treatment for pediatric thyroid nodules; nonetheless, the extent of surgery remains controversial. Because surgery is not without risk, the decision matrix necessitates focus on the benefits of surgery for the child contingent upon all the preoperative exams. New diagnostic technology such as molecular testing with fine needle aspiration biopsy may help distinguish between benign and malignant lesions while potentially decreasing surgery

for benign disease. The objective of this review is to summarize new concepts in clinical disease management of nodular thyroid disease in the pediatric population, including patient history, medical examination, and diagnosis workup

3.(3) Thyroid nodular disease is very common in the United States, with palpable nodules occurring in approximately 5% of adults, especially in women. Because of the possibility of a single nodule being cancerous (albeit only approximately 5%), a thorough clinical evaluation, including a detailed history and physical exam, must be undertaken. Fine needle aspiration biopsy is the cornerstone of the laboratory evaluation of thyroid nodules, and its use in recent years has resulted in a significant decrease in the number of thyroid surgeries being performed, while increasing the yield of malignant lesions of patients who have undergone operation. The utility of levothyroxine suppression in patients with benign thyroid nodules continues to be controversial.

4.(4) Fine-needle aspiration biopsy (FNAB) is recommended for the initial evaluation of thyroid nodule. If a benign cytology is obtained, suppression therapy with levothyroxine is the first choice in the management of nodular goitre with a follow-up of nodule size with ultrasonography, but the effects of FNAB have not been taken into consideration in this approach. We

aimed at evaluating the effect of FNAB on thyroid volume and other ultrasonographic dimensions by measurement of these parameters before and immediately after the procedure, and in later periods, and to clarify the necessity of regarding the effects of FNAB on thyroid. Forty-six patients (34 females, 12 males; mean age: 36.3 ± 10.7 yr) with solitary thyroid nodules were included in the study. The nodules were solid in ultrasonography, thyroid function tests were normal and results of FNAB were found as benign cytology. Thyroid hormone suppression therapy was not initiated. Ultrasonographic measurements were made before FNAB, repeated immediately after FNAB, and 1 month and 6 months later. There were no statistically significant changes in the mean thyroid nodule volume, nodule area and circumference of patients before, immediately after FNAB, 1 month and 6 months later. Size differences and individual variability at each time period were analyzed. These parameters changed by more than 10% in a great majority (69.5–78.2%) of patients, and more than 50% change was observed in 17.3–26.0% of patients. Changes in thyroid dimensions were bi-directional, both increment and decrement being noticed. It was thought that this is the reason why there was no significant change in mean nodule volume, area and circumference. Evaluating the difference in nodule volume according to ultrasonographic parameters obtained before FNAB may be misleading because of the individual change

in these parameters with FNAB. It may be useful to evaluate the nodule size and volume closely after FNAB to make a true correspondence of these parameters in the long term.

5.(5) Females constituted 92.5 % (n=617) of the series. The mean age of all patients was 35.2+/-11.58 years (range, 13 to 90 years). Most patients (93%) came from highland areas with an average altitude of 2000 to 2600 meters above sea level. The average duration since patients noticed swelling until the diagnosis was made was about 4 years. Multinodular bilateral swelling was the most common clinical finding (44.9%), while solitary nodules constituted the least common (17.4%). The most common associated symptom was dyspnoea (20.5%). The most common histopathological finding was nodular and colloid goitre (62.8%), while malignancy accounted for 17.7%. Subtotal thyroidectomy was the most frequent procedure, and the most common postoperative complication was hypocalcaemia.

6.(6) Thyroid carcinoma (TC) is a relatively rare tumour, but it represents the most frequent form of cancer of the endocrine glands. Epidemiologically ascertained risk factors are ionising radiation, the presence of thyroid adenoma and multinodular goiter (MNG). Multinodularity of goiter should no longer be considered an indicator of probable benign disease. A retrospective analysis was performed on patients operated of MNG at the

Unit of Otolaryngology, Sanremo Hospital (Italy) from January 1st 1995 to December 31st 2002, in order to establish the incidence of carcinoma. The results of this retrospective study, demonstrate that in 13.7% of the patients operated for goiter, the presence of a carcinoma was noticed in the definitive histopathologic examination. Such incidence percentage of MNG is in accordance with the data reported in published reports. Thus, the authors conclude that the risk of malignancy in MNG has not to be underestimated, and that a dominant nodule in MNG should be valued as if it were a solitary nodule in an otherwise normal gland.

7. Already history, ultrasound and TSH (thyroid-stimulating hormone) determination do allow a first risk assessment for the further diagnostic work-up. Fine-needle biopsy (FNB) offers the best sensitivity and specificity for the distinction between benign and malignant thyroid nodules. The combination of several clinical and ultrasound criteria and laboratory determinations (calcitonin) can help with the selection of thyroid nodules with scintigraphically normal or decreased uptake > 1 cm for FNB. However, the efficiency of FNB requires sufficient training and experience of both the cytopathologist and the person performing FNB.

8. Thyroid nodular disease is very common in the United States, with palpable nodules occurring in approximately 5% of adults, especially in

women. Because of the possibility of a single nodule being cancerous (albeit only approximately 5%), a thorough clinical evaluation, including a detailed history and physical exam, must be undertaken. Fine needle aspiration biopsy is the cornerstone of the laboratory evaluation of thyroid nodules, and its use in recent years has resulted in a significant decrease in the number of thyroid surgeries being performed, while increasing the yield of malignant lesions of patients who have undergone operation. The utility of levothyroxine suppression in patients with benign thyroid nodules continues to be controversial

9. Results

In the present study, rapid enhancement was seen in 87.5% of malignant cases and washout pattern was seen in 87.5% of malignant STN ($p = 0.019$). Only 20% of the benign lesions showed washout pattern ($p = 0.0034$). Benign cases demonstrated gradual enhancement in 85% cases as compared to 12.5% in malignant STN ($p = 0.0098$).⁽⁸⁾

10. (9) Nodular goiter encompasses a spectrum of diseases from the incidental asymptomatic small solitary nodule to the large intrathoracic goiter causing pressure symptoms as well as functional complaints. The mainstay in the diagnostic evaluation is related to functional and morphological characterization with serum thyroid-stimulating hormone

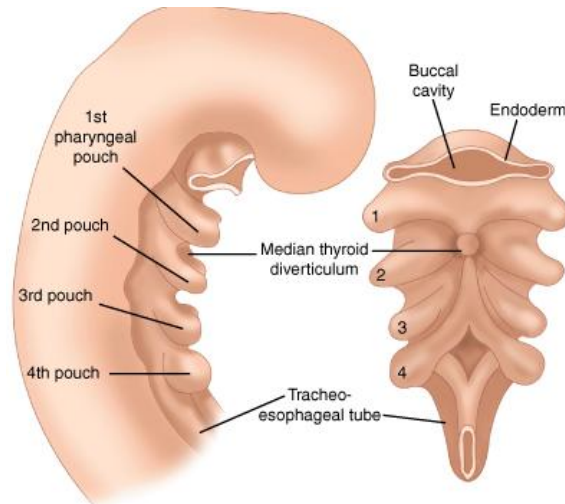
(TSH), ultrasound (US) and other imaging procedures and cytology by fine needle aspiration (FNA) on the basis of the different diseases. A clinical classification considering solitary cyst, adenomatous functioning nodule, follicular lesion and multinodular goiter may be proposed to consider the alternative therapies other than surgery as TSH suppressive or thyrostatic treatment, ¹³¹I therapy, percutaneous ethanol injection therapy (PEIT) or the only clinical exam in benignant lesions. Surgery should be advocated for the treatment of thyroid nodules whenever a patient presents with either pressure symptoms, hyperthyroidism or follicular/indeterminate cytology. Surgical approach, intraoperative strategy and the extension of surgical treatment are correlated to the different clinical categories. At surgery the frozen section analysis in case of hemithyroidectomy is of aid to rule out malignancy and to prevent the reoperation. The surgical treatment of choice in case of uninodular goiter is lobectomy, total thyroidectomy or near total thyroidectomy is the correct treatment of multinodular bilateral goiter. The choice of the treatment must be condvided with the patient.

11.(10) There were 160 multinodular goiters during the study period, out of which 24 (15.0%) had histologically diagnosed cancer, and 1 out of the thirteen patients with solitary thyroid nodule (7.6%) had carcinoma. The ages of the patients with carcinoma ranged from 16 to 65 years, with a mean age of 38.8 years. Eighteen (72%) were females, and 7 (28%) were males.

Six out of the 25 cases of carcinoma were detected preoperatively by fine needle aspiration cytology. Well differentiated follicular carcinoma was the predominant histological type in 13 (52%) cases, followed by papillary in 10 (40%), medullary carcinoma in 1 (4%) and anaplastic carcinoma in 1 (4%) patient.

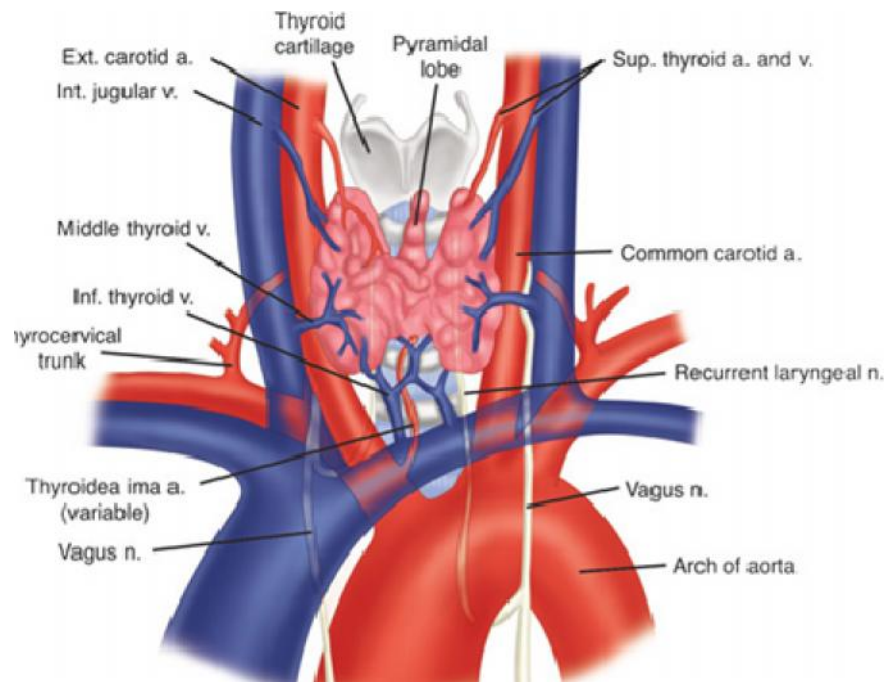
12.(11) Repeat FNAC was benign in 346 patients (86.5%), insufficient for diagnosis in 42 (10.5%), suspicious in 16 (2.5%) and malignant in 2 (0.5%). All diagnostic changes to suspicious malignant cytology took place in patients with solitary nodules. Surgery confirmed thyroid cancer in the 2 patients with malignant cytology, in 5 of 10 patients with suspicious cytology and in none of 39 patients with benign cytology who underwent surgery for other reasons. Clinical changes (size increase or local symptoms) were not related to changes in cytologic diagnosis after a second aspiration, nor with the results of the biopsy.

EMBROLOGY



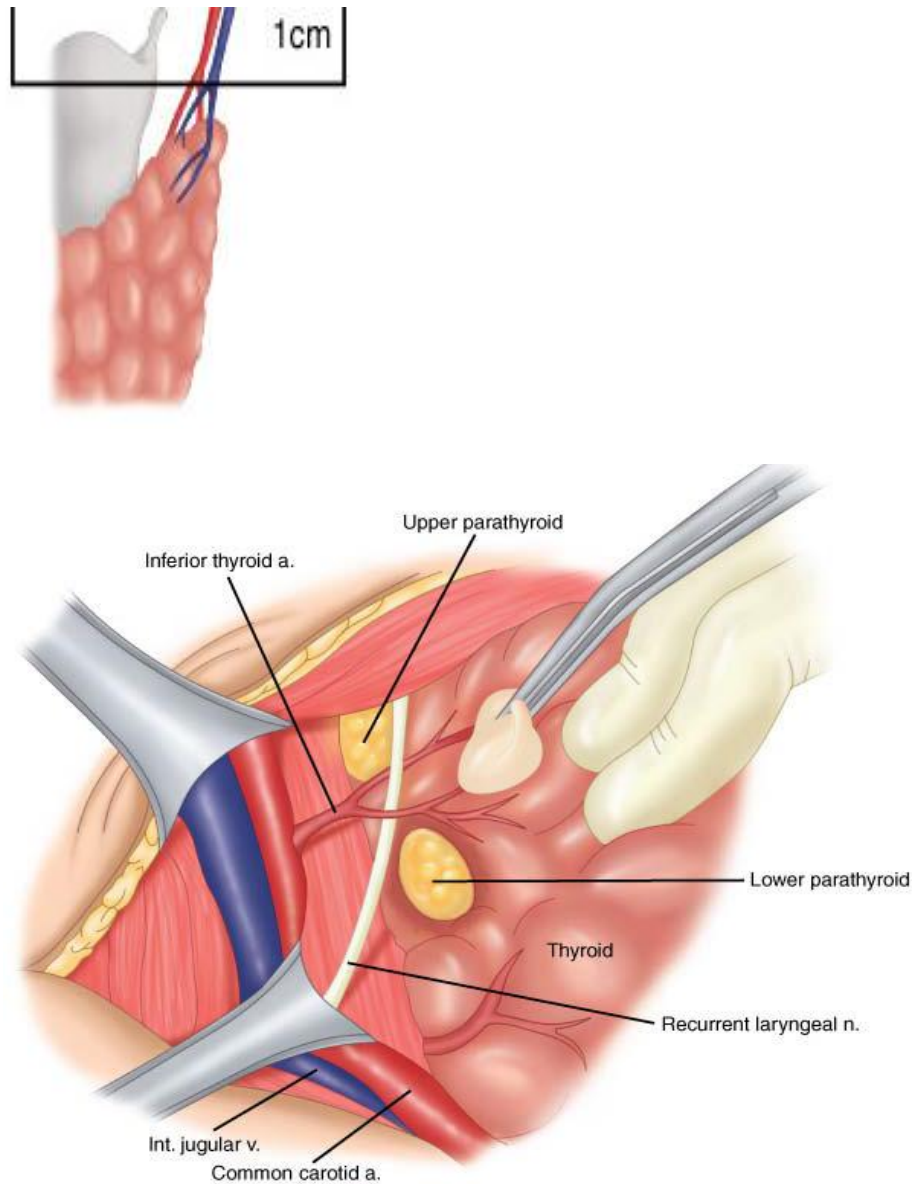
Thyroid Gland develops from Thyroglossal duct by Invagination from floor of pharynx. Thyroglossal duct Extends from foramen caecum in the base of tongue to the neck. This is of endodermal origin. Thyroglobulin synthesis starts by 8th week of gestation. Iodine trapping and colloid formation by 12th week of gestation. Calcitonin producing parafollicular cells develop from 4th pharyngeal pouch and migrates from neural crest . By 6th week of gestation this thyroglossal duct reabsorbed only distal end remains and matures as pyramidal lobe. The maternal TSH, T3, T4 do not cross placenta.

ANATOMY



Thyroid gland weight is around 10-20 grams. It is bilobed structure lying anterior compartment of the neck at the junction of larynx and trachea connected by isthmus, Thyroid gland has the highest rate of Blood flow per gram of tissue of any organ of the body. Thyroid extends lateral to trachea and oesophagus. The deep investing layer of neck pre-tracheal fascia encircles the thyroid gland, posteriorly gets condensed to form ligament Berry attached to cricoids cartilage. It is lined by cuboidal epithelium with 20-40 follicles. Nerves-superior laryngeal nerve travels along with superior thyroid Artery and inferior thyroid artery accompany recurrent laryngeal Nerve.

Blood supply:



The Thyroid gland is supplied by following Arteries, superior thyroid artery-Branch of External carotid artery. Inferior Thyroid artery-Branch of Thyrocervical trunk which is branch of subclavian artery. In 5% of

individuals Thyroid ima artery direct branch of arch of aorta directly supplies.

Venous Drainage:

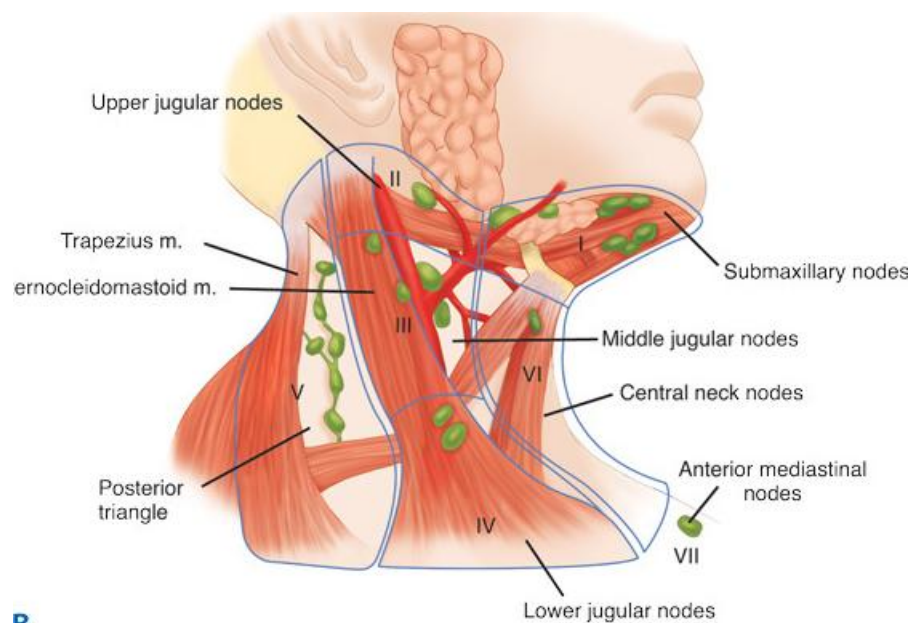
The Thyroid gland drained by 3 known veins

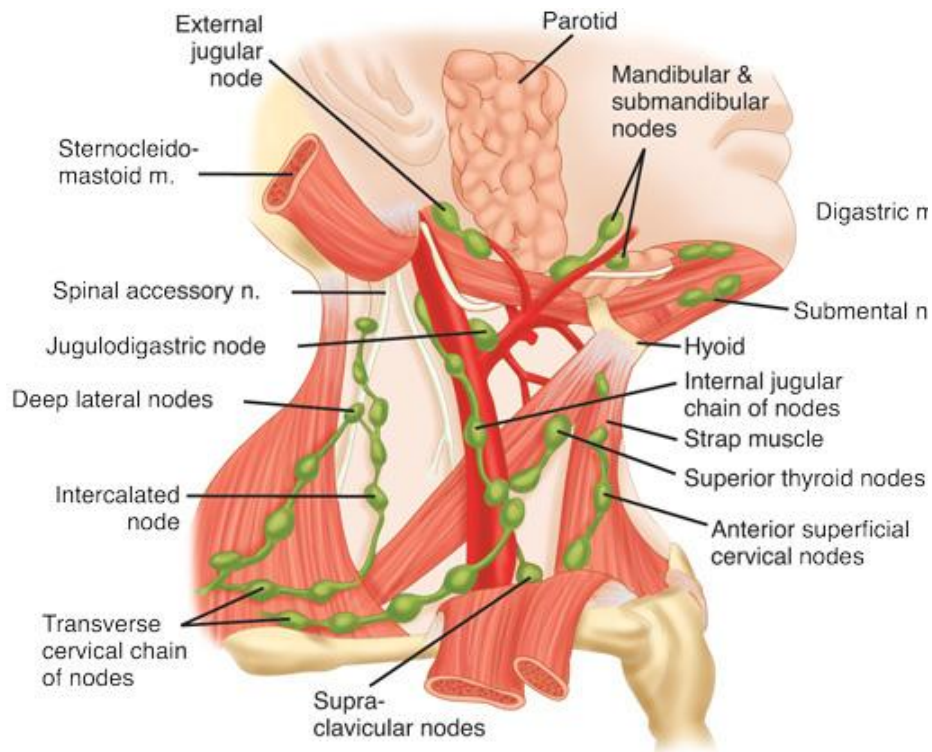
The superior thyroid vein drains into internal jugular vein.

The middle thyroid vein drains into internal jugular vein.

The inferior Thyroid vein drains into Brachiocephalic vein.

Lymphatic Drainage:





The gland drain into

Pre-tracheal nodes

Para-tracheal nodes

Superior mediasternal nodes

Retropharyngeal nodes

Oesophageal nodes

Upper, middle, lower jugular nodes

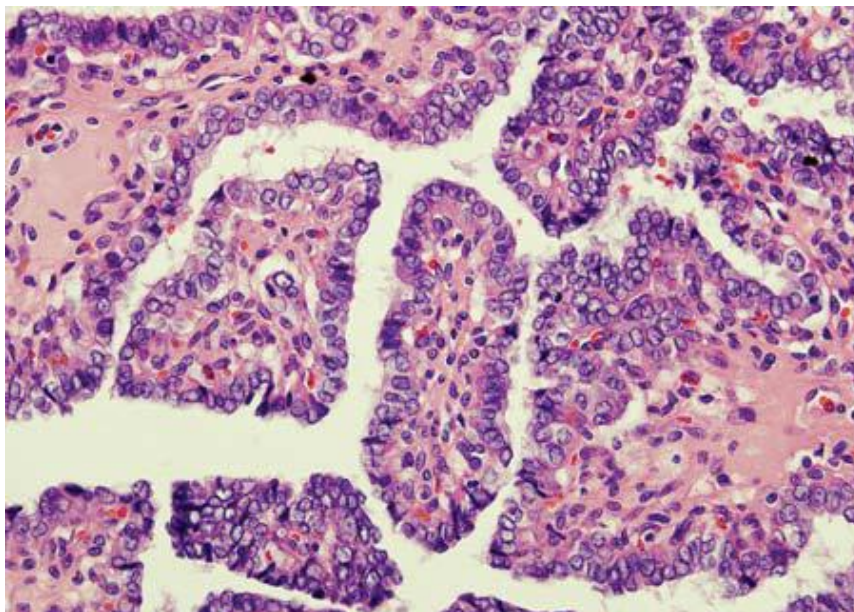
Cervical nodes

Sub maxillary node

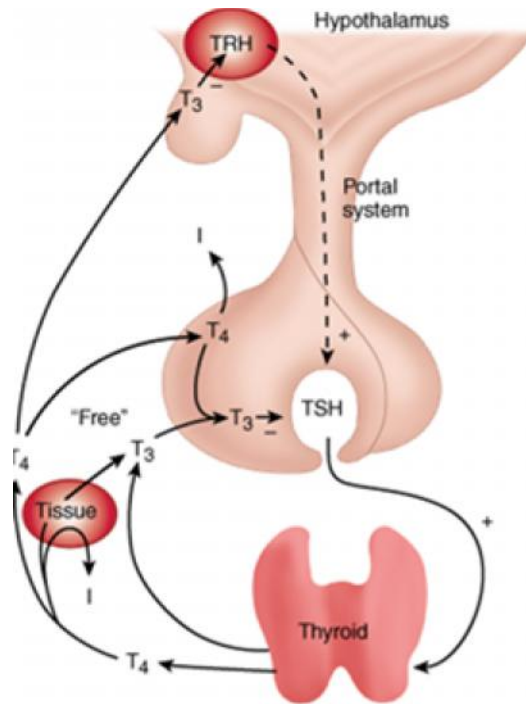
MICROSCOPIC FINDINGS

Each gland lobes are made of multiple follicles. Each follicle are spherical in shape and surrounded by single layer of secretory cells, central portion of follicle filled with colloid. When the gland is Inactive cells are flat and here more colloid. When the gland is active Cells are cuboid or columnar follicles are small and have less

Colloid. Colloid is nothing but condensed Thyroglobulin.



PHYSIOLOGY



Thyroid gland secretes following Hormones directly into blood stream.

T₄-Thyroxin

T₃-Tri-iodothyroxin

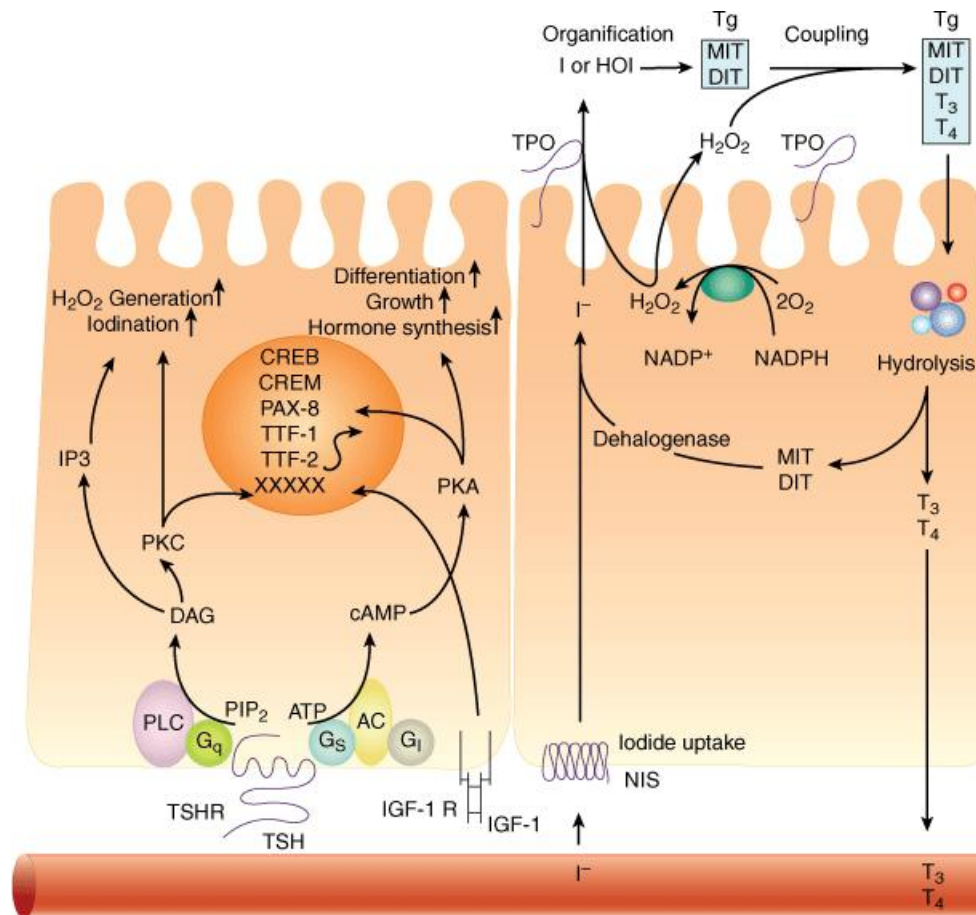
Reverse T₃-Reverse Tri- iodothyronin

Calcitonin-calcium lowering substance.

Thyroid hormone required for 2 weeks are stored in the gland. Most of thyroid hormone released is T₄, it is converted in the peripheral Tissue to T₃. T₃ hormone is most active and potent. Reverse T₃ is Inactive.

Hypothalamo-pituitary thyroid axis regulates Thyroid Hormone secretion. Hypothalamus secretes Thyrotropin Hormone Which acts on anterior Pituitary and stimulates to secrete TSH, TSH acts on Thyroid gland and release Thyroid Hormones. There is Negative feedback inhibition System. TSH is Primary regulator of Thyroid Hormone. Condition that decreases TSH secretion classified as primary Hypothyroidism. When abnormality results at Hypothalamus and pituitary results in decreased TSH is called central Hypothyroidism. In the periphery thyroid T4 is converted to T3 and Increase affinity peripheral nuclear thyroid hormone receptor Member of steroid hormone receptor family. 80% of circulating Thyroid hormone bind to thyroxin binding globulin in the periphery. Some of T4 is bound to pre-albumin and albumin. Only 1% of T3 and T4 are free, rest of are bound. The Half life of T3 is 12 hours, T4 is 7 days due to efficient binding. Patient with Thyrotoxicosis have increased adrenergic activity, the Beta Blockers used for treatment does not directly inhibit thyroid Hormone synthesis parse the control sensitivity to Catecholamine's. Therefore cardiovascular symptoms such as Increased pulse rate, tremor and anxiety improve but Hyper metabolic rate remains as, progress with treatment alone.

THYROID HORMONE SYNTHESIS:

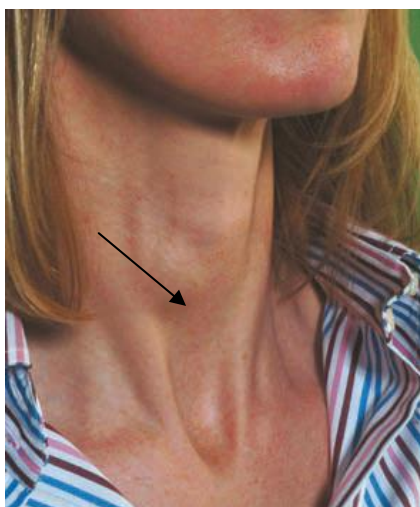


80% of Iodine in the Body is found in the Thyroid gland. In thyroid follicle iodide get oxidised to iodine and bind tyrosine residue of thyroglobulin results in formation Iodothyronine namely MIT, DIT, of this when both DIT combines to form T4. MIT, DIT combines to form T3. rarely DIT, MIT results in formation of reverse T3 which is inactive.

PATHOLOGY

Solitary thyroid nodule

The palpable single nodule in thyroid gland with rest of gland impalpable or otherwise normal gland is called solitary nodule. The solitary thyroid malignancy is common around 6-16% of cases. The solitary nodule commonly due to thyroid adenomas which are follicular type colloid variety, it does not have potency for micro-invasion, other type fetal-microfollicular potential for micro-invasion. Embryonal atypical also potential for micro invasion.



The papillary carcinoma is common, follicular, medullary and anaplastic are rare. In some cases thyroid cyst or thyroiditis present as nodular goitre. The solitary nodule 70% are benign, 10%- suspicious of malignancy, 5% are malignant and 15% are non diagnostic. Some nodule may be toxic or non toxic based on radioisotope scan, Hot means the

autonomous toxic nodule, nodule is overactive the surrounding thyroid tissue is normal and inactive. The warm nodule is normal functioning nodule, the nodule and surrounding normal thyroid will take up the isotope. Out of 10% are malignant. The cold nodule are non functioning nodule will not take up isotope, out of which 20 % are malignant.

The features of solitary nodule is palpable nodule in one or other lobe which is firm and smooth, on examination absent nodule in other part of whole gland. The nodule in children and elderly adult are mostly malignant confirmed by radioisotope scanning, some time the malignant lesion goes up rapid enlargement, with tracheal deviation confirmed by trail sign and by x-ray neck. The common site of nodule is junction of isthmus to thyroid gland. The characters suggesting of malignancy is hard nodule rapid increase in size, with hoarseness of voice, dysphagia, stridor, dyspnoea. There may be fixity of nodule with neck nodes.

BENIGN NODULE

The benign nodule which is nontoxic observed without any treatment. There is no hormone treatment, clinical examination is annually to rule out increase in size of 2mm or 20% in diameter then needs repeated FNAC followed hemithyroidectomy. When there are compressive symptoms or

cosmetics hemithyroidectomy can be planned. In follicular adenoma total thyroidectomy can be done.

MALIGNANT NODULE

In fine needle aspiration cytology comes as papillary carcinoma the total thyroidectomy can be done. When there is extracapsular spread with 2cm in size than radioactive iodine can be used, followed by suppressive dose of thyroxin. When patient operated for follicular adenoma than biopsy reports as follicular carcinoma with capsular and vascular invasion than total thyroidectomy can be done after 3 weeks are within 7 days. In medullary carcinoma along with total thyroidectomy bilateral neck nodal dissection with central compartment is done.

INDETERMINATE NODULE

In follicular adenoma patient treated with hemithyroidectomy but if HPE reports for follicular carcinoma with capsular and vascular invasion than total thyroidectomy done within a week.

In suspicious nodule hemithyroidectomy is done followed frozen section report total thyroidectomy is done in malignancy, the frozen section is useful in papillary carcinoma but not in follicular.

BENIGN THYROID DISEASE:

Hypothyroidism:



Primary Hypothyroidism is failure of thyroid to produce sufficient Hormone. In some cases production is normal but hormone has limited activity or resistance.

IODINE DEFICIENCY:

Chronic Iodine deficiency due to decreased intake Leads to decreased production of hormone. On investigation T3, T4 low and TSH is elevated. Goitre develops at early ages, it remains Higher in women's. Thyroid gland enlargement occurs, Follicular space reduces and follicle distended with colloids. The follicle became inactive. Necrosis, scarring, Haemorrhage, fibrosis can occur resulting in enlargement in asymmetric pattern.

POST RADIATION HYPOTHYROIDISM:

It is seen in patient underwent I131 therapy for Graves's disease, Toxic Multinodular Goitre or external beam radiation in mediasternal lymphoma.

POSTSURGICAL HYPOTHYROIDISM:

It is commonly seen following subtotal thyroidectomy or total thyroidectomy.

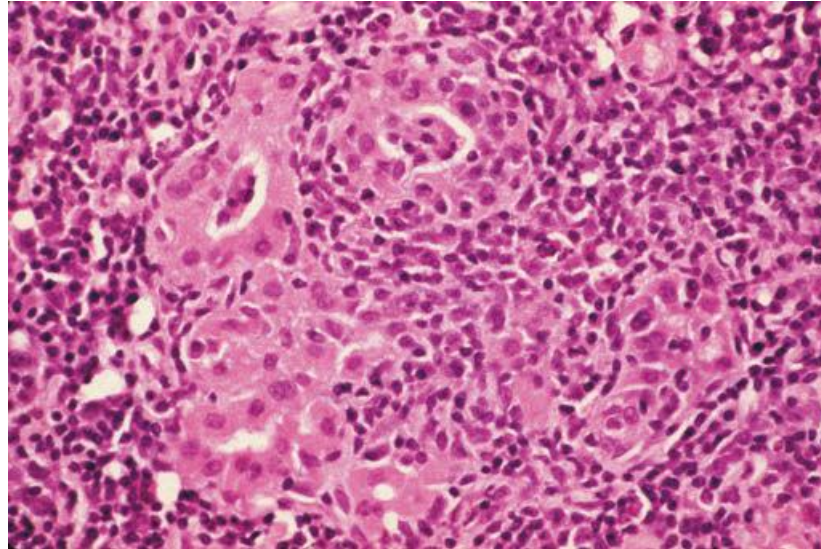
DRUG INDUCED HYPOTHYROIDISM:



Methimazole, propylthiouracil can cause Hypothyroidism on treatment of Hyperthyroidism. Some drugs like lithium, Amiodarone and cytokines can also induce Hypothyroidism.

THYROIDITIS:

Hashimoto's thyroiditis



It is autoimmune Thyroiditis, most common cause for Hypothyroidism in adults mostly seen in Females(10:1) in Hashimoto's Thyroiditis antibodies are formed against TSH receptors and Thyroid peroxidase, results in reduced Thyroid hormone synthesis.

CHRONIC LYMPHOCYTIC THYROIDITIS:

In this condition there will be raised antibodies titre, patient present with nodular, diffuse or bosselated or rarely subclinical thyroid failure. In some cases primary myxoedema without thyroid enlargement present as end stage of pathological process. The onset may be insidious or sudden with mild hyperthyroidism followed hypothyroidism. The goitre may be lobulated or localised to one lobe with soft, rubbery, firm or fibrosis in consistency in

women at menopause rarely develops into papillary or malignant lymphoma. Patient should be supplemented with thyroxine because some may subside with hormone therapy. Even after the goitre increase after thyroxine then steroid can be tried. Thyroidectomy is necessary if thyroid large and produce discomfort.

GRANULOMATOUS THYROIDITIS :

It is otherwise called as subacute thyroiditis, de quervain's thyroiditis, following viral infection, It develops following upper airway infection. Patient have diffuse swelling in cervical with sudden increase in pain. Some patient present with fever, fatigue loss of weight, however the disease process progress. On investigation raised inflammatory markers without antibodies, normal thyroid profile with low I123 uptake by gland. Some patient present with hypothyroidism or hyperthyroidism, the treatment is steroid for two weeks and tapered for next month, if thyroid failure arise thyroxin can be substituted.

RIEDEL'S THYROIDITIS

Rare of .5 % goitre where thyroid is replaced with cellular fibrous tissue, leads to infiltration to adjacent muscle, parathyroid, nerve and vessels. In this patient may be associated with collagen disease involving fibrosis of retroperitoneum and mediasternum. The hard goitre with fixity should be

differentiated from anaplastic carcinoma thyroid by isthumectomy biopsy. It is treated with steroid, thyroxin and tamoxifen, in early treatment response is good.

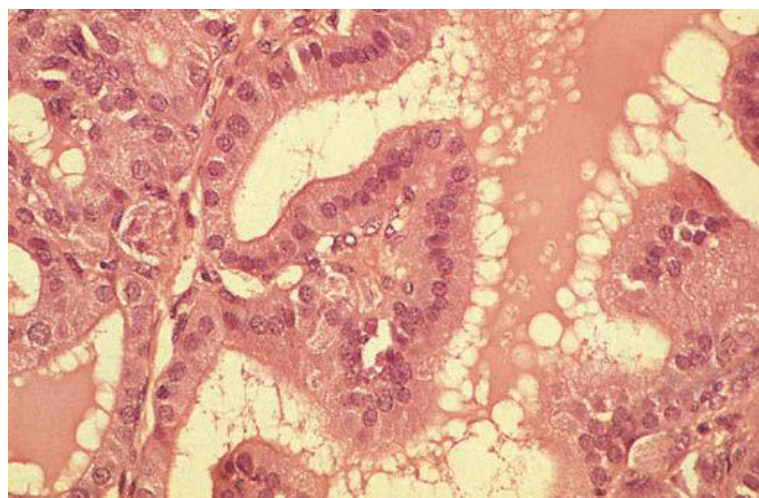
ACUTE SUPPURATIVE THYROIDITIS :

It is due infection of Thyroid following Pyogenic infection of upper airway. It is very rare.

HYPERTHYROIDISM:

The classical symptoms of Hyperthyroidism Includes sweating, anxiety, increased appetite, loss of weight, Heat intolerance, palpitation, Hair loss, Hyper menorrhoea, congestive cardiac failure, ventricular tachycardia and ventricular fibrillation and high output cardiac failure.

THYROTOXICOSIS:



Thyrotoxicosis is nothing but hyperthyroidism, symptoms due raised level of circulating thyroid hormone resulting in manifestation of disease.

The clinical types are

1. GRAVES DISEASE :



It is autoimmune Hyperthyroidism, due to auto Antibodies against TSH receptor, commonly seen in women 20-40yrs. In Graves disease eyes are affected mostly, results in proptosis, supraorbital, infraorbital conjunctival swelling and odema, which leads to ophthalmoplegia, diplopia, optic nerve damage and blindness. 50% of patients have autoimmune endocrine disease.

The heart rate is fast in thyrotoxicosis which persists in sleep also. The cardiac arrhythmia superimposed on sinus tachycardia which results in multiple extrasystole, paroxysmal atrial tachycardia, paroxysmal atrial fibrillation, followed atrial fibrillation not responding to digoxin.

MYOPATHY

There is proximal muscle weakness the severe weakness resembles myasthenia gravis which improve on control of hyperthyroidism.

EYE SIGNS

Some patient develops exophthalmos to some degree is common in thyrotoxicosis but in true exophthalmos is proptosis of eye due to infiltration of retrobulbar tissue with fluid and round cells resulting in retraction and spasm of upper eyelid. The widened palpebral fissure with upper sclera visible above margin of iris and cornea. When hyperthyroidism is on control the spasm and retraction disappears. The eye signs improved with beta-adrenergic blocking drugs, the ophthalmic vein compression results in oedema of eyes, chemosis, conjunctival injection. The diplopia due to weakness in elevator muscle (inferior oblique). The severe form called as malignant exophthalmos. The exophthalmos improved by sleeping and lateral tarsorrhaphy. Patient improves with high dose of steroid.



LID RETRACTION :

The lower eyelid normal in position, the upper eyelid is higher than normal, due sympathetic over activity causing the spasm of Muller muscle levator palpabera superiors.

VON GRAEFE'S SIGN :

The inability of upper eyelid to follow eyeball on looking downward of examiners fingers.

DALRYMPLE'S SIGN :

Visibility of upper sclera due to retraction of upper eyelid.

STELLWAG'S SIGN :

Absence of normal blinking, due to widened palpebral fissure is the first sign to appear, the lid retraction and contraction of voluntary muscle levator palpebra superioris produces this sign.

JOFFROY'S SIGN:

In head bent down position when eyes looked up absent forehead wrinkles.

MOEBIUS SIGN:

The eyeball fails to converge, due to lymphocytic infiltration of rectus and inferior oblique muscle results in diplopia.

NAFFZIGER'S SIGN:

The patient examined from behind patient in sitting position with neck fully extended the protruded eyeball is visualised.

THYROID DERMOPATHY:



It is pretibial myxoedema, characterised by thickening of skin by deposition of hyaluronic acid in dermis and subcutis.

TOXIC NODULAR GOITRE:

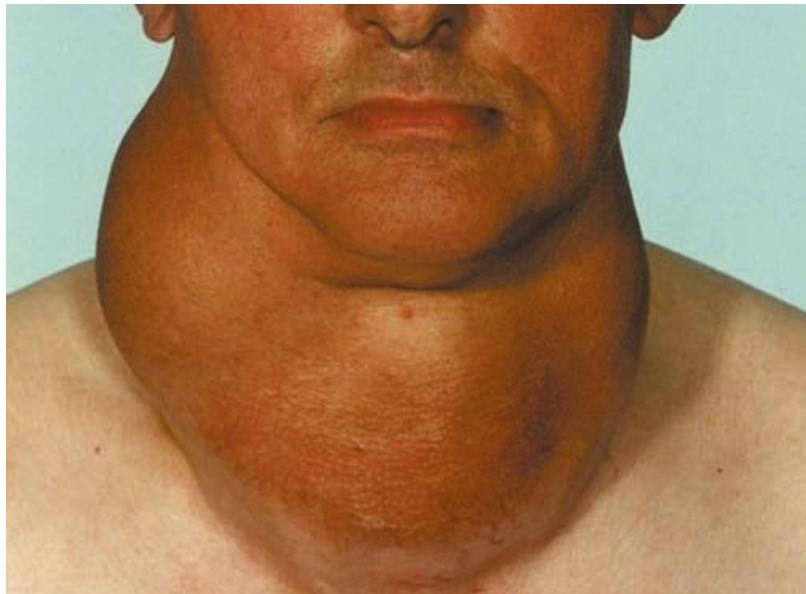
It present as simple goitre for long time before, hyperthyroidism commonly in middle aged or elderly women associated with eye signs. Secondary thyrotoxicosis features as been seen. Toxic nodular goitre, nodule in goitre functions autonomously independent of TSH. However in some cases one or more nodules are overactive and results in hyperthyroidism.

TOXIC ADENOMA :

A toxic nodule is a solitary overactive nodule as a part of generalised nodularity or as toxic adenoma. The TSH receptor antibody does not play any role it is autonomous hypertrophy and hyperplasia. The high level of thyroid hormone results in suppression of TSH which results in inactive nodule and gland. In normal thyroid gland consist of follicle lined by cuboidal epithelium filled with colloid homogenous material, in hyperthyroidism the cells became columnar epithelium and may them are empty and others contain vacuolated colloid.

NON FUNCTIONING GOITRE :

MULTINODULAR GOITRE :



The thyroid gland diffusely enlarged heterogenous, asymmetric nodularity is seen, the cause is usually iodine deficiency. Initially the mass is euthyroid by elevation in size of gland T3 T4 level progress to hypothyroidism.

SUBSTERNAL GOITRE:



The enlarged thyroid extends into thoracic, substernally. Mostly substernal goitre is secondary because of Extension of multi nodular goitre. Vascularity depends on inferior thyroid artery. But in primary is aberrant tissue in anterior or posterior mediasternum depends on intrathoracic vascularity.

CLINICAL FEATURES

HYPOTHYROIDISM

1. Bradycardia
2. Cold extremities
3. Dry skin and hair
4. Periorbital puffiness
5. Hoarseness of voice
6. Bradykinesia
7. Delayed relaxation phase of ankle jerks

SYMPTOMS:

1. Tiredness
2. Mental lethargy
3. Cold intolerance
4. Weight gain
5. Constipation
6. Menstrual disturbance
7. Carpal tunnel syndrome.

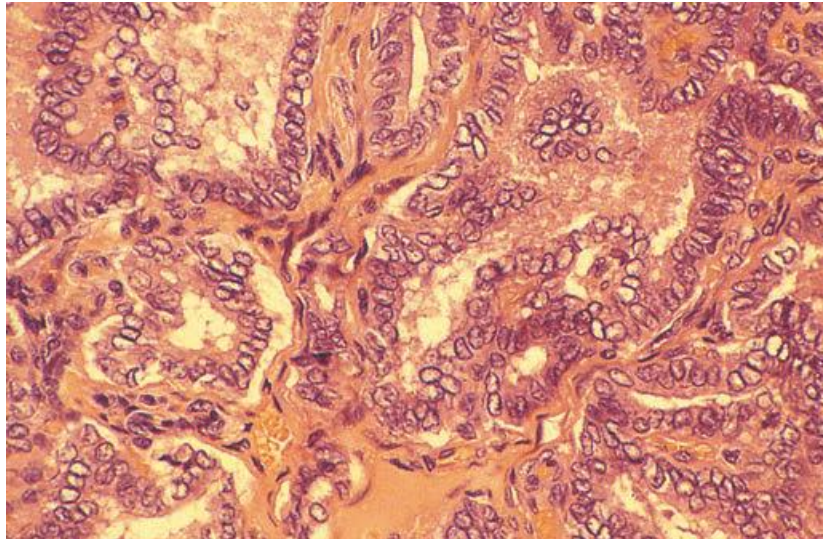
HYPERTHYROIDISM:

1. Tiredness
2. Emotional liability
3. Heat intolerance
4. Weight loss
5. Excessive appetite
6. Palpitation
7. Tachycardia
8. Hot, moist palms
9. Exophthalmos
10. Eyelid lag/retraction
11. Agitation
12. Thyroid goitre and bruit.

MALIGNACIES:

PAPILLARY CARCINOMA:

Papillary carcinoma is most common thyroid Neoplasm with excellent prognosis. More common in female patients particularly 30-50 years of age. Most common risk factor is ionising radiation exposure in childhood for medical or from environmental source or thyroid malignancies in families. Diagnosis can be made by Presence follicle filled with follicular structures in some mixed with



colloid and follicle of intra-nuclear inclusion bodies follicular grooves and psammoma bodies, histologically in tumour there will be papillary projections with orphan annie –eyed nuclei. The primary tumour can arise as multiple foci in same lobe, the gland is rich in intrathyroidal lymph plexus so lymphatic spread is more common. Extrathyroidal by infiltrating capsule and spreading to surrounding trachea and oesophagus is rare. The treatment of choice is high risk patient that is

1. More Than 50 Yrs of Age
2. Tumour Size Greater Than 4 Cm
3. FNAC Suspicious of Papillary Carcinoma
5. Family History
6. History of Radiation Exposure

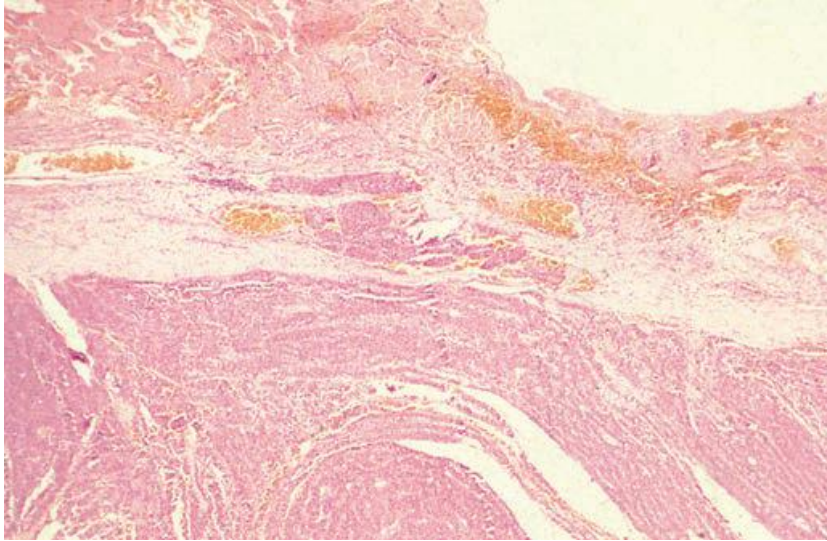
To undergo near total or total thyroidectomy.

MICROCARCINOMA (OCCULT CARCINOMA)

The tiny foci prevalence of papillary carcinoma is based thyroid examined under microscope. The autopsy studies shows when thyroid examined the incidence of papillary carcinoma 36% , the never progress to became clinically significant. In some cases the thyroid appears normal but there will be enlarged lymphnode or pulmonary metastasis. When the primary tumour size of less than 1.5 cm called as occult but now when tumour size less than 1 cm called as microcarcinoma.

FOLLICULAR CARCINOMA:

Follicular carcinoma is the second most common thyroid malignancy. Most common in females of 3:1 ratio, of older age distribution 40-60yrs. It is increased in incidence associated with iodine deficiency. They appear to be capsulated but capsular and vascular space invasion is seen On histopathology examination follicular cancer deposits in capsule, vascular and lymphatics. The lymphatics involvement is less than 10% compared to papillary thyroid cancer, prognosis is less favourable in follicular carcinoma.



Treatment of choice is total thyroidectomy. Postoperatively radioiodine ablation therapy can be done using iodine I 131.

HURTHLE CELL CARCINOMA

It is subtype of follicular carcinoma. It contains abundant oxyphilic cells. It has worse clinical prognosis common in older age.

PROGNOSIS IN DIFFERENTIATED THYROID CANCER

There is excellent prognosis in differentiated thyroid carcinoma. The prognosis depends on various factors most common is age at diagnosis, size of tumour, metastasis, extrathyroidal spread or capsular transgression (follicular carcinoma). Approximately 70 percent of patient risk of dying of thyroid cancer due recurrence failure to eradicate all macroscopic disease at first operation. The treatment of choice in this patient is total thyroidectomy with adjacent nodal excision followed by radio iodine ablation with long

term TSH suppression. The guidelines advocate routine total thyroidectomy followed early reoperation and second lobectomy following the first lobectomy with central compartment node dissection for all tumours greater than 1 cm. Total Thyroidectomy facilitates use of radio iodine for post operative scanning to detect and ablate metastases in lower thyroglobulin level, local recurrence in thyroid contralateral lobe or thyroid bed is rare in total lobectomy. When surgery is planned in differentiated thyroid carcinoma image of neck with MRI or USG is done to identify nodal involvement and plan for surgery Total thyroidectomy can be done tumour greater than 2 cm with metastasis and nodal involved, for other cases lobectomy can done. Functional selective node dissection of involved node level is performed if required. Level 3-7 node is accessed by lateral extension of normal thyroidectomy, if accessibility to level is needed J shaped incision is done the aim of our surgery is to remove macroscopic diseases. There difference between central compartment dissection in patient without nodal involvement to with nodal involvement. In diagnostic there will be unilateral nodal dissection with preservation of thymus but in therapeutic dissection requires clearance of all tissue to the level of innominate vein. Sometime it may required to sacrifice recurrent laryngeal nerve, oesophagus and trachea.

OPTIONAL MODALITIES

Thyroxine is commonly used in dose of 100-200 mcug daily to suppress endogenous TSH production in all cases of differentiated thyroid cancer due TSH dependant. TSH suppression is confirmed by measurement when the level not $<.1\mu\text{u/L}$ then the dose of thyroxine is inadequate. Most patients require thyroid supplementation following total thyroidectomy and near total thyroidectomy. Patient with metastasis may require repeated dose of radio iodine for scanning and therapy so tri-iodothyronine can used because of shorter duration of action. The patient is spared 4 weeks to develop thyroid insufficiency . instead of thyroxine withdrawl recombinant TSH can be for 48 hours period for maximum iodine uptake which is more expensive.

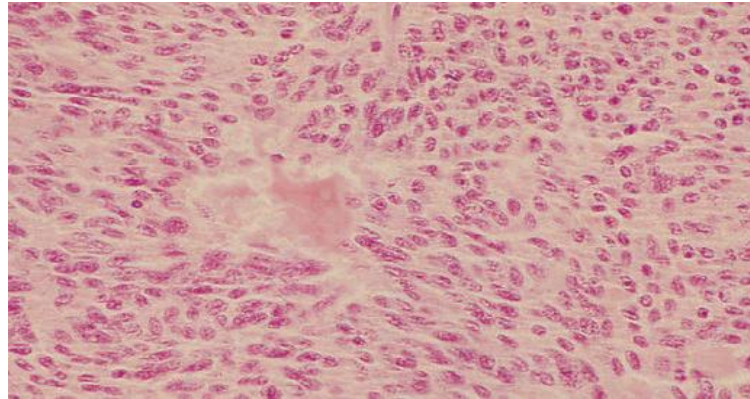
In radio isotope scan when metastasis take more radioisotopes they can treated with large dose of radioiodine. The proper scanning method the normal thyroid tissue must have been abalated either by surgery or radioiodine so the patient must be hypothyroid to improve uptake. The radiodine are used in unresctable, metastatic disease, local recurrence. A high dose radio iodine given followed whole body scan 10 days later to allow decay of activity. The solitary metastasis is treated by external radiotherapy. When metastasis is treated the serum thyroglobulin level and protocol decides when scan to be repeated.

Thyroglobulin is used as indicator in cases of follow up in detection of metastatic disease in patient who have undergone surgery for papillary or follicular malignancy. This indicator can be used following lobectomy or total thyroidectomy where endogenous TSH production is suppressed by Thyroxine. When antithyroglobulin antibodies found thyroglobulin as serum marker for recurrence becomes invalid .

MEDULLARY CARCINOMA

It accounts for 4-8% of thyroid cancer, arises from parafollicular cells or C cells. Commonly associated with MEN 2A and MEN 2B. It is diagnosed by finding of increased calcitonin level. Calcitonin has been used as indicator which falls on resection and increases on recurrence. Most patients present with diarrhoea due to increased level of 5-hydroxy tryptamine or prostaglandin produced by tumour cells. The medullary carcinoma of the thyroid can occur in combination with adrenal pheochromocytoma and hyperparathyroidism commonly in children and young adults. Involvement of lymph nodes occurs in 40-50 % of cases and blood borne metastasis is common. The treatment is total thyroidectomy with therapeutic or prophylactic dissection of bilateral and central cervical nodes. Patients with RET mutation are more prone for development of medullary cancer in later life. In some cases prophylactic thyroidectomy is done in infants with

mutation, all cases be planned for thyroidectomy should be undergone screening Pheochromocytoma.



ANAPLASTIC THYROID CANCER:

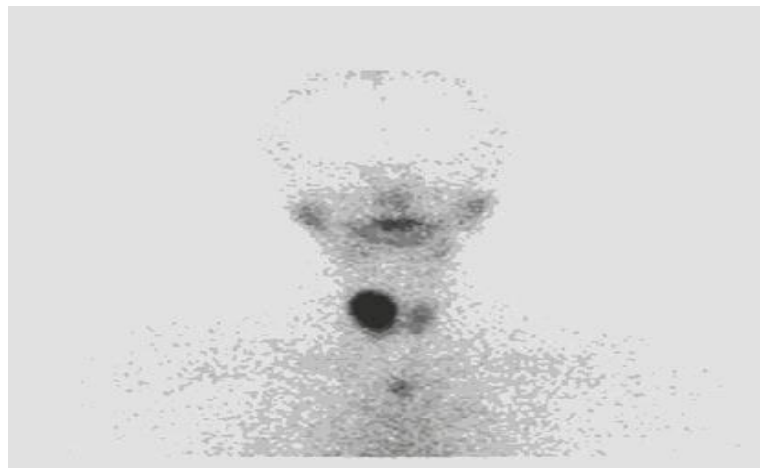
It is 1% of thyroid malignancies. Commonly seen in elderly women the tumour spread by lymphatics and blood stream and local infiltration is early features. The survival calculated in months. Some of this aggressive lesion present as tracheal obstruction requires decompression by isthumectomy, tracheostomy is avoided radiotherapy and chemotherapy are little importance patient present with enlarging neck mass, cervical tenderness, dysphagia in older patient and prognosis is very bad. On microscopic examination giant cells with intranuclear cytoplasmic invagination has been seen. Surgery is tempered because on diagnosis itself there is 10% metastasis distantly including lungs.

LYMPHOMA

It is rare and develops from pre-existing Hashimoto's thyroiditis commonly seen in females 4:1 ratio. Patient present with fever dysphagia, hoarseness of voice. It is non-Hodgkin's lymphoma B cell origin. Patient treated with CHOP (cyclophosphamide, hydroxyactinomycin, vincristine, prednisolone) regimen. Surgical resection includes total thyroidectomy, near total thyroidectomy. In patient with tracheal compression isthusectomy is most appropriate treatment.

INVESTIGATION

1. TSH –Thyroid stimulating hormone to assess pituitary-thyroid feedback. It has been used to delineate the hypothyroidism, hyperthyroidism from euthyroidism.
2. SERUM T3 T4- To estimate free T3 T4, serum protein bound T3 and T4.
3. CALCITONIN-In isolates medullary carcinoma or MEN type2 suspected calcitonin estimation is done.
4. **RADIOACTIVE IODINE UPTAKE:**



Screening of solitary nodular goitre I121 is given after 24 hrs, uptake is calculated using radioscintigraphy usually 15-30% uptake. I121 is used because of short half life and lesser radiation exposure.

5. THYROID AUTO ANTIBODIES LEVEL :

It is used in detection of auto immune thyroidism. The commonly used autoantibodies are Thyroid stimulating immunoglobulin, antimicrosomal antibodies, antithyroid peroxidase antibodies.

ROUTINE INVESTIGATION:

- Haemoglobin
- Total count, Differential count, ESR
- Random Blood sugar
- Urea, creatinine
- Urine Routine
- ECG
- X-ray chest, x- ray neck

ULTRASOUND NECK

High frequency probe in 7.5 Hz to 16MHz ranges are used. It is used to differentiate cystic or solid, if solid number of nodule size of nodule ,position of nodule are detected. It can detect malignancy by microcalcification, hypervascularity, infiltrative irregular margins, hypoechoic surrounding margins.

INDIRECT LARYNGOSCOPE

To rule out status of vocal cords. In some even voice can be normal but there will be unilateral vocal cord paralysis due to mumps or other viral infections.

FINE NEEDLE ASPIRATION CYTOLOGY:

It is single most important test can be performed with or without ultrasound guidance. The nodule difficult to palpitate and for cystic or solid USG guided aspiration can be done. The syringe with 23G needle used for aspiration several passes are made while aspirating, after releasing the suction on syringe the needle withdrawn and cells are placed in dry glass slide some immersed in 70% alcohol, while other dried in air, some placed in 90% alcohol for cytopsin or cell pellets. The slide stained with papanicoloau stain or wright's stain examined under microscope. Following FNAC the nodules are categorised into the following group. Benign-63%, suspicious-21%, malignancy-6% ,non diagnostic – 8%. The false positive 1% ,false negative 3%.in non diagnostic condition it is repeated. The benign leision include the cyst and colloid nodule. The risk of malignancy in this patient <3%. The diagnosis of malignancy relies on demonstrating capsular or vascular invasion, features cannot be determined by FNAC.

MANAGEMENT

TREATMENT:

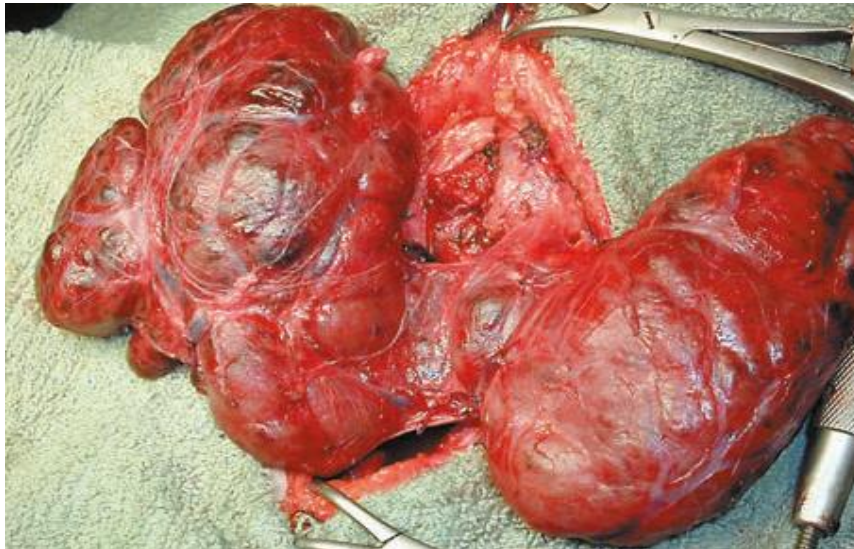
Primary Hypothyroidism-levothyroxine is safe and effective, it is available oral, intramuscular and iv preparation. The dose calculated based on Body weight and started with low dose and increased. Most patient tolerate oral preparation once daily.

HYPERTHYROIDISM:

Patient treated with Beta blockers-Reduces adrenergic symptoms of thyrotoxicosis. PROPYLTHIOURACIL - Blocks organification of iodine, inhibits coupling, peripheral conversion of T4 to T3 METHIMAZOLE- Inhibits coupling CORTICOSTEROIDS - Inhibits synthesis of autoantibodies. IODINE131-Radioactive abalation therapy it abalates thyroid within 6-8 weeks.

SURGERY:

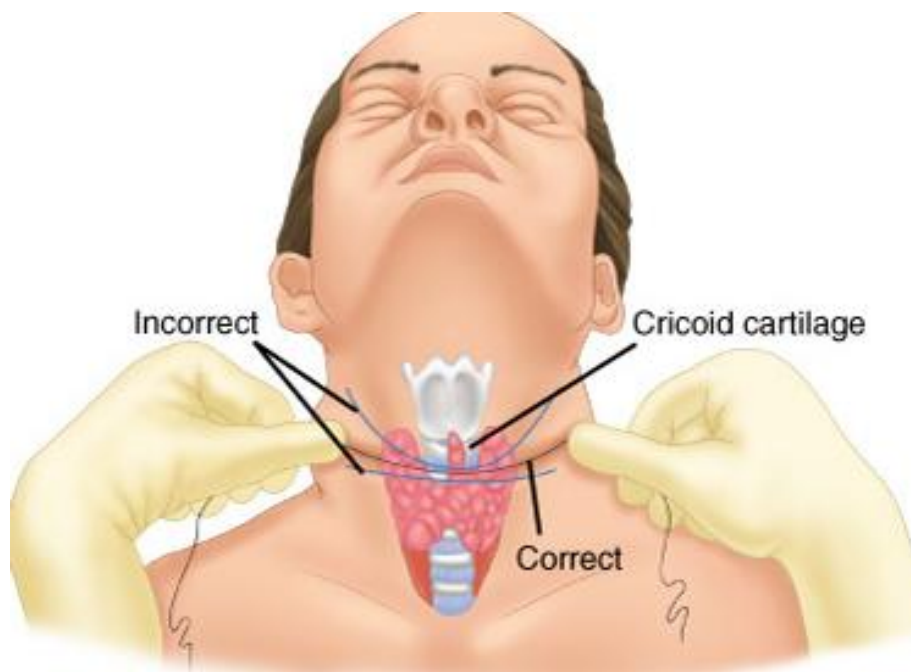
Total thyroidectomy:

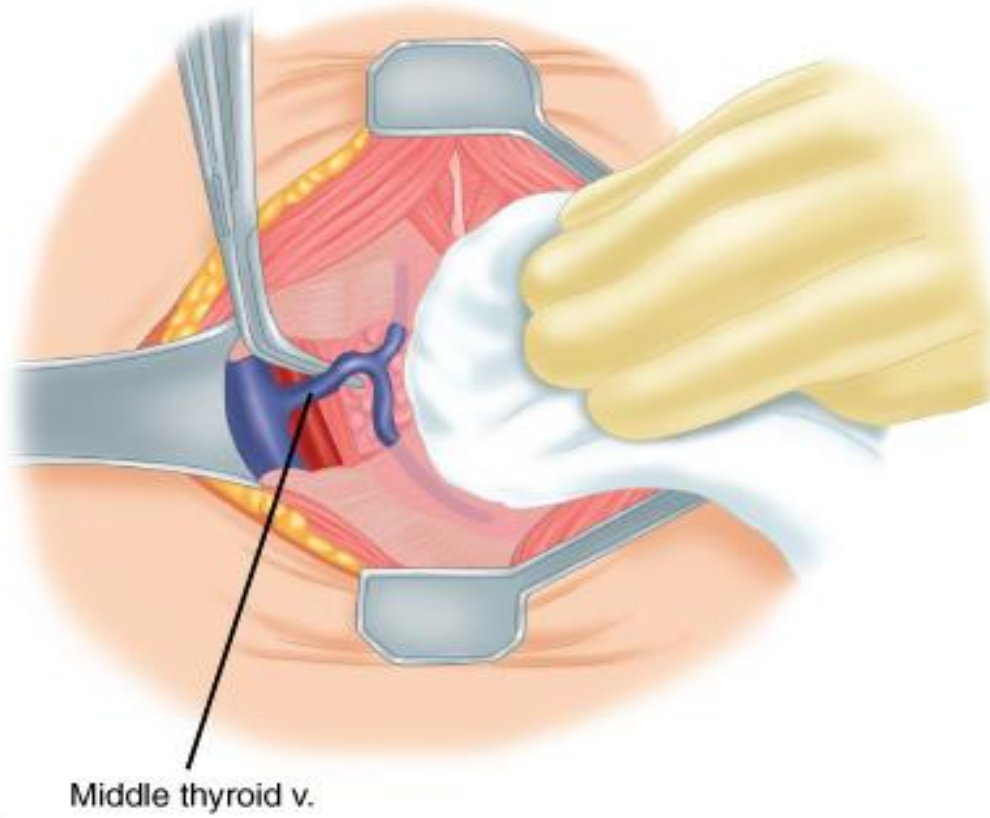
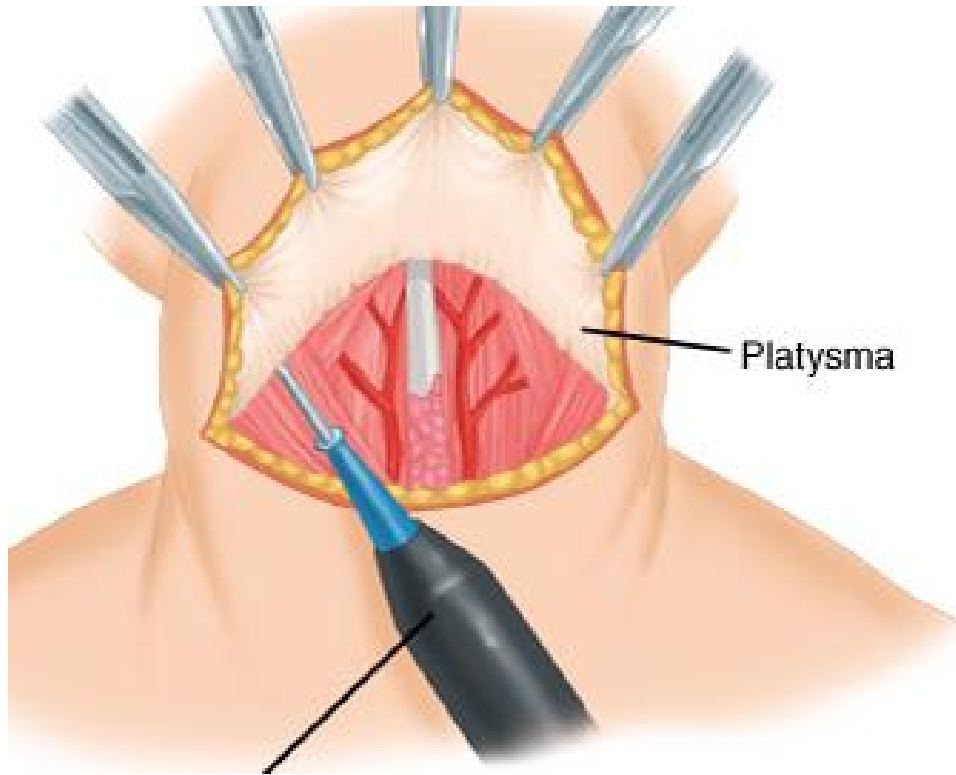


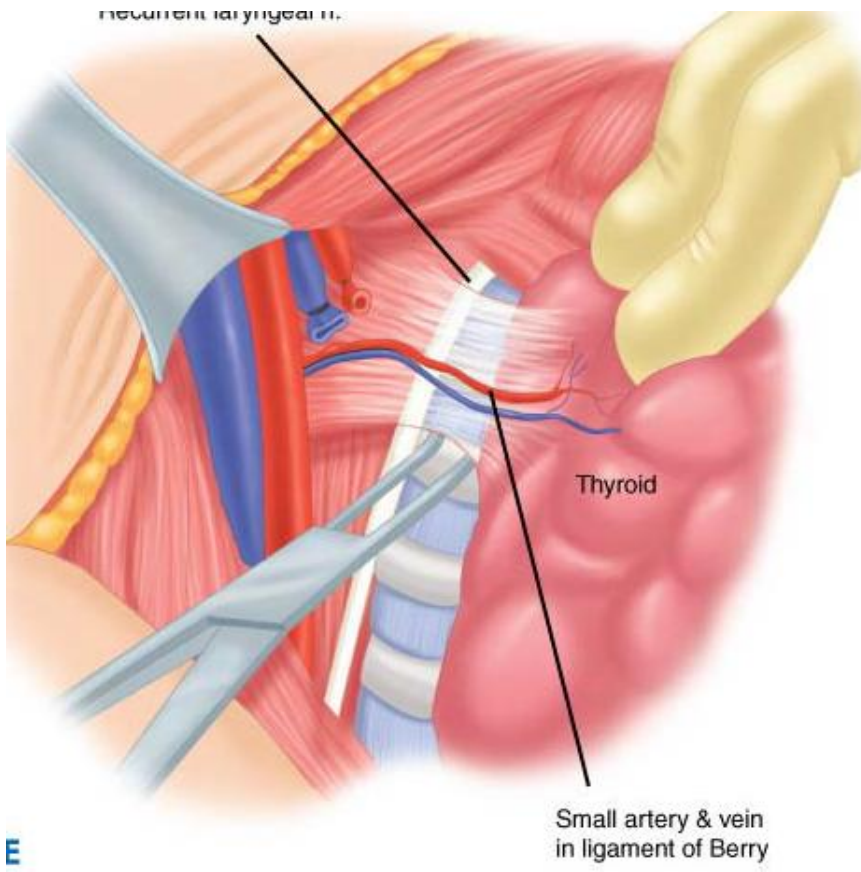
Sub total thyroidectomy

Near-total thyroidectomy

THYROIDECTOMY:





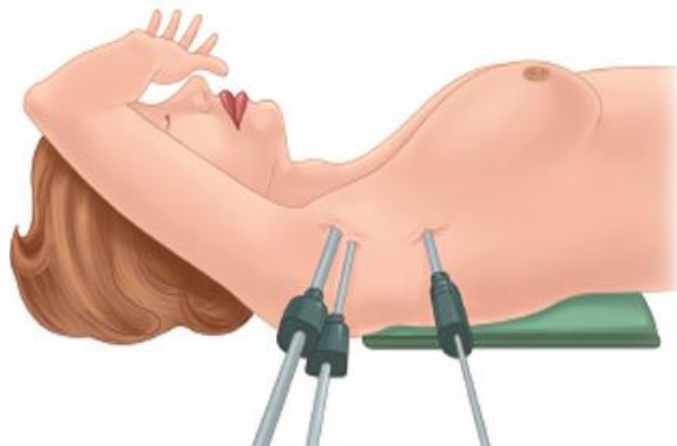


All patient before undergoing surgery undergoes investigation like thyroid profile, blood routine, ENT opinion regarding vocal cord status, ECG and cardiologist opinion. Patient lies in supine position with sand bag under inter-scapular region hyper-extended neck with head ring makes maximal exposure of thyroid region. A Kocher transverse skin crease incision done midway between cricoid cartilage and supra-sternal notch extending lateral border of sternocleidomastoid muscle from one side to other. Skin, subcutaneous, platysma incised upper and lower flap raised, upper flap upto thyroid cartilage lower flap upto suprasternal notch. Deep fascia opened with care strap muscles are retracted. In some condition on operating on large goitre strap muscle divided in upper part to safeguard ansa cervicalis. The anterior jugular vein ligated. Thyroid gland enclosed in pretracheal fascia opened gland exposed searched lateral to gland middle thyroid vein draining into internal jugular vein, ligated and divided. The middle thyroid vein, the vein without artery. The gland can be mobilised medially. The upper part of gland dissected for superior pedicle identified and ligated artery and vein separately to prevent AV fistula formation. The pedicle is cut after external laryngeal nerve visualisation. The superior and inferior parathyroid gland visualised on dissection which is golden brown or orange brown in colour, they receive its blood supply from inferior thyroid artery. The recurrent laryngeal nerve dissected in Riedel's triangle formed medially trachea

laterally carotid artery and above inferior thyroid artery the nerve course towards larynx and enter greater cornu of thyroid cartilage. In some patient the thyroid extend posteriorly close to ligamentum berry is called zuckerkindl tubercle. The recurrent laryngeal nerve runs between trachea and zuckerkindl tubercle or main gland. The 4th aortic arch failure results in some cases for development of non recurrent laryngeal nerve on right side which directly arise from vagus and and enter larynx at inferior horn of thyroid cartilage. The ligamentum berry and recurrent laryngeal nerve are in close contact. The inferior thyroid artery arise from thyrocervical trunk ascends up at carotid turns towards midline and supplies the gland, so ligation of inferior thyroid artery at the capsular level to be done, the thyroid gland dissected and removed. Haemostasis obtained, suction drain placed and fixed, wound closed with sub-cuticular sutures, dressing done.

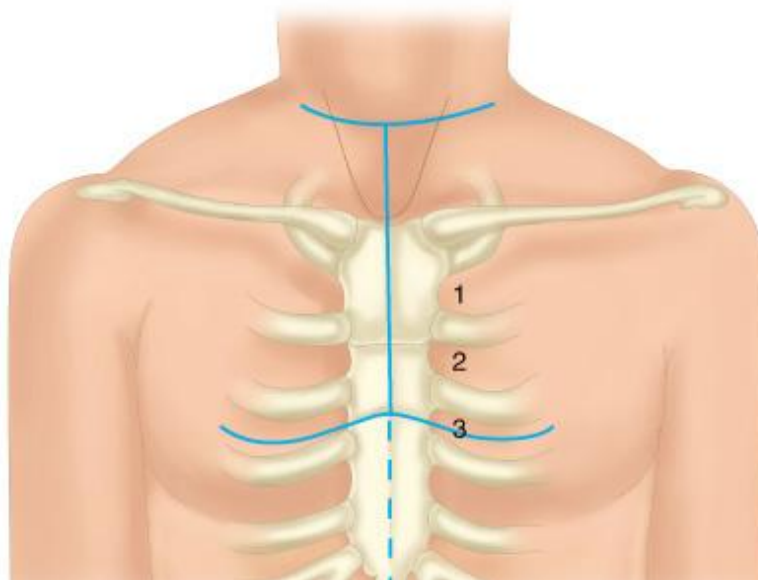
MINIMALLY INVASIVE TECHNIQUE IN THYROIDECTOMY

A small 3-cm incision is done, the flap not raised minimal dissection to remove thyroid through the incision then pretracheal and paratracheal dissection done. For visualisation video assisting can be used. The gland can be approached through endoscopy through axilla. Supraclavicular anterior chest and breast. In this approaches around 30 mm incision are done and multiple trocars are inserted co2 insufflated upto 4mmhg the working space created the muscle



retracted and vessels are clips applied, the benefit over open approach not established.

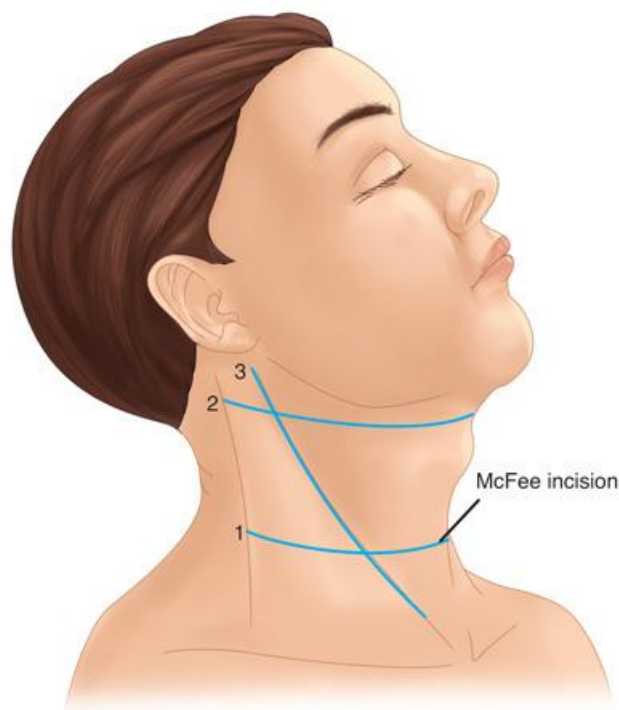
INTRATHORACIC GOITRE SURGICAL REMOVAL



The thyroid is considered mediastinal goitre when 50% of thyroid in intrathoracic. It may be primary or secondary in primary goitre arise from ectopic thyroid in chest and it derives blood supply from intrathoracic vessels. In secondary the thyroid tissue extends from neck and derives blood

supply from superior and inferior thyroid vessels. Intrathoracic goitre removed by median sternotomy upto 3rd rib and divided. The goitre is approached by neck incision vessels like superior and inferior pedicle, middle thyroid vein identified and dissected.

CENTRAL AND LATERAL NECK DISSECTION



The central compartment lies medial to carotid vessels the nodes in this area are involved in malignancy like papillary, medullary and hurthle cell carcinoma, so lymphnode should be removed during thyroidectomy. Care to be taken to preserve recurrent laryngeal nerve and parathyroid gland. Ipsilateral modified radical neck dissection done in medullary carcinoma when thyroid lesion is more than 1 cm, as prophylactic clearance. The same

thyroid incision can be used for modified radical neck dissection but extended laterally upto trapezius (mc fee incision), the fibrofatty tissue along internal jugular vein level 2,3,4 and posterior triangle removed, the internal jugular vein, spinal accessory nerve, sternomastoid muscle are preserved

COMPLICATION

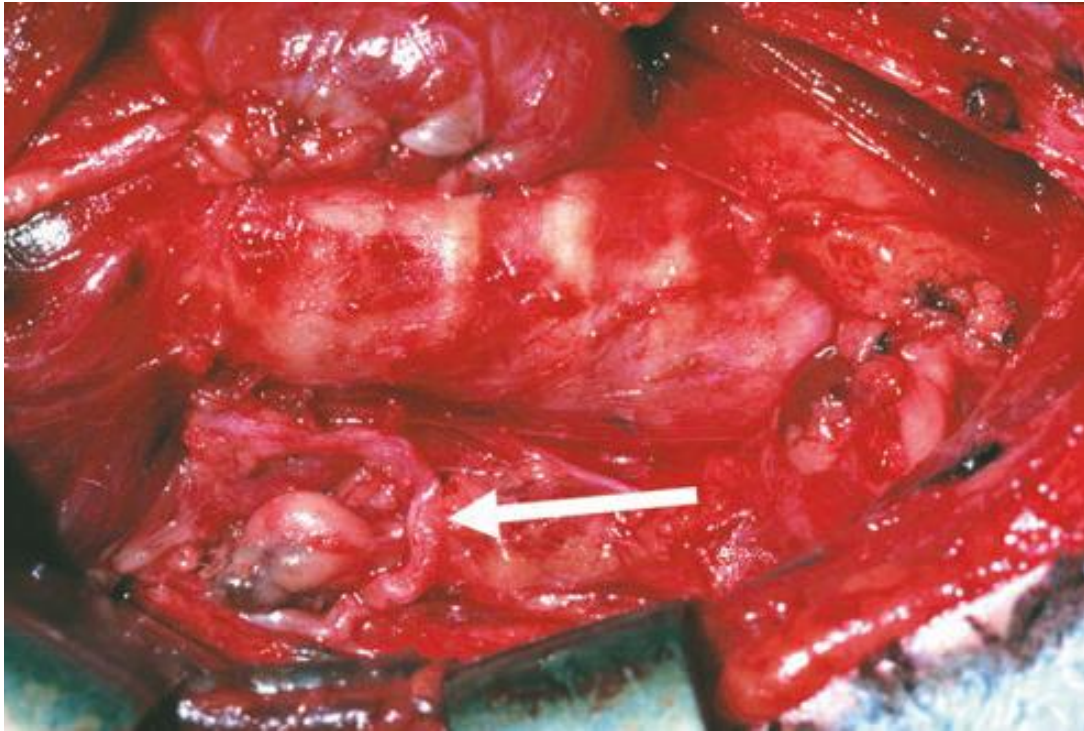
HAEMORRHAGE

The reactionary Haemorrhage from one of thyroid arteries results in tension Haematoma deep to cervical fascia. Sometimes haemorrhage from thyroid vein or thyroid remnant may be responsible. It requires urgent decompression by opening the layer of wound, a subcutaneous haematoma or collection of serum requires urgent evacuation which is the life saving procedure.

RESPIRATORY DEPRESSION

This is seen in condition associated with tracheomalacia, due to kinking or collapse of trachea. Some cases are due laryngeal oedema. The tension haematoma produces laryngeal oedema. During intubation and surgical manipulation or highly vascular results in laryngeal oedema. The unilateral or bilateral vocal cord paralysis does not cause immediate post operative obstruction. In tension haematoma trachea to intubated and tension haematoma should be removed. If needed endotracheal intubation can be left for weeks ,steroid can be added as antiiodematic measures, sometimes rarely tracheostomy can be done. When laryngeal odema is present intubation is difficult so wide bore needle tracheostomy can done, as temporary measures.

RECURRENT LARYNGEAL PARALYSIS AND VOICE CHANGE



Recurrent laryngeal nerve injury commonly unilateral and rarely bilateral, transient or permanent. Postoperative laryngoscopy reveals vocal cord paralysis which is assessed by voice and cough. For first 4 weeks vocal cord assessment wants to be done. Recurrent nerve palsy is 2% in first 3months which declines to .5% at three months. When surgery performed by visualising RLN then permanent paralysis is very rare. Injury to superior laryngeal nerve is common because of close association with superior thyroid vessels. When it injured results in loss of tension in vocal cord with

diminished power and range in voice. Patient should be advised about voice change postoperatively even without nerve injury.

THYROID INSUFFICIENCY:

Following subtotal thyroidectomy patient develops thyroid insufficiency especially when operated in thyroiditis because of autoimmune destruction of thyroid cells, commonly seen in graves disease. In surgeries for toxic adenoma thyroid insufficiency is very rare because there is no autoimmune disease.

PARATHYROID INSUFFICIENCY:

It is due to removal of parathyroid gland or infarction through damage to parathyroid end artery results in parathyroid insufficiency. Then inadvertent removal vascular injury is more common. Less than 1% suffer with permanent Hypoparathyroidism. Usually 2-3 days rarely 2-3 weeks patient present with features of Hypocalcemia.

THYROID CRISIS(STORM):

It is acute exacerbation of hyperthyroidism. Most commonly seen when patient with hyperthyroidism taken for surgery without adequate preparation. Patient needed supportive treatment for dehydration, hyperpyrexia, and restlessness. The patient requires administration of

intravenous fluids, cooling patient with ice packs, administration of oxygen, diuretics for cardiac failure, digoxin for uncontrolled atrial fibrillation, sedation and intravenous Hydrocortisone, the specific treatment is carbimazole 10-20mg 6th hourly, sodium iodide or lugols iodine or propranolol intravenously or orally will block beta adrenergic effect.

Wound infection:

Sometimes cellulitis or subcutaneous or deep cervical abscess requires antibiotics.

HYPERTROPHIC OR KELOID SCAR:

Along incision line rarely develop keloid common in dark skinned individuals especially over sternum, corticosteroid intradermal injection given monthly once or scar revision surgery done.

Stitch Granuloma:

When non absorbable silk like suture material used more prone for sinus formation.

POST OPERATIVE CARE:

About 20 percent patients develop transient hypocalcemia post operatively requires oral calcium 1gm three or four times a day. If symptoms severe patient may treated with intravenous calcium infusion. As routine parathyroid insufficiency assessed by measuring serum calcium level 4 weeks after operation.

CONCLUSION

- ✓ The best modality of investigation for thyroid based on our study found to be Fine needle aspiration cytology, easy to perform and cheaper.
- ✓ In our study conducted among the patient visiting our Hospital the commonest thyroid disease is solitary nodular goitre
- ✓ Out of 100 patients 92 females and 8 males were affected which shows disease of female predominance
- ✓ Most of affected people were middle aged 30-60 years, which shows disease of mid age group
- ✓ Most of lesion benign 79 cases out of 100 which proves benign nodules are common presentation
- ✓ The reported 21 malignant cases papillary carcinoma of 14 cases and 7 follicular carcinoma, which show the common thyroid malignancy is papillary carcinoma
- ✓ The reported 8 cases in males 3 were malignant which shows propionately solitary nodule in male are more malignant
- ✓ The patients with benign lesion underwent hemithyroidectomy of 79 cases, while patient with malignant and suspicious underwent total thyroidectomy with lymphnode dissection.

BIBLIOGRAPHY

1. Kaliszewski K, Diakowska D, Wojtczak B, Struty ska-Karpi ska M, Domosławski P, Sutkowski K, et al. Fine-Needle Aspiration Biopsy as a Preoperative Procedure in Patients with Malignancy in Solitary and Multiple Thyroid Nodules. *PLoS One*. 2016;11(1):e0146883.
2. Guille JT, Opoku-Boateng A, Thibeault SL, Chen H. Evaluation and management of the pediatric thyroid nodule. *The Oncologist*. 2015 Jan;20(1):19–27.
3. Singer PA. Evaluation and management of the solitary thyroid nodule. *Otolaryngol Clin North Am*. 1996 Aug;29(4):577–91.
4. Güney E, Ozgen AG, Kabalak T. Is the effect of fine-needle aspiration biopsy on the thyroid nodule volume important to evaluate the effectiveness of suppression therapy? *J Endocrinol Invest*. 2003 Jul;26(7):651–4.
5. Al-Hureibi KA, Abdulmughni YA, Al-Hureibi MA, Al-Hureibi YA, Ghafoor MA. The epidemiology, pathology, and management of goitre in Yemen. *Ann Saudi Med*. 2004 Apr;24(2):119–23.
6. Gandolfi PP, Frisina A, Raffa M, Renda F, Rocchetti O, Ruggeri C, et al. The incidence of thyroid carcinoma in multinodular goiter: retrospective analysis. *Acta Bio-Medica Atenei Parm*. 2004 Aug;75(2):114–7.

7. Paschke R, Schmid KW, Gärtner R, Mann K, Dralle H, Reiners C. [Epidemiology, pathophysiology, guideline-adjusted diagnostics, and treatment of thyroid nodules]. *Med Klin Munich Ger* 1983. 2010 Feb;105(2):80–7.
8. Gupta N, Norbu C, Goswami B, Chowdhury V, RaviShankar L, Gulati P, et al. Role of dynamic MRI in differentiating benign from malignant follicular thyroid nodule. *Auris Nasus Larynx*. 2011 Dec;38(6):718–23.
9. Pelizzo MR, Merante Boschini I, Toniato A, Sorgato N, Marzola MC, Rubello D. Surgical therapeutic planning options in nodular goiter. *Minerva Endocrinol*. 2010 Sep;35(3):173–85.
10. Edino ST, Mohammed AZ, Ochicha O, Malami SA, Yakubu AA. Thyroid cancers in nodular goiters in Kano, Nigeria. *Niger J Clin Pract*. 2010 Sep;13(3):298–300.
11. Menéndez Torre E, Pineda Arribas J, Martínez de Esteban JP, López Carballo MT, de Miguel C, Salvador P. Value of repeated fine needle aspiration cytology in patients with nodular goiter. *Acta Cytol*. 2007 Dec;51(6):850–2.
12. Bailey and love 's short practice of surgery 25th edition
13. scgswartz principles of surgery 8th edition

14. Robbins pathology 7th edition
15. Master of surgery Josef E. Fischer 5th Edition
16. Grant's Atlas of Anatomy 10th edition
17. Yolando C.D FNAC and diagnosis of thyroid cancer endocrinology and metabolism clinics of north america 1996
18. Yolando c.oertel MD fine needle aspiration of the thyroid technique and terminology and endocrinology and clinics of north america 36(2007)
19. Hossein gharib M.D.enrico papini thyroid nodules clinical importance, assessment and treatment endocrinology and metabolism clinics of north america.
20. AACE/AME Task force on thyroid nodule american association of clinical endocrinology and association medici Endocrinology medical guidelines for clinical practice for diagnosis and management of thyroid nodules. Endocr pract 2006 12(1) 63-102.
21. Mary Jo Welker and Diano orlov ohio state university college of medicine and public Health , columbus- American family physician journal vol 67 No-3
22. Rosai and ackerman's 9th edition - Juain rosai

23. Antonia belforia -Giacoma luciola rosa-FNAB of thyroid endocrinology and metabolism clinic of north america-2001 vol 30 (2)
24. Barren shah williams R. Fleming john lyn Thyroid cancer. Recent advance in surgery 2004 27th edition
25. sidabvy MK. del rechio DMK noll SM. FNAC of thyroid nodules. correlation between cytology and histology and evaluation of discrepant cases cancer 1997:81:
26. Gita Jayaraman FNAC study in 308 cases of SN thyroid with HPE 1984: 16:P76-83
27. Ghosal B paul. N.C Manjundas PM 1984 (46) FNAC in diagnosis of thyroid nodule correlation with HPE HPE report and application in thyroid surgery indian journal of surgery.
28. Dr. c. suryaprakash Roa, Dr. v. ramakrishnan kakinad andhrapradesh-an analysis of 100 cases of thyroid disease-ASI
29. Fenn A.S et al solitary nodule of thyoid gland revei of 342 cases - indian jornal surgery 1980
30. svante R orell -Fine needle aspiration cytology fourth edition

PROFORMA

A FOLLOW UP STUDY BY FINE NEEDLE ASPIRATION CYTOLOGY IN SOLITARY NODULAR GOITRE IN GVMCH

NAME :
AGE :
SEX : MALE FEMALE
OCCUPATION :
ADDRESS :
IP/OP NO. :
CBC :
RFT :
FASTING BLOOD SUGAR :
POST PRANDIAL BLOOD SUGAR :
THYROID PROFILE :
ECG :
USG NECK :
SYSTOLIC BP :
DIASTOLIC BP :
HEIGHT : WEIGHT : BMI :
FNAC Report :

PATIENT CONSENT FORM
A FOLLOW UP STUDY BY FINE NEEDLE ASPIRATION CYTOLOGY IN
SOLITARY NODULAR GOITRE IN GVMCH

STUDY CENTRE :
PATIENT'S NAME :
PATIENT'S AGE :
IDENTIFICATION NUMBER :

I confirm that I have understood the purpose and procedure of the above study. I have the opportunity to ask questions and all my questions and doubts have been answered to my complete satisfaction.

I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving reason, without my legal rights being affected.

I understand that the sponsor of the clinical study, others working on the sponsor's behalf, the ethical committee and the regulatory authorities will not need my permission to look at my health records, both in respect of the current study and any further research that may be conducted in relation to it, even if I withdraw from the study I agree to this access. However I understand that my identity would not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from this study.

I hereby consent to participate in this study.

I hereby give permission to undergo complete clinical examination and diagnostic tests including haematological, biochemical, radiological tests.

Signature/thumb impression:

Patient's name and address:

Place:

Date:

Signature of the investigator:

Name of the investigator:

Place:

Date:

ஒப்பிட்டுப்படிவம்

**A FOLLOW UP STUDY BY FINE NEEDLE ASPIRATION CYTOLOGY IN
SOLITARY NODULAR GOITRE IN GVMCH**

ஆராய்ச்சி தலைப்பு :

முழுப்பெயர் :

தந்தை/ தாயார்பெயர் :

பிறந்ததேதி/ வயது :

I. நான் மேலே குறிப்பிட்டுள்ள ஆராய்ச்சி குறித்து வளக்க உரையடிப்படத்துடன் புரட்சி கொண்டுள்ளேன் எனில், எனக்கு கொள்வனவுக் கமிஷனிடம் அளக்கப்பட்டது என்று உறுதிபடுத்துகிறேன்.

II. நான் இந்த ஆராய்ச்சியைப் பங்கேற்றுத் தன்னிச்சையாகத்தான் என்று, நான் எப்பொழுது வேண்டுமானாலும், காரணம் ஏதும் தெரிவிக்காமல் இந்த ஆராய்ச்சியிலிருந்து விலகமுற்பட எனக்கு அதிகாரம் உண்டு என்று, அப்பெயர்ச்சியை என் சட்டரீதியாக மறு சிசுச்செய்தப்பட உரிமைக் பாதுகாக்கப்பட்டது என்று நான் அறிகிறேன்.

III. இந்த ஆராய்ச்சியைப் பரவலாக மறு அவர்கள் சார்பாகப் பண்புரப்பவர்கள் நன்றிமுறைகள் (மறு கட்டுப்பாட்டு குழுவின் ஆகியோர், இந்த ஆராய்ச்சியைப் பொதும, பன்னிரண்டு சம்பந்தமாக வேறு ஆராய்ச்சி செய்யும் பொதும, என் சம்பந்தப்பட சிசுச்செய்த

வாவரங்களை மெலும் எனச் சூ அனுய; இன்ற காண் அனுய;
அளக்கிறேன். முன்றாய நபர்களுக்கி இந்த ஆராய்ச்சியை பற்ற
வளக்கும பொதும, இந்த ஆராய்ச்சியான (டிவுகளை பரகரக்கும
பொதும எனச் சூ அடையாளம வெளியிடப்படமாட்டது எனச் சூ நாள்
அறிகிறேன்.

IV. இந்த ஆராய்ச்சியான முல் அறியப்படு வவையங்கள் மற்
முடிவு அறவையல் சாரந்த காரணங்களுக்காக வெளியிடப்படுவதை
நாள் எப்பொதும தடுக்கமாட்டேன் எனச் சூ அளக்கிறேன்.

V. நாள் இந்த ஆராய்ச்சியால் பற் பெறசமமதம தெரவாகிறேன்.

- 1) ஆராய்ச்சியால் பற் பெறும் நபர் / சட்டப்பூர்வ பரதனாதுயான
கையழுத்து / ஆளகாட்டிவாரல் பதிப்பு
பெயர் / உறவுமுறை
- 2) ஆராய்ச்சியாளர் கையழுத்து
- 3) சாட்ச கையழுத்து தேதி

MASTER CHART

Admit.dt	Dis.dt	Patient no	Patient name	Sex	Age	Blood routine	Clinical examination	Ultrasound neck	Nodule site	FNAC	HPE	Procedure
21/07/2016 - 08:19 PM	08-07-2016	45273	MAHALAXMI	Female	21	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
26/08/2016 - 12:49 PM	14/09/2016	62609	SUGUNA	Female	32	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
26/08/2016 - 09:40 AM	23/09/2016	62555	VAJRAM	Male	35	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
26/09/2016 - 11:05 AM	10-08-2016	69816	PADMAVATHI	Female	41	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	adenomatous hyperplasia	Hemithyroidectomy
17/10/2016 - 10:03 PM	11-04-2016	74893	THULASI	Female	35	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
06/11/2016 - 08:50 AM	16/11/2016	79661	VANITHA	Female	22	normal	solitary nodule	solitary nodule	Isthmus	BENIGN	cystic	Hemithyroidectomy
11/09/2016 - 12:36 PM	21/11/2016	80438	,AHALAKSHMI	Female	36	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
15/11/2016 - 11:24 AM	28/11/2016	81738	ARULMOZHI	Female	39	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
12/01/2016 - 10:45 AM	12-12-2016	85447	SARASWATHI	Female	42	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
08/12/2016 - 10:07 AM	27/12/2016	86822	SIVAGAMI	Female	44	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	adenomatous hyperplasia	Hemithyroidectomy
29/11/2016 - 11.24 AM	27/12/2016	84964	KALAIVANI	Female	51	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
24/12/2016 - 10:08 AM	01-09-2017	90319	JAYANTHI	Female	23	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
12/08/2016 - 09:06 AM	18/01/2017	86807	KANCHANAMMAL	Female	53	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
15/02/2017 - 11:54 AM	25/02/2017	9515	KRISHNAVENI	Female	52	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy

15/02/2017 - 11:28 AM	03-01-2017	9505	VALLI	Female	51	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
13/02/2017 - 02:02 PM	13/03/2017	9077	JAYA	Female	36	normal	solitary nodule	solitary nodule	Isthmus	BENIGN	colloid	Hemithyroidectomy
03/02/2017 - 09:32 AM	16/03/2017	12941	KAMSALA	Female	24	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	adenomatous hyperplasia	Hemithyroidectomy
20/03/2017 - 12:54 AM	04-04-2017	16833	ORANGE AMMAL	Female	69	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
31/03/2017 - 10:14 AM	04-06-2017	19882	BANU YASHMIN	Female	37	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
04/04/2017 - 11:30 AM	05-02-2017	20601	AMSA	Female	47	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
05/02/2017 - 10:32 AM	05-02-2017	26789	KASTHURI	Female	66	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
05/09/2017 - 09:40 AM	26/05/2017	28320	KASTHURI	Female	48	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
19/05/2017 - 12:28 PM	31/05/2017	30885	VASANTHA	Female	27	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	cystic	Hemithyroidectomy
22/05/2017 - 9.24 PM	06-06-2017	31563	SHANTHI	Female	39	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
06/05/2017 - 09:43 AM	21/06/2017	34953	LAXMI	Female	21	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
06/01/2017 - 12:53 AM	24/06/2017	34105	SOWMIYA	Female	41	normal	solitary nodule	solitary nodule	Isthmus	BENIGN	colloid	Hemithyroidectomy
28/06/2017 - 12:44 AM	30/06/2017	40914	ASHOK KUMAR	Male	22	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
08/08/2016 - 02:19 PM	18/08/2016	49303	VIMALA	Female	49	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
15/08/2016 - 08:37 AM	22/08/2016	50901	JOTHI	Female	28	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
23/11/2016 - 10:56 AM	12-09-2016	83644	SUGANYA	Female	54	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
12/09/2016 - 11:21 AM	17/12/2016	87119	UNNAMALAI	Female	52	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
28/12/2016 - 11:53 AM	31/12/2016	91118	SURESH	Male	24	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
29/12/2016 - 10:16 AM	14/01/2017	91319	MAHESHWARI	Female	51	normal	solitary nodule	solitary nodule	Isthmus	BENIGN	colloid	Hemithyroidectomy
01/11/2017 - 11:24 AM	28/01/2017	2232	RENUGA	Female	61	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	adenomatous	Hemithyroidectomy

											hyperplasia	
30/01/2017 - 11:06 AM	14/02/2017	6067	SHARMILA	Female	41	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	adenomatous hyperplasia	Hemithyroidectomy
24/01/2017 - 10:25 AM	16/02/2017	4892	RAMU	Male	26	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	follicular carcinoma	Total thyroidectomy
02/06/2017 - 09:45 AM	21/02/2017	7570	LALITHA	Female	44	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
02/10/2017 - 12:05 AM	27/02/2017	8515	JAYA	Female	62	normal	solitary nodule	solitary nodule	Isthmus	BENIGN	colloid	Hemithyroidectomy
15/02/2017 - 11:58 AM	03-04-2017	8516	KUMARI	Female	57	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
09/03/2017 - 10:59 AM	20/03/2017	14909	DHARMALINGAM	Female	52	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
22/03/2017 - 12:11 PM	04-03-2017	17285	KANTHA	Female	33	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
28/04/2017 - 10:37 AM	16/05/2017	25925	UMA	Female	38	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
20/05/2017 - 09:45 AM	24/05/2017	31081	RAMANI	Female	29	normal	solitary nodule	solitary nodule	Right lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
19/05/2017 - 12:25 PM	30/05/2017	30883	SOWBAKKIYAM	Female	39	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
16/05/2017 - 12:03 AM	06-05-2017	30020	SUSILA	Female	32	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
28/06/2017 - 10:46 AM	07-06-2017	40863	NEELAVATHI	Female	43	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	adenomatous hyperplasia	Hemithyroidectomy
21/07/2016 - 08:19 PM	08-07-2016	45273	MAHALAXMI	Female	21	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	follicular carcinoma	Total thyroidectomy
26/08/2016 - 12:49 PM	14/09/2016	62609	SUGUNA	Female	44	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
26/09/2016 - 11:05 AM	10-08-2016	69816	PADMAVATHI	Female	72	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
17/10/2016 - 10:03 PM	11-04-2016	74893	THULASI	Female	49	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
06/11/2016 - 08:50 AM	16/11/2016	79661	VANITHA	Female	50	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
11/09/2016 - 12:36 PM	21/11/2016	80438	,AHALAKSHMI	Female	22	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	papillary	Total thyroidectomy

											carcinoma	
15/11/2016 - 11:24 AM	28/11/2016	81738	ARULMOZHI	Female	55	normal	solitary nodule	solitary nodule	Isthmus	BENIGN	colloid	Hemithyroidectomy
12/01/2016 - 10:45 AM	12-12-2016	85447	SARASWATHI	Female	25	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
08/12/2016 - 10:07 AM	27/12/2016	86822	SIVAGAMI	Female	51	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
29/11/2016 - 11.24 AM	27/12/2016	84964	KALAIVANI	Female	21	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
16/12/2016 - 12:08 AM	27/12/2016	88612	MUNIYAN	Male	43	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	follicular carcinoma	Hemithyroidectomy
24/12/2016 - 10:08 AM	01-09-2017	90319	JAYANTHI	Female	52	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
12/08/2016 - 09:06 AM	18/01/2017	86807	KANCHANAMMAL	Female	20	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
15/02/2017 - 11:54 AM	25/02/2017	9515	KRISHNAVENI	Female	29	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
15/02/2017 - 11:28 AM	03-01-2017	9505	VALLI	Female	53	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
13/02/2017 - 02:02 PM	13/03/2017	9077	JAYA	Female	21	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
03/02/2017 - 09:32 AM	16/03/2017	12941	KAMSALA	Female	54	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
20/03/2017 - 12:54 AM	04-04-2017	16833	ORANGE AMMAL	Female	24	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
31/03/2017 - 10:14 AM	04-06-2017	19882	BANU YASHMIN	Female	25	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
04/04/2017 - 11:30 AM	05-02-2017	20601	AMSA	Female	26	normal	solitary nodule	solitary nodule	Right lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
05/02/2017 - 10:32 AM	05-02-2017	26789	KASTHURI	Female	55	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
05/09/2017 - 09:40 AM	26/05/2017	28320	KASTHURI	Female	66	normal	solitary nodule	solitary nodule	Isthmus	BENIGN	colloid	Hemithyroidectomy
19/05/2017 - 12:28 PM	31/05/2017	30885	VASANTHA	Female	44	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
22/05/2017 - 9.24 PM	06-06-2017	31563	SHANTHI	Female	28	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
06/05/2017 - 09:43 AM	21/06/2017	34953	LAXMI	Female	63	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	follicular carcinoma	Total thyroidectomy

06/01/2017 - 12:53 AM	24/06/2017	34105	SOWMIYA	Female	43	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	adenomatous hyperplasia	Hemithyroidectomy
28/06/2017 - 12:44 AM	30/06/2017	40914	ASHOK KUMAR	Male	42	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	cystic	Hemithyroidectomy
15/09/2016 - 02:10 PM	17/09/2016	67216	GOUSIGA	Female	47	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
14/09/2016 - 11:31 AM	23/09/2016	66896	USHA	Female	48	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
11/08/2016 - 12:23 PM	14/11/2016	80194	VJIYA	Female	45	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
16/11/2016 - 08:45 AM	28/11/2016	81930	JOTHI	Female	20	normal	solitary nodule	solitary nodule	Right lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
16/12/2016 - 11:31 AM	31/12/2016	888593	AGILANDAM	Female	49	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
01/02/2017 - 11:54 AM	14/01/2017	282	KUMARI	Female	42	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
21/01/2017 - 10:13 AM	28/01/2017	4270	SIVAGAMI	Female	41	normal	solitary nodule	solitary nodule	Right lobe	MALIGNANT	papillary carcinoma	Hemithyroidectomy
30/01/2017 - 12:17 AM	02-10-2017	6116	MANI	Male	51	normal	solitary nodule	solitary nodule	Isthmus	BENIGN	colloid	Hemithyroidectomy
02/08/2017 - 12:07 AM	15/02/2017	8093	YASMIN	Female	58	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	follicular carcinoma	Total thyroidectomy
16/02/2017 - 10:46 AM	03-06-2017	9697	GOWRI	Female	53	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
15/02/2017 - 11:41 AM	03-07-2017	9509	VENKATESH	Male	62	normal	solitary nodule	solitary nodule	Right lobe	MALIGNANT	papillary carcinoma	Hemithyroidectomy
17/03/2017 - 10:15 AM	24/03/2017	16200	BANU	Female	42	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
20/03/2017 - 03:58 PM	27/03/2017	16873	VASANTHA	Female	44	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
21/03/2017 - 09:28 AM	28/03/2017	17012	MUNIYAMMA	Female	65	normal	solitary nodule	solitary nodule	Left lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
03/01/2017 - 11:27 AM	30/03/2017	12777	POONGAVANAM	Female	56	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
04/01/2017 - 10:47 AM	04-07-2017	20077	HAVAMMA	Female	57	normal	solitary nodule	solitary nodule	Right lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy

04/04/2017 - 03:52 PM	15/04/2017	20658	MANJULA	Female	53	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
20/04/2017 - 01:05 PM	05-02-2017	24197	RANI	Female	27	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
26/04/2017 - 10:21 AM	05-06-2017	25467	RENUKA	Female	46	normal	solitary nodule	solitary nodule	Right lobe	MALIGNANT	follicular carcinoma	Total thyroidectomy
14/05/2017 - 09:06 AM	15/05/2017	29507	USHA	Female	42	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
08/05/2017 - 03:30 PM	17/05/2017	28167	ELLAMMAL	Female	25	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
23/05/2017 - 09:11 AM	23/05/2017	31861	LAKSHMI	Female	47	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy
06/07/2017 - 10:19 AM	15/06/2017	35511	REKKA	Female	48	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
08/09/2017 - 11:55 AM	08-11-2017	51244	MEHARAJ BEE	Female	47	normal	solitary nodule	solitary nodule	Right lobe	MALIGNANT	papillary carcinoma	Total thyroidectomy
05/09/2016 - 09:57 AM	09-09-2016	64556	PRIYA	Female	44	normal	solitary nodule	solitary nodule	Left lobe	BENIGN	colloid	Hemithyroidectomy
02/06/2017 - 11:52 AM	14/02/2017	7612	REVATHI	Female	52	normal	solitary nodule	solitary nodule	Right lobe	BENIGN	colloid	Hemithyroidectomy