A DISSERTATION TO DETERMINE THE FREQUENCY OF THYROID MALIGNANCY IN NODULAR GOITRE IN OUR INSTITUTION

Dissertation Submitted in partial fulfillment of

M.S.DEGREE EXAMINATION

M.S.GENERAL SURGERY-BRANCH I

CHENGALPATTU MEDICAL COLLEGE,CHENGALPATTU

THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY

CHENNAI, TAMILNADU

APRIL 2011

CERTIFICATE

This is to certify that this dissertation titled "**TO DETERMINE THE FREQUENCY OF THYROID MALIGNANCY IN NODULAR GOITRE IN OUR INSTITUTION"** has been prepared by **Dr.A.RAMESH KUMAR.,** under my supervision in the Department of General Surgery, Chengalpattu Medical College, Chengalpattu during the academic period 2008-2011 and is being submitted to the Tamil Nadu Dr.M.G.R. Medical University, Chennai in partial fulfillment of the University regulation for the award of the Degree of Master of surgery(M.S.General Surgery) and his dissertation is a bonafide work.

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DECLARATION

I, Dr.A.Ramesh kumar, solemnly declare that the dissertation "**TO DETERMINE THE FREQUENCY OF THYROID MALIGNANCY IN NODULAR GOITRE IN OUR INSTITUTION"** a bonafide work done by me in the Department of General Surgery, Chengalpattu Medical College, Chengalpattu, Under the able guidance of **Prof.Dr.G.Raja Billy Graham, M.S.,** Professor, Chengalpattu Medical College,Chengalpattu.

Place:Chengalpattu.
Date:

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ACKNOWLEDGEMENT

I wish to express my sincere thanks to Dr.P.Ramakrishnan.M.D.DLO., Dean, Chengalpattu Medical College & Hospictal,Chengalpattu for having kindly permitted me to utilize the hospital facilities.

I wish to express my grateful thanks to; Prof. Dr. G. Raja Billy Graham, M.S., Head of the Departmt., Department of General Surgery, Chengalpattu Medical College, Chengalpattu for his immense help, encouragement and constant supervision and

I wish to thank my unit Assitant Professors Dr.C.Srinivasan.M.S., Dr.K.Sathyamoorthy M.S., Dr.J.Selvaraj.M.S., for their valuable suggestions, guidance, great care and attention to prepare this dissertation.

I owe great debt of gratitude to all the Assistant Professors and Tutors for their able help and support.They have been a source of great encouragement throughout my Postgraduate course.

And I can never forget theatre personnel for their willing cooperation and assistance. I thank all the patients who took part in my study and their relatives.

CONTENTS

INTRODUCTION

Cancer is becoming a leading cause of death in many countries of the world. Thyroid malignancy is relatively rare, but represents the most frequent form of cancer of the endocrine glands. It may present as solitary nodule or as a dominant nodule in multinodular goitre. Therefore both conditions should be carefully evaluated to detect any underlying malignant foci. In India thyroid cancer responsible for 1.2% cases of all malignant tumors. Exposure to ionizing radiation, changing levels of iodine nutrition and improvement in the various investigations to identify malignant foci have all proposed as explanations for world wide increase in the incidence of thyroid malignancy.

AIM OF STUDY

To determine the frequency of thyroid malignancy in solitary nodular goitre and multinodular goitre patients who are undergoing thyroidectomy in our institution.

MATERIALS AND METHODS

This retrospective study was carried out in our hospital over the period of two years from 2008 to 2009. All patients who are underwent different types of thyroid surgery during this period were included in this study. All data including age gender, relevant history, investigations like untrasonography and fine needle aspiration cytology, duration of hospital stay, and final histopathology report were recorded on a standard form.

REVIEW OF LITERATURE

HISTORICAL REVIEW :

Year	Event
2700 BC	Emperor Shen Nung's prescriptions (first published in Pen Tsao, the herbal of the Chinese pharmacopoeia, 1596) mention the use of seaweed for the treatment of goitre.
300 BC	Ayur Veda, Hindu holy text, discusses goitre.
340	Ko-Hung, Chinese alchemist, recommends seaweed for treatment of goitre among people living in mountains.
961	Abdul Kasim, a personal physician to Caliph El-Hakin III of Codoba, is first to describe thyroidectomy for goitre and perform a needle biopsy of the thyroid.
1170	Roger of Salerno uses seaweed in the treatment of goitre.
1475	Chinese physician, Wang Hei, recommended treatment of goitre with minced thyroid.
1500	Leonardo da Vinci is the first person to recognize and draw the thyroid gland.
1543	Andreas Vesalius provides first anatomic description and illustration of the thyroid gland.
1563	Eustachius introduces the term "isthmus".
1646	First Known Thyroidectomy was described by Wilhelm Fabricius of Jeneva.

1656 Thomas Wharton names gland ‘Thyroid’ after the shape of an ancient Greecian shield.

1669 Albrecht van Haller describes constipation as a complication of cretinism.

1789 P.S. Dessault has done well documented partial thyroidectomy.

1808 Guilliance dupuytren performed a total thyroidectomy for tumor.

1811 Bernard Courtois discovers iodine by oxidizing burnt seaweed with sulfuric acid.

1818 Goitre reported in British Columbia.

1820 Jean Francois Coindet concludes that iodine deficiency causes goitre and begins treatment of goitre with iodine.

1825 C. Parry describes exophthalmic goitre.

1834 Robert Graves describes a syndrome of palpitations, goitre, and exophthalmos in three women.

1848 C. Von Basedown describes exophthalmic goitre.

1849 J.L. Prevost adds iodine to food and water to prevent goitre.

1862 A.Trousseau introduces the term “Graves disease”

1867 A.von Graefe describes lid lag in thyrotoxicosis (Basedow’s disease)

1873 Th. Billroth describes tetany following total thyroidectomy

1883 E.T. Kocher calls attention to myxedema following thyroidectomy.

1886 Pierre Marie describes the characteristic tremor of hyperthyroidism.

1891 G.R. Murray introduces the use the thyroid extract to treat myxedema.

1896 B. Riedel publishes first description of chronic, fibrous thyroiditis.

1897 Pendred describes associations of goiter with deaf – mutism.

1902 F. de Quervain describes subacute granulomatous thyroiditis.

1907 David Marine publishes that iodine is necessary for thyroid function.

1912 Kocher coins term Jod Basedow for iodine overdosage.

1915 E.A. Kendall isolates thyroxine.

1917 Thyroxine introduced into commercial distribution in the Unite States for $350 per gram.

1926 First goitre belt identified in USA.

1927 Harington determines the chemical structure of thyroxine.

1936 Dr. Saul Hertz first proposes the use of radioactive iodine for the study of the thyroid.

1943 Kennedy observes that thiourea is goitrogenic.

1948 T. Tempka, J. Publish the use of fine needle thyroid biopsy as a diagnostic method.

1951 B. Duffy identify cancer in children following radiation.

1952	Lawson, Rimington, and Searele synthesize carbimazole.
1956	Roitt and Doniach demonstrate autoantibodies in Hashimoto's disease.
1965	E.D. Williams reports 17 cases of cancer of the thyroid and phaeochromocytoma.
1966	J.H. Sipple describe the first case of multiple endocrine neoplasia type2.
1970	L.Braverma, S. Ingbar, and K. Sterling discover T4 to T3 conversion.
1974	S. Refetoff and L. DeGroot identify thyroid hormone resistance.
1998	Recombinant human TSH approved for clinical use in the United States.
2002	Thomas Scanlan discovers 3 –iodo – thyronine (T1 amine)

REVIEW OF THYROID MALIGNANCY

ANATOMY OF THYROID

Thyroid is a brownish red and highly vascular gland located anteriorly in the lower neck. It extents from fifth cervical to first thoracic vertebrae. It has two lobes connected by isthmus.

Weight of the gland is 25 to 30 gram, Height of the gland is 50 – 60 mm. A conical pyramidal lobe often ascends from isthmus towards hyoid bone.

It is invested by the middle layer of the deep cervical fascia. It has inner thin true capsule which adheres closely to the gland. Extension of the capsule to the gland forms numerous septae that divides the gland into lobes and lobules.

FASCIA AND LIGAMENT

Thyroid ensheathed by visceral fascia a division of middle layer of deep cervical fascia, which attaches it firmly to laryngo-skeleton.

Anterior suspensory ligament extends from supero-medial aspect of each lobe to cricoid and thyroid cartilage. Posterior suspensory ligament (Berry's ligament) attaches postero medial aspect of thyroid to cricoid cartilage, I, II tracheal rings, responsible for movement during deglutition.

RELATION TO STRAP MUSCLES

The lateral surface of thyroid is covered by sternothyroid muscle. Its attachment to the oblique line of thyroid cartilage prevents the superior pole extending superiorly under thyrohyoid muscle.

More anteriorly sternohyoid and superior belly of omohyoid covers the gland.

VASCULAR SUPPLY

The arterial supply to the gland comes from superior and inferior thyroid arteries and occasionally thyroidea ima artery. These vessels have abundant collateral anastomoses with each other, both ipsilaterally and contralaterally.

Superior thyroid artery is the first branch of the extemal carotid artery. In rare cases, it may arise from the common carotid artery just before its bifurcation. The superior thyroid artery descends laterally to the larynx under cover of the omohyoid and stemohyoid muscles. This artery runs superficially on the anterior border of the lateral lobe, sending a branch deep into the gland before curving towards the isthmus were it anastomoses with the contralateral artery.

Cephalad to the superior pole, the extemal branch of the superior laryngeal nerve runs with the superior thyroid artery before turning medially to supply the cricothyroid muscle. High ligation of the superior thyroid artery during thyroidectomy places this nerve at risk of inadvertent injury, which would produce dysphonia by altering pitch regulation.

INFERIOR THYROID ARTERY AND RECURRENT LARYNGEAL NERVE

The inferior thyroid artery arises from the thyrocervical trunk, a branch of the subclavian artery. It ascends vertically and then curves medically to enter the tracheoesophageal groove in a plane posterior to the carotid sheath. Most of its branches penetrate the posterior aspect of the lateral lobe.

The inferior thyroid has a variable branching pattern and is closely associated with the recurrent laryngeal nerve. The latter also ascends in the tracheoesophageal groove and enters the larynx between the inferior cornu of the thyroid cartilage and the arch of the cricoids. The recurrent laryngeal nerve can be found after it emerges from the superior thoracic outlet, in a triangle bounded laterally by the common carotid artery, medially by the trachea and superiorly by the thyroid lobe.

The relationship between the nerve and the inferior thyroid artery is highly variable, as demonstrated by the classic work of Reed, who was described 28 variations in this relationship at 1943. The nerve can be found deep to the inferior thyroid artery (40%) superficially (20%) or between branches of the artery (35%). Significantly, the relationship between nerve and artery on one side of the neck is similar to that found on the other side in only 17% of the population. Furthermore, at the level of the inferior thyroid artery, branches of the recurrent laryngeal nerve that are extralaryngeal may be present (5%). Preservation of all those branches is important during thyroidectomy.

Another hint to the location of the recurrent larynegeal nerve is the Zuckerkandl tubercle, an extension of the thyroid, close to the Berry ligament.

LOCATION OF PARATHYROID

Superior parathyroid located in posterior surface of upper pole.

Inferior parathyroid located in lateral surface of lower pole.

VENOUS DRAINAGE

3 pairs of veins present.

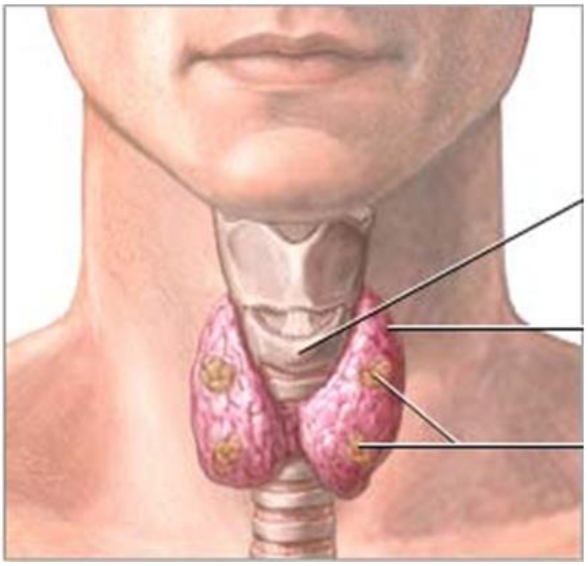
Superior Thyroid vein drains into internal jugular vein.

Middle thyroid vein which is directly drains into internal jugular vein.

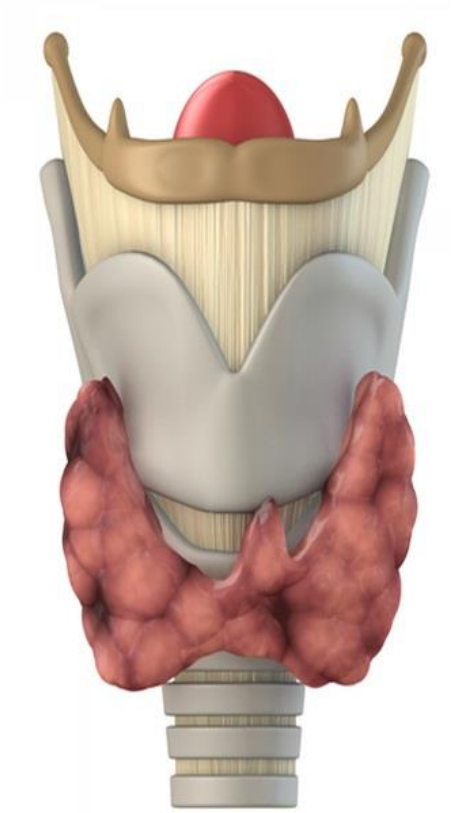
Inferior thyroid vein drains into right and left brachiocephalic vein.

LYMPHATIC DRAINAGE

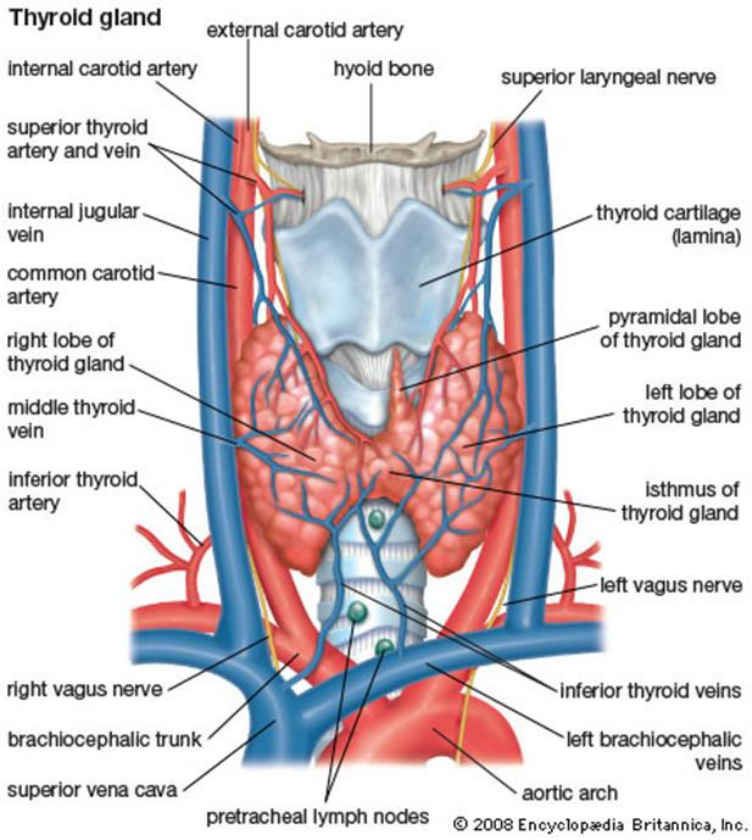
Into prelaryngeal (Delphian), pretracheal, paratracheal lymph nodes, cervical lymph nodes then finally into mediastainal nodes.



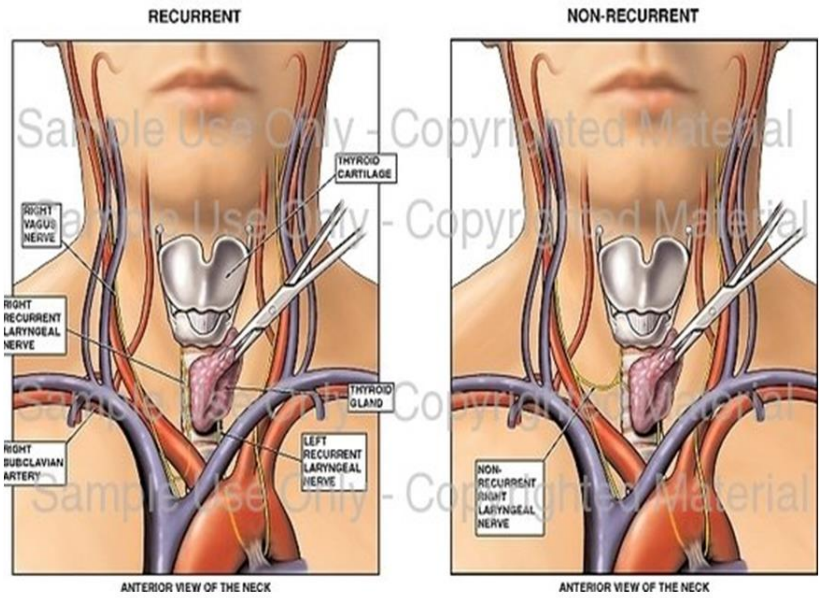
Location of Parathyroid



Location of thyroid



Vascular and venous drainage



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Anatomy of the recurrent laryngeal nerve

SOLITARY NODULE OF THYROID

It is defined as palpably discrete swelling within an apparently normal gland.

May be benign or malignant.

Benign classified into cysts (or) adenoma either toxic or non toxic

EPIDEMIOLOGY

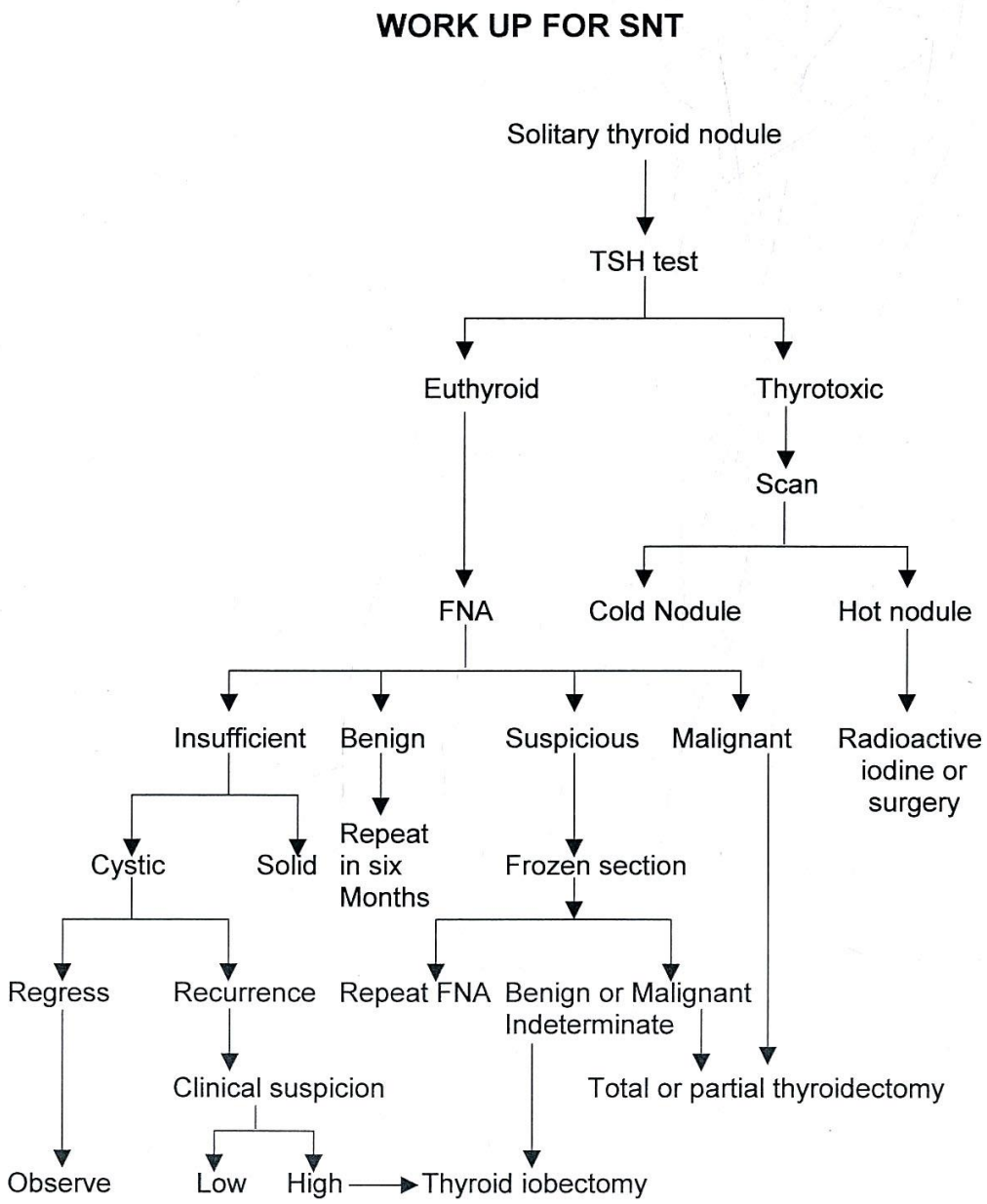
Prevalence varies from each region depending on iodine sufficiency.

5% in sufficient areas. Upto 50% in insufficient areas.

More common in women.

TYPES OF THYROID NODULES

Adenoma	Carcinoma	Colloid nodule
Macrofollicular adenoma	Papillary	Dominant nodule in a multinodular goiter
Microfollicular adenoma (fetal)	Follicular	Others
Embryonal adenoma	Medullary	Inflammatory thyroid disorders
Hurthle cell adenoma	Anaplastic	Subacute thyroiditis
Atypical adenoma	Thyroid lymphoma	Chronic lymphocytic thyroiditis
Adenoma with papillae	**Cyst**	Granulomatous disease
Signet-ring adenoma	Simple cyst	Developmental abnormalities
	Cystic/solid tumors	Dermoid


WORK UP FOR SNT
Solitary thyroid nodule
TSH test
Euthyroid
Thyrotoxic
Scan
FNA
Cold Nodule
Hot nodule
Insufficient
Benign
Suspicious
Malignant
Radioactive iodine or surgery
Cystic
Solid
Repeat in six Months
Frozen section
Regress
Recurrence
Repeat FNA
Benign or Malignant Indeterminate
Clinical suspicion
Total or partial thyroidectomy
Observe
Low
High
Thyroid iobectomy

SYMPTOMS

Non toxic are asymptomatic

Toxic ones are gives symptoms depends upon toxicity

Neck mass if it is a large one.

DIFFERENTIAL DIAGNOSIS

- Cyst
- Non functioning adenoma
- Primary Thyroid Cancer
- Lymphoma
- Metastatic Cancer

THYROID MALIGNANCIES

The normal thyroid composed of two main parenchymal cell types. Follicular cells line the colloid follicles which gives rise to well differentiated cancers. The second cell type is “C” cells or parafollicular cells gives rise to medullary thyroid cancer. Immune and stromal cells gives rise to lymphoma and sarcoma respectively.

90% are well differentiated cancers, 5-9 % are medullary thyroid cancer, and 1-2% are anaplastic, 1-3% are lymphoma, 1% sarcoma.

Among well differentiated cancer papillary type is 80 to 85 %, 10-15% are follicular, 3 to 5% Hurthle cell type. Thyroid malignancies are categorized by level of clinical aggressiveness. Well differentiated are papillary

and follicular cancer. Intermediate are hurthle cell and insular cell cancers. Poorly differentiated is anaplastic cancer.

RISK FACTORS

- Extremes of age.
- Female gender
- Family history of goitre.
- Family history of thyroid malignancies
- Past history of radiation.
- Patients with Hashimoto's thyroiditis have a 70-fold increased risk of developinglymphoma.

GENETIC FACTORS

- Most well differentiated tumors are sporadic.
- Studies have demonstrated that genetic rearrangement of the RET Proto-oncogene in 50% of tumors.
- Kindreds of papillary cancer with no associated extrathyroid tumors.
- Patients with cowden syndrome.
- Patients with adenomatous polyposis coli.
- Family members of MEN syndrome.

WHO CLASSIFICATION OF THYROID MALIGNANCIES

Primary malignancies of follicular cells.

- Papillary carcinoma
- Follicular carcinoma
- Anaplastic carcinoma

Malignancies of 'C' Cells:

- Medullary carcinoma of thyroid

Malignancies of mixed follicular and 'C' Cells.

Miscellaneous malignancies of epithelial cells

- Squamous cell carcinoma
- Adeno carcinoma
- Adeno squamous variety
- Malignancies asso. With FAP
- Muco epidermoid carcinoma.
- Teratoma

Malignancies of non epithelial cells.

- Lymphoma
- Sarcoma

Secondary Metastasis of thyroid

- Malignant melanoma
- Renal cell carcinoma
- Bronchogenic carcinoma
- Breast carcinoma

PAPILLARY CANCER

- 50% of tumors are < 2 cm at presentation.
- 30- 50% are multicentric.
- < 1 cm are considered as micro papillary lesions.
- Classical, follicular variant, tall cell, oxyphil, diffuse sclerosing, De-differentiated are the various types.
- 'Psammoma bodies' and 'orphan Annie' nuclei are classical histologic features.
- Microscopic features of papillary cancer include the demonstration of true papillae, which occasionally occur in combination with follicles.
- A combination of the encapsulated variant and the follicular variant called lindsay's tumor.
- 80% cervical nodes has microscopic deposits.
- Early spread to cervical lymph nodes.
- Lateral aberrant thyroid is almost a metastatic papillary carcinoma.
- Most of the tumors are TSH dependent.
- TSH suppression therapy with thyroxine is appropriate for post operatively.
- Thyroxine reduces the recurrence and improves survival.

FOLLICULAR CARCINOMA

- This is a malignant epithelial tumor with evidence of follicular cell differentiation without the features of papillary cancer.
- Cannot differentiate adenoma from carcinoma by FNAC.
- Solitary, encapsulated.
- There are two types, based on the degree of invasiveness of the lesion.
- Minimally invasive type is a solid, encapsulated, fleshy tumor that looks very much like a simple thyroid adenoma.
- Widely invasive type shows widespread infiltration of blood vessels, the capsule and adjacent thyroid tissue.
- Follicular cancer dose not invade lymphatics.
- Metestasis by blood stream to lungs and bones.
- Immunostaining for thyroglobulin is usually positive in this tumor.

MEDULLARY THYROID CARCINOMA.

- Accounts for 5-10% of all thyroid cancers.
- Arises from para follicular C cells.
- 80% are sporadic, 20%are familial. Familial cancers can occur as a non-MEN form (FMTC) or as a part of MEN either IIA or IIB.
- Autosomal dominant inheritance. Mutations of the RET proto-oncogene to exclude familial disease.
- Secretes calcitonin. It is a tumor marker and also used for follow up.
- Familial ones are multifocal, present at younger age, aggressive, recurrence is common.
- Metastasis by blood, and lymphatic.

- Sporadic are solitary, older age, good prognosis.
- Three familial forms of MTC are known. 1) Familial medullary thyroid cancer – indolent course with no feature of MEN and a very good prognosis. 2) MEN IIA- MTC associated with phaeochromocytomas, parathyroid hyperplasia, cutaneous lichen amyloidosis. 3) MEN IIB – MTC associated with marfanoid, with high arched palates, have characteristic neuromas on their tongue and eyelids.
- Total thyroidectomy should be performed in MEN IIB family members and the age of 5.

ANAPLASTIC CARCINOMA

- ❖ Highly aggressive, poorly differentiated and lethal disease.
- ❖ Affects older age.
- ❖ Fifty percentage of cases have concurrent or previous differentiated thyroid cancers, but anaplastic cancer can arise de novo.
- ❖ It presents as a rapidly growing mass strangulating the structures of the neck.
- ❖ Local and distant metastasis are present at the time of presentation.
- ❖ Anaplastic cancers are usually spindle or giant cell tumors.
- ❖ The possibility of a secondary deposit in the thyroid must always be considered.
- ❖ Very poor prognosis.

THYROID LYMPHOMA

- ▪ It represents 5% of all thyroid malignancies. The incidence is rising due to the increase in rates of Hashimoto's thyroiditis.
- ▪ It is often associated with a history of thyroxine replacement.

- Most lymphomas are of diffuse histiocytic type and vary from intermediate-to high – grade.
- Staging is mandatory and total – body scanning is performed.
- On ultrasound, the thyroid is usually hypoechoic and CT or MRI cannot separate simple Hashimoto's from lymphoma.
- FNAC can usually secure a tissue diagnosis.
- There is no role for thyroidectomy or iodine treatment for thyroid Lymphoma.
- Primary treatment is external-beam radiation with chemotherapy.
- 5 years survival rates of 80%.

SYMPTOMS OF THYROID MALIGNANCY

May not cause symptoms in early stages.

A lump in the neck.

Hoarseness of voice

Difficulty in swallowing.

Difficulty in breathing.

Lymph nodes in neck.

Symptoms of metastasis like bone pain,and headache.

Primary Tumor (T)[a,b]

TX	Primary tumor cannot be assessed
TO	No evidence of primary tumor
T1	Tumor ≤ cm in greatest dimension limited to the thyroid
T1a	Tumor ≤ 1 cm, limited to the thyroid
T1b	Tumor > cm but ≤ 4 cm in greatest dimension, limited to the thyroid
T3	Tumor >4cm in greatest dimension limited to the thyroid or any tumor

	with minimal extra thyroid extension (e.g. extension to sterno thyroid muscle or perithyroid soft tissues)
T4a	Moderately advanced disease
	Tumor of any size extending beyond the thyroid capsule to invade subcutaneous soft tissues, larynx, trachea, esophagus or recurrent laryngeal nerve.
T4b	Very advanced disease
	Tumor invades prevertebral facia or encases carotid artery or mediastinal vessels.
^{o}T4a	Intrathyroidal anaplastic carcinoma.
^{o}T4b	Anaplastic carcinoma with gross extra thyroid extension.

Regional Lymph Nodes (N)[a,b]

TX	Regional lymph nodes cannot be assessed
NO	No regional lymph node metastasis
N1	Regional lymph node metastasis
N1a	Metastases to Level VI (pretracheal, paratracheal and prelaryngeal/ Delphian lymph nodes)
N1b	Metastases to unilateral, bilateral, or contra lateral cervical (Levels I,II,III,IV or retropharyngeal or superior mediastinal lymph nodes (Level VII)

Distant Metastasis (M)a

NO	No distant metastasis
M1	Distant metastasis

STAGING

Stage – I Papillary carcinoma

Below 2cm, Localized to thyroid, 50% are multifocal.

Mostly associated with follicular elements.

10 Years survival rate is good.

Stage – II Papillary Carcinoma

2-4cm in size, distant spread if <45 years, Limits with in thyroid if >45 years.

Stage – III papillary Carcinoma

>4cm in size, extra thyroid extension present.

Lymphnode metastasis present

Prognosis poor if cervical lymphnodes present.

Stage – IV Papillary Carcinoma

Any size with distant metastasis.

Prognosis poor.

Stage – I Follicular Carcinoma

< 2cm, must be distinguished from follicular adenoma.

Prognosis good when vascular invasion absent.

Stage – II Follicular Carcinoma

2-4cm, distant spread if < 45 years or limit to thyroid

> 45 years, prognosis less favourable than papillary carcinoma.

Stage – III Follicular Carcinoma

Above >4cm, limits to the thyroid, prognosis poor if cervical lymphnodes present.

Stage – IV Follicular Carcinoma

Beyond thyroid capsule with any size. With distant metastasis present. Prognosis is Poor.

Stage – I Medullary Thyroid Carcinoma

< 2cm in size.

Stage – II Medullary Thyroid Carcinoma

2-4 cm in size with minimal extra thyroid extension.

Stage – III Medullary Thyroid Carcinoma

Any size with lymphnode metastasis.

Stage – IV Medullary Thyroid Carcinoma

A. Moderately advanced – absent lymphnodes with absent distant metastasis.
B. Very advanced - Positive lymphnodes with absent metastasis.
C. With distant metastasis

Staging for Anaplastic Carcinoma:

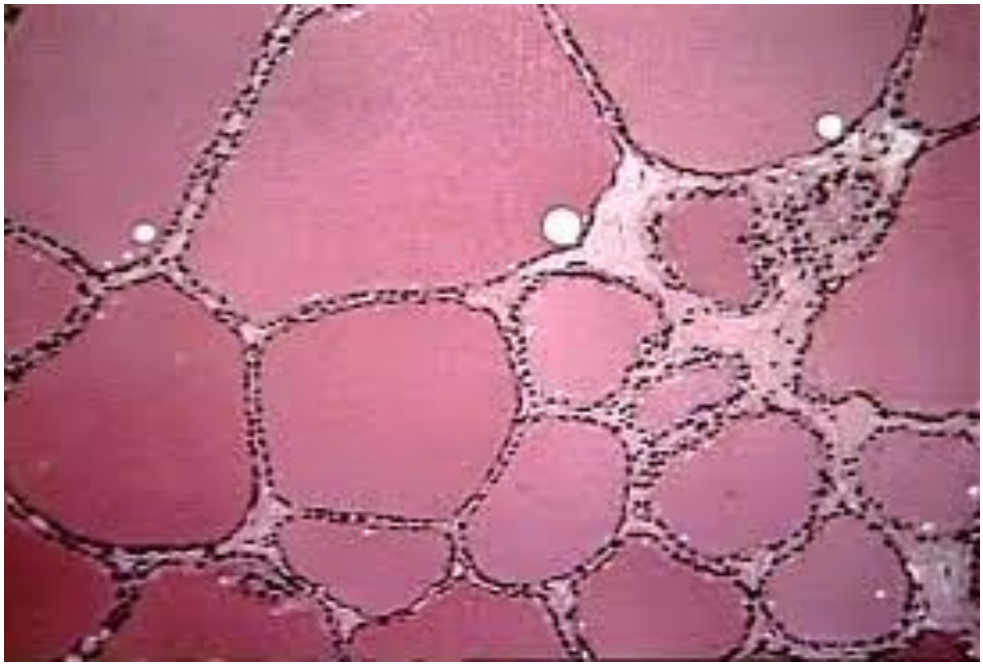
No general accepted staging system.

All patients considered as stage IV.

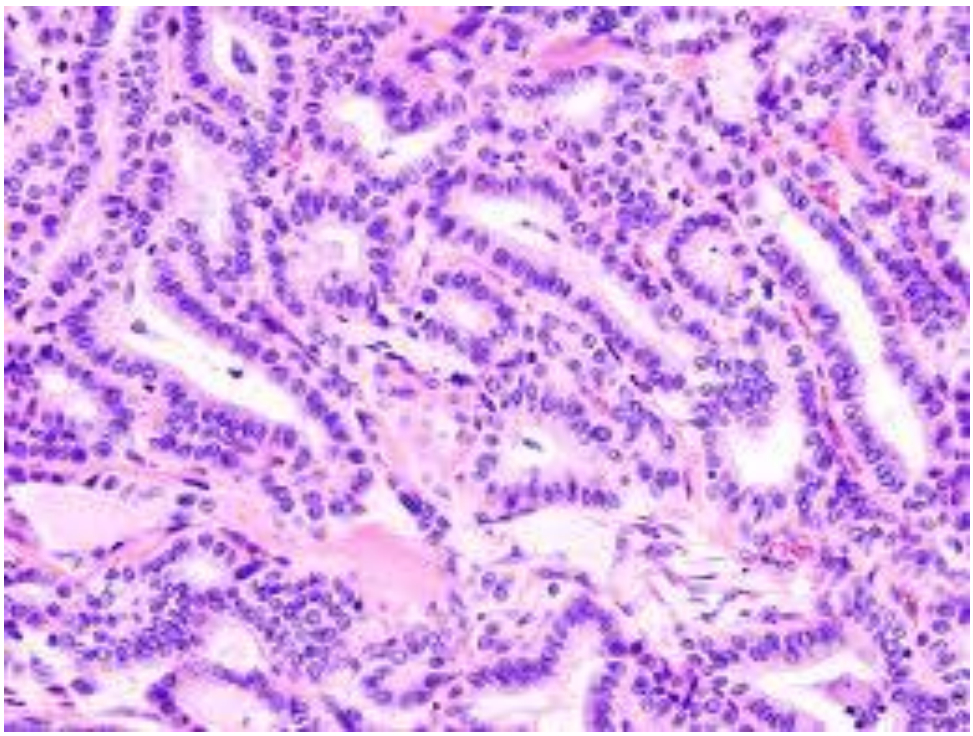
It is sub classified small cell and large cell.

Staging for Hurthle Cell Carcinoma

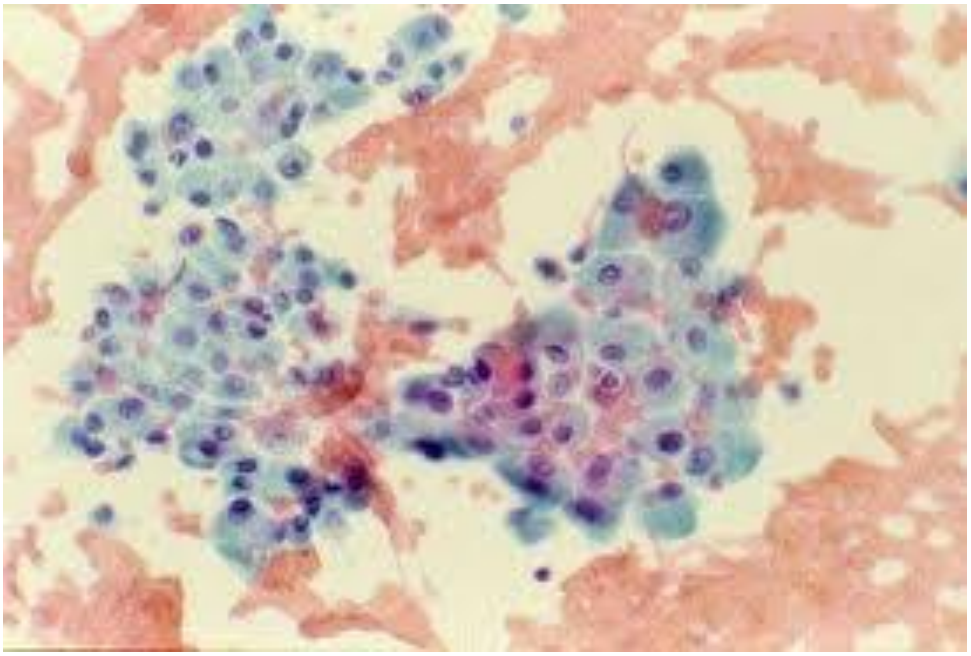
Equivalent stage as non hurthle cell follicular carcinoma.



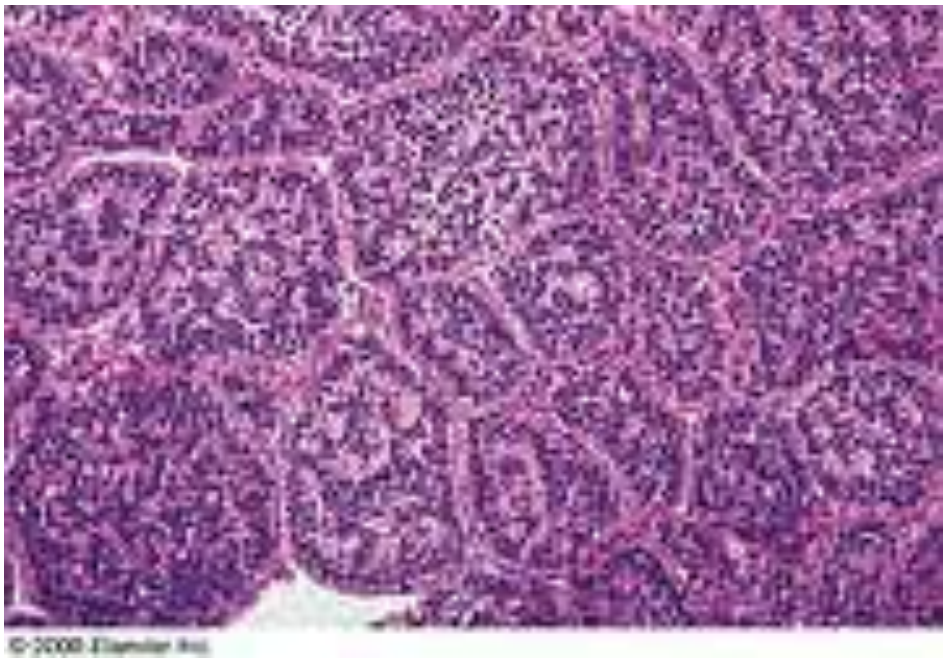
NORMAL HISTOLOGY OF THYROID



PAPILLARY CARCINOMA OF THYROID



HURTHLE CELL CARCINOMA



FOLLICULAR CARCINOMA

INVESTIGATIONS

1. Thyroid Function Test

Usually within normal limits in malignancies. Not a useful predictor for malignancies.

2. X-Ray Soft tissue neck

For tracheal position , some time shows fine stippled calcification in papillary cancer, or signet ring calcification in old cysts.

3. FNAC

Most accurate , using 22 – 25 G needles, specimen adequacy should be >2 slides with 6to 8 cell clusters. > 95% accuracy, False positive -1%, False negative 2%. Clearly diagnose 90% of papillary carcinoma. Can't differentiate between Follicular adenoma from carcinoma.

4. Laryngoscopy

To evaluate the vocal cord status pre operatively.

5. Ultra sound Neck

Identify nodules that are difficult to palpate and <2 cm in size, useful to identify cystic nodules, useful to perform FNAC under it guidance , monitoring the size of the nodule, evaluate the lymphnode status of neck. It can suggest malignancy by sonographic features.

6. Radio active iodine study

It provides the evidence for diagnose MNG, and rarely malignancy.Cold nodule suggestive of malignancy (10%).chance of malignancy is low when a nodule is hyper functioning.Tool for identify distant metastasis.

7. C T Scan neck

Should be done without iodine containing contrast.

Identify soft tissue involvement, and lymphnode status.

Useful for identify retrosternal extension.

8. PET scan

Mainly used for identify the metastasis, recurrence and follow up.

9. SERUM CALCITONIN ASSAY in medullary carcinoma of thyroid.

PROGNOSTIC FACTORS FOR IMPROVED SURVIVAL

Age of the patient ,>40 yrs poor prognosis.

Type of the cancer.

The stage of the cancer.

General health of the patient

Presence or absence of metastasis.

Whether he associated with MEN 2B.

TREATMENT MODALITIES

SURGERY

- May be lobectomy or near total or total thyroidectomy.
- Lobectomy can be done in < 2 cm size, with well differentiated histology, absent lymphnode involvement, solitary, tumors.
- Total thyroidectomy can be done in high risk patients with low rates of local recurrence.
- Lymphadenectomy in well differentiated cancer has little or no effect on prognosis. Berry picking can be done in this tumors.
- When central nodes are present, a clearance should be performed in the way of central neck node dissection.
- When lymphnodes are present in the lateral compartment, a functional neck dissection including levels II-V is performed.

RADIATION THERAPY

- In the form of radio active iodine. Higher doses than used to diagnose are used. Since only thyroid tissue takes up iodine, RAI destroys cancer cells.
- Indications are > 2.5 cm in size, locally invasive, multi focal, presence of metastasis.
- In high risk groups ^{131} I ablation is considered standard management because large residual thyroid beds with high uptake may obscure metastasis, serum thyroglobulin is a better marker of recurrence after ^{131} I ablation.

- It started after four week of total or near total thyroidectomy having allowed the TSH to rise to 50iu or more. At third day post treatment scans are obtained if the patients activity false to permitted levels he or she is discharged with advice by the medical physicist regarding contact with other people. Thyroxine at replacement doses started.
- After 4 months the thyroglobulin is measured and a repeat total-body scans are performed after stopped thyroxine for at least 10 days. If successful ablation is achieved after the first dose of ^{131} I treatment patient discharged with replacement dose of thyroxine and follow up.
- If initial ablation is into successful, remnant ablation will need to be performed at 6-12 monthly intervals until ablation is complete.

RADIOTHERAPY

Post operatively it can be given in a form of either external beam or internal with needles, seeds, and wires.

CHEMOTHERAPY

Combined chemotherapy with bleomycin, adriamycin, and platinum compounds are tried in advanced cancer

HORMONE THERAPY

Is a cancer treatment that removes hormones or blocks their action. Since most tumors are TSH dependent, suppressive doses of thyroxine is enough to prevent recurrence.

TARGETED THERAPY

Drugs that specifically identify and attack cancer cells in the treatment of thyroid cancer are under study. Tyrosine kinase receptor inhibitors are under trial.

TREATMENT OPTIONS BY STAGE.

STAGE 1 AND 2 PAPILLARY OR FOLLICULAR CARCINOMA.

- Near total or Total thyroidectomy with or without RAI therapy.
- Hemithyroidectomy with or without lymphadenectomy followed by Hormone therapy..

STAGE 3 PAPILLARY OR FOLLICULAR.

- Total Thyroidectomy with lymphadenectomy with or without RAI therapy.

STAGE 4 PAPILLARY OR FOLLICULAR.

- Total thyroidectomy with lymphadenectomy plus radiation therapy if only lymph node metastasis is present.
- If distant metastasis is present treatment is usually palliative in the form of RAI therapy, external beam RT, Hormone therapy, clinical trial of chemo therapy or targeted therapy.

TREATMENT FOR MEDULLARY THYROID CARCINOMA

- Total thyroidectomy with central lymphnode dissection.
- External beam radio therapy as palliative to relieve symptoms.
- Chemotherapy as palliative treatment for tumors that have distant spread.

TREATMENT FOR ANAPLASTIC CARCINOMA

- ❖ Tracheostomy, isthumectomy are palliative treatment to relieves symptoms.
- ❖ Total thyroidectomy as palliative treatment when tumor not spread away from the gland.
- ❖ Combined thyroidectomy, external beam radio therapy, chemotherapy are under trial.

STEPS OF THYROIDECTOMY

- Patient under general anaesthesia with semi-fowler's position.
- Skin crease incision is made 2cm from the jugular notch. Length of the incision depends up on the size of the goitre.
- Using mayo's scissors superior and inferior flaps are raised up to thyroid notch superiorly and suprasternal notch inferiorly. It is important to stay anterior to the jugular veins, under the platysma, to achieve a bloodless dissection. These skin flaps are held apart by one or two joll's self-relatining retractors or wishbone ratractors depending on the surgeon's preference.
- Deep cervical fascia is opened longitudinally.
- Strap muscles are separated and retracted laterally.
- The sternohyoid and sternothyroid muscles are some time divided for greater exposure of a large or vascular lobe. It is recommended to do the transection in the upper thirds of these muscles to avoid nerve injury.
- Freeing of the lobe by using the lateral approach. Another approaches are cranial or superior approach. This later approach is preferable when the goitre is large. Superior approach is useful when the goitre is retrosternal.
- The use of graspers should be avoided even in non vascular glands, if malignancy is suspected, to avoid breaching the capsule of the lobe.
- With the aid of firm lateral traction of the assistant with the surgeon applying a gentle medial and upward pull in the dislocated lobe.
- The operative field between the carotid sheath and the thyroid gland can be opened up with careful blunt and sharp dissection. As soon as the

inferior thyroid artery is identified, it is followed medially to its intersection with the recurrent laryngeal nerve, if already visualized in the trachea-esophageal groove. Looping the trunk of the artery at this stage facilities the dissection and improves the exposure of the recurrent laryngeal nerve.

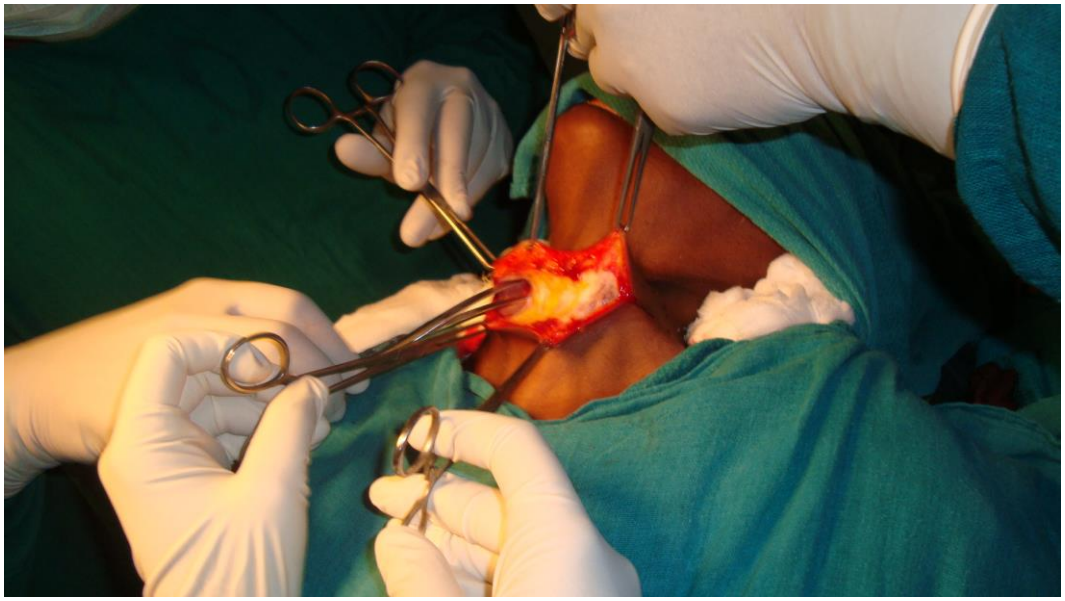
- The next step is to fully mobilize the lobe by ligation of the superior pole vessels. Here care should be taken to preserve the external branch of the superior laryngeal nerve. The upper pole is exposed by gentle downward traction on the lobe and blunt dissection laterally to break down fibrous adhesions. The ESLN is usually identified on the surface of the inferior pharyngeal constrictor before it enters the cricothyroid muscles.
- This is achieved by opening the space medial to the superior thyroid artery with an artery forceps or a pledget. Due to anatomical variations and frequent intramuscular locations (10%) it is only visualized on the constrictor in about 70% of cases. Mass ligation of the upper pole vessels should be avoided as the nerve passes between the branches of the vessels.
- Each pedicles are divided individually close to the gland with absorbable suture material.
- The RLN's 'encountered' usually near the ligament of Berry, rather than being dissected along it is entire length. The critical point is superiority, where the nerve enters the ligament of Berry and could be easily injured while handling the organ of Zuckerkandl. From here medial dissection between the gland and the trachea is continued. It is mandatory to

avoid any form of electro – cautery in the vicinity of the RLN as it could be damaged by conducted heat. Troublesome bleeders could be controlled with fine absorbable transfixion sutures. This dissection is continued medially until the isthmus is completely freed and the transection made close to the opposite lobe.

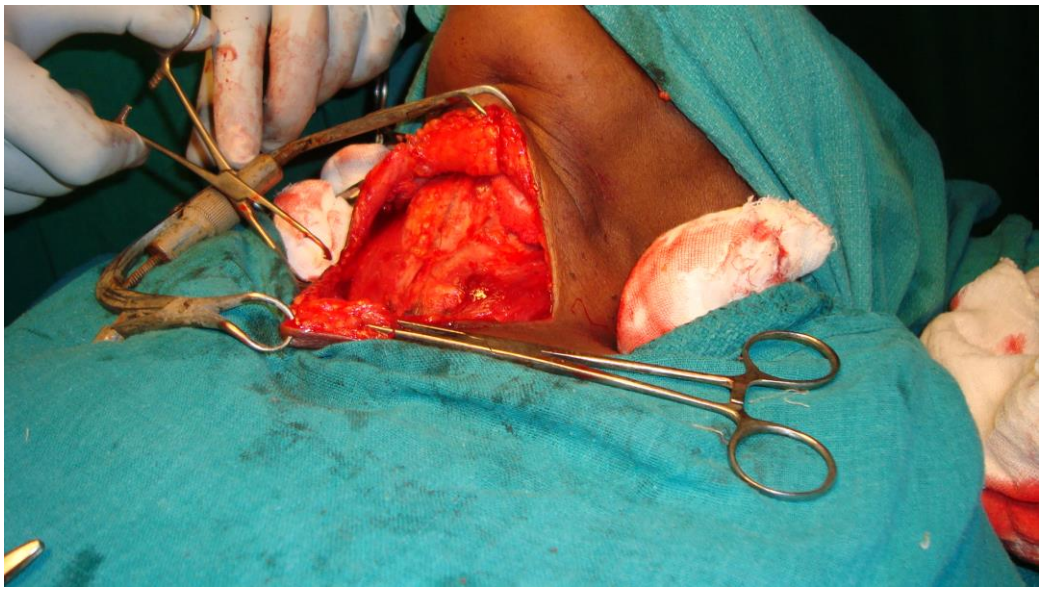
- The stump is closed continuously with an absorbable suture in a haemostatic manner at the same time avoiding bunching up the tissues.
- Nerve stimulation during surgery has been shown to help in the identification and protection of nerves.
- Meticulous control of bleeders should be standard practices as the use of drains is not a replacement for hemostasis.
- If the strap muscles had been transected to improve access to the lobe, they should be re-approximated with interrupted absorbable mattress sutures like 2-0 chromic catgut.
- Skin closure can be achieved with subcutaneous stitch after kept a corrugated drain.

POSITION OF THE PATIENT

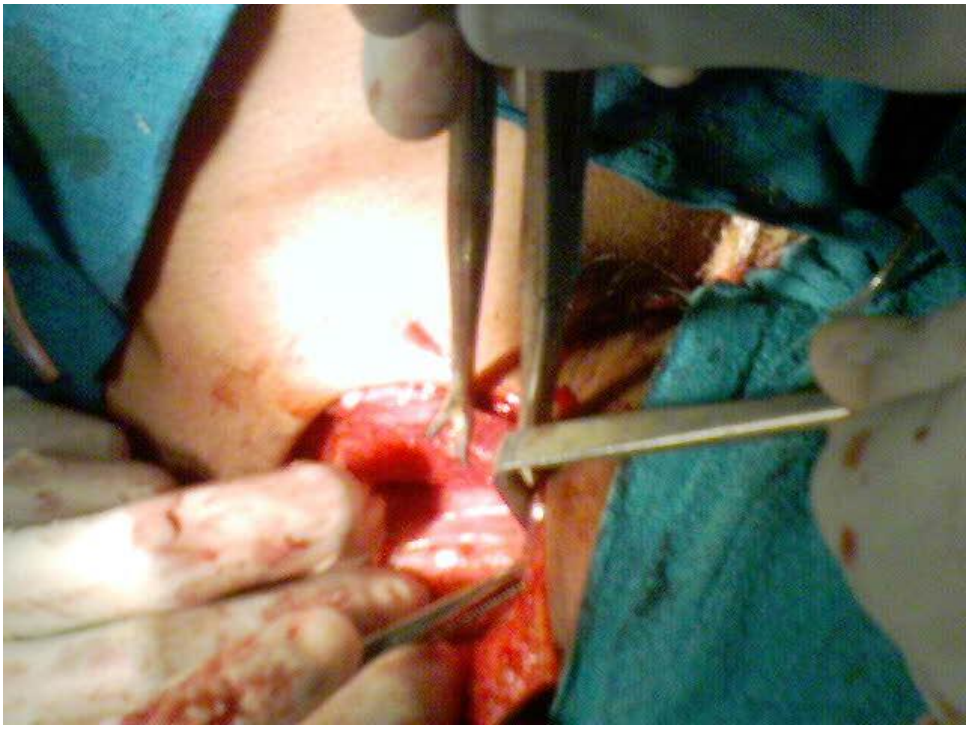
BEFORE SKIN INCISION



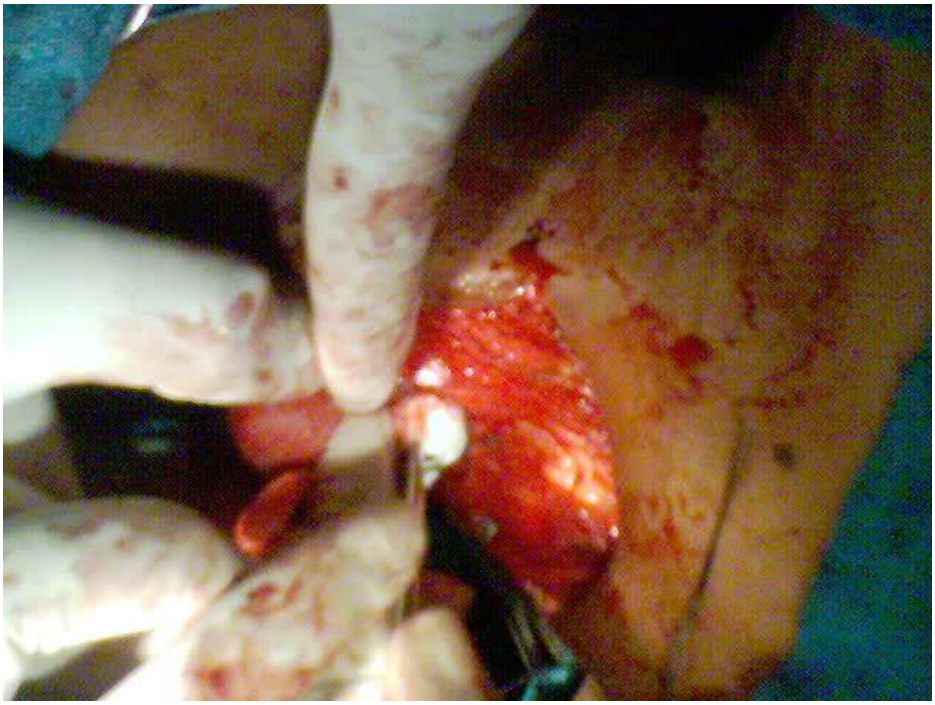
RAISING OF FLAPS



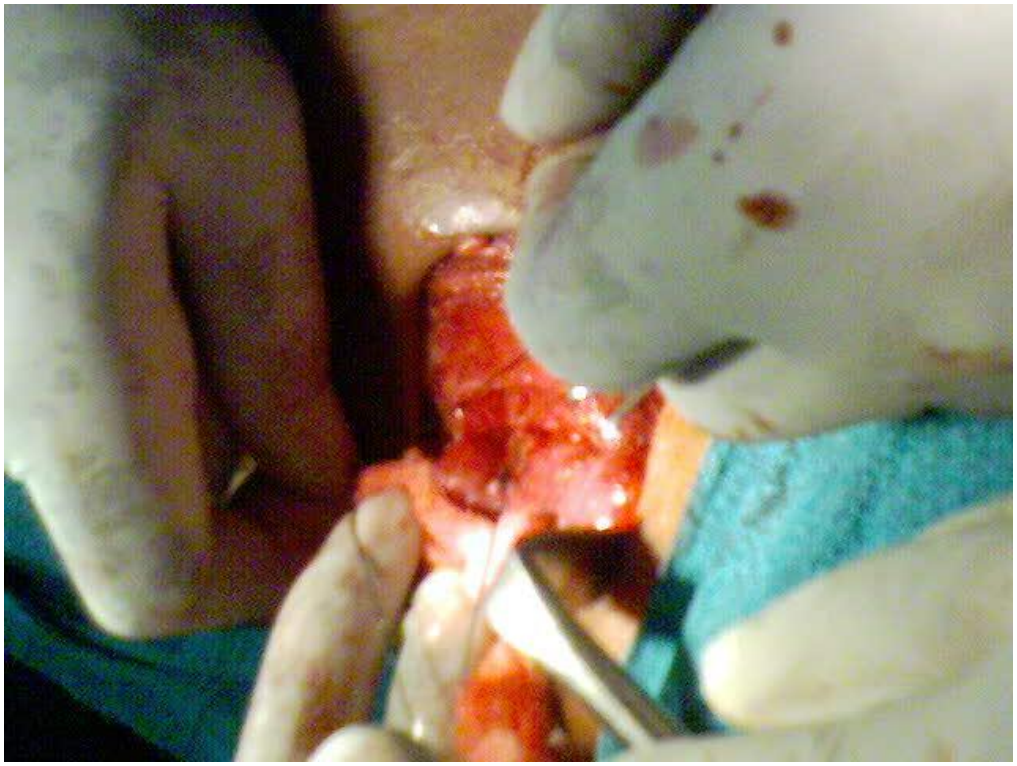
OPENING OF DEEP CERVICAL FASCIA



MEDIALISATION OF LOBE

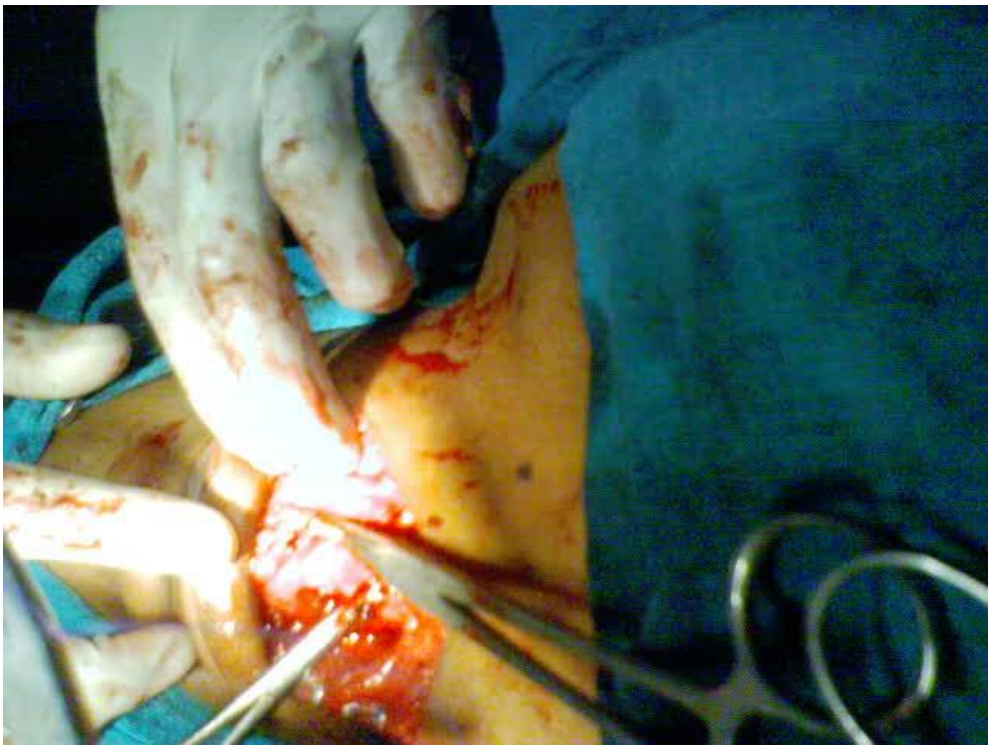


LIGATION OF SUPERIOR PEDICLE



LIGATION OF INFERIOR PEDICLE

SHOWS RECURRENT LARYNGEAL NERVE



SHOWS PARATHYROID

SPECIMEN

COMPLICATIONS OF THYROIDECTOMY

- Small hematomas or serous collections under the skin flaps are not unusual during the first week. These resolve spontaneously.
- Large bleeds requiring reopening and evacuation of heamatoma to relieve pressure symptoms.
- Stridor arising from laryngeal edema due to blockage of venous returns by a deep hematoma is best managed by opening the wound urgently.
- Unilateral recurrent laryngeal nerve occurs in various types like complete transection, traction, contusion, burn. Steroids improve the neuropraxia. If permanent hoarseness present it was treated by surgery like medialization – Type-I thyroplasty, Reinnervation, Primary neurorrhaphy.
- If bilateral recurrent laryngeal nerve injury occurs and both vocal cords are fixed in the adducted position, severe airway obstruction, requiring a traheostomy.
- A tracheostomy is usually a last resort. Large doses of hydrocortisone are usually give at this stage in an effort to reduce the effect of a neuropraxia and the oedema of the injured nerve.
- Permanent RLN palsy after partial thyroidectomy is reported in the literature to be 0-1.3%.
- Treatment for bilateral recurrent laryngeal nerve are cordotomy, arytenoidectomy.
- Any muscle pains, paresthesia, twitching or cramps before discharge indicate hypoparathyroidism and the patients are usually managed

accordingly. 10 mls of intravenous calcium gluconate 8 hourly is commenced at the same time with oral calcium.

- If parathyroids injured during surgery, it can be implanted in sternomastoid muscle after cutting the gland into 2-3mm pieces with clip for identification in future, are in non dominant forearm under brachioradialis muscle.

Thyroid Storm :

Is a clinical manifestation of extreme hyperthyroid state, that results in significant morbidity and mortality.

Causes :

Commonly encountered during surgery, post-operative states, now-a-days it occurs in hyperthyroid patients undergoing emergency surgery for other causes. Trauma, stress, parturition, after withdrawal of anti thyroid drugs, infection.

Clinical Features :

High grade fever, confusion, dehydration, vomiting, abdominal pain, diarrhoea, delivium, seizure, coma.

Treatment :

1) Fluid correction

2) Propylthiouracil is the drug of choice.

3) Proponolol

4) Esmomol

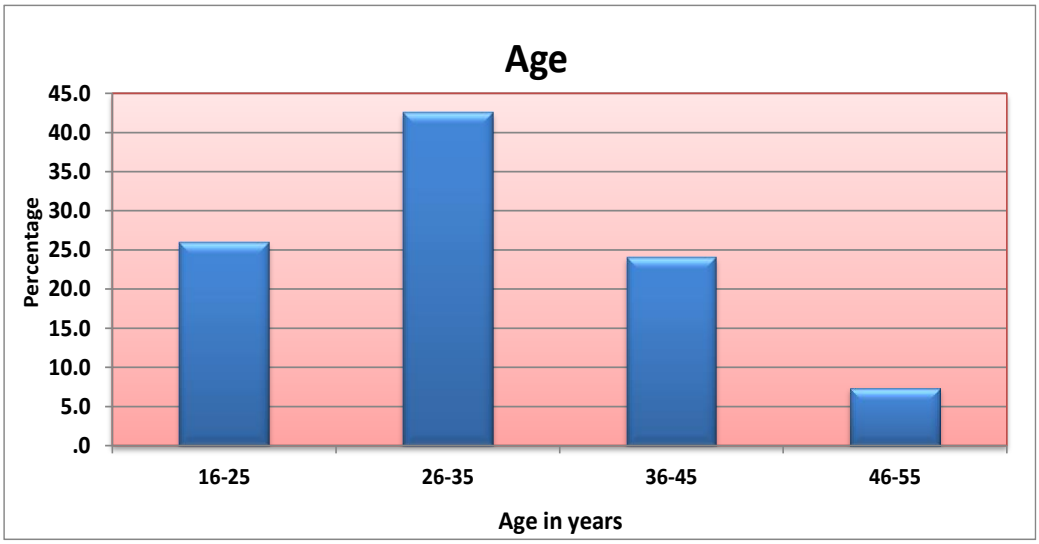
5) Steroids

6) Anti pyretics

7) Digitalization

OBSERVATIONS & CHARTS

Age Group	Frequency	Percent
16-25	14	25.9
26-35	23	42.6
36-45	13	24.1
46-55	4	7.4
Total	**54**	**100.0**

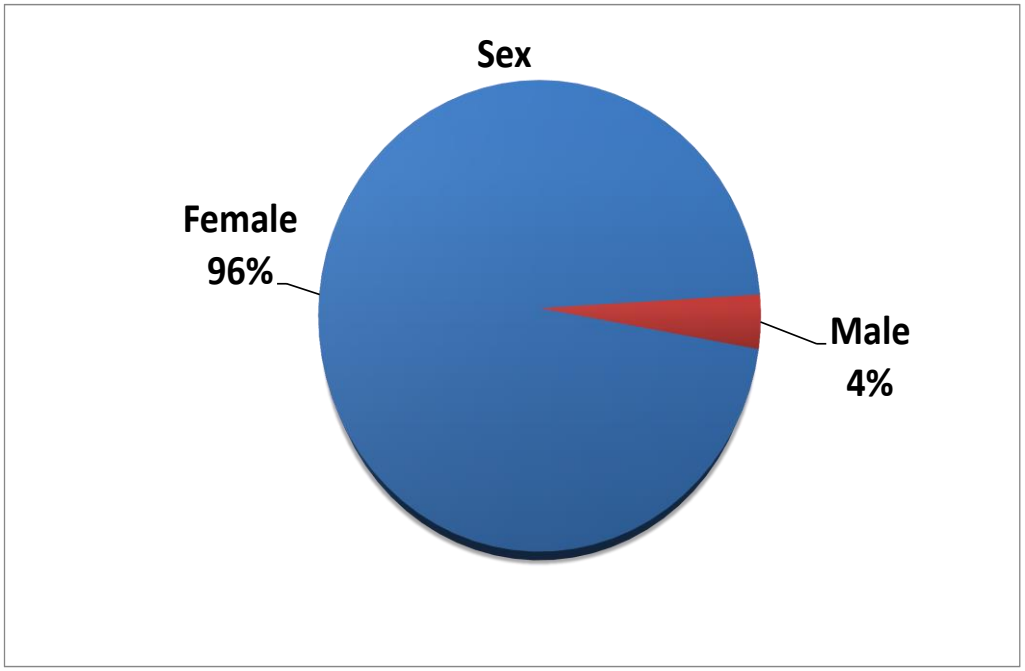


Total No. of Patients = 54

Most common age group that present with goitre = 26-35 (42.6%)

Least common age group that present with goitre = > 45 (7.4%)

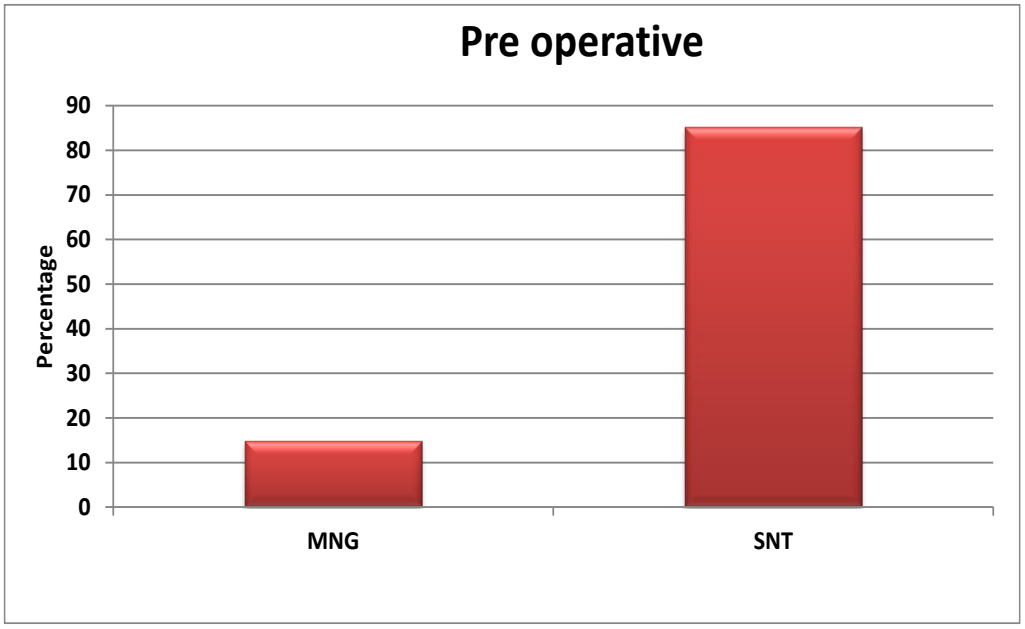
Sex	Frequency	Percent
F	52	96.3
M	2	3.7
Total	**54**	**100.0**



Among 54 Patients females are = 52 (96.3%)

Among 54 patients males are = 2 (3.7%)

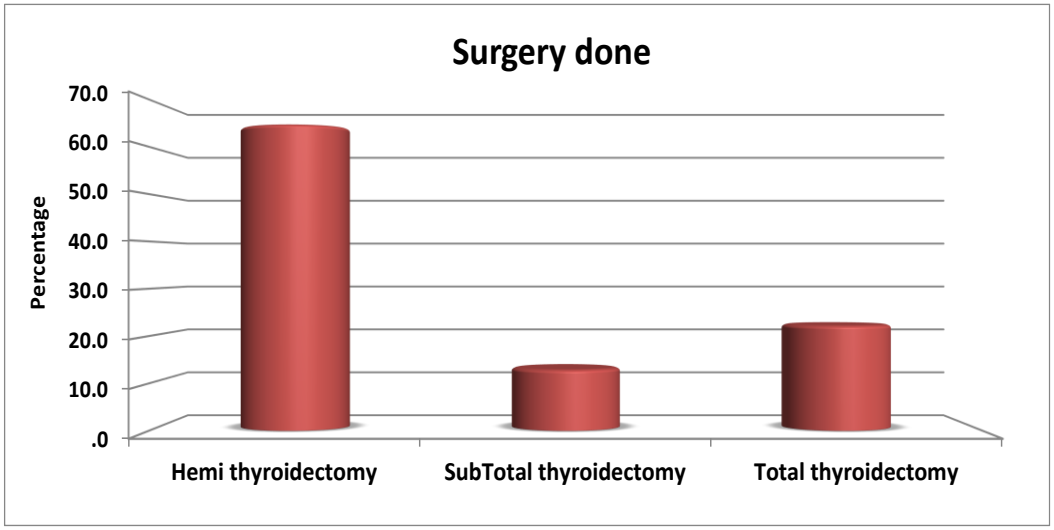
Pre operative	Frequency	Percent
MNG	8	14.8
SNT	46	85.2
Total	**54**	**100.0**



Among 54 patients 46 patients present as solitary nodular goitre (85.2%)

8 patients present as multinodular goitre (14.8%)

Surgery done	Frequency	Percent
Hemi thyroidectomy	35	64.8
SubTotal thyroidectomy	7	13.0
Total thyroidectomy	12	22.3
Total	**54**	**100.0**



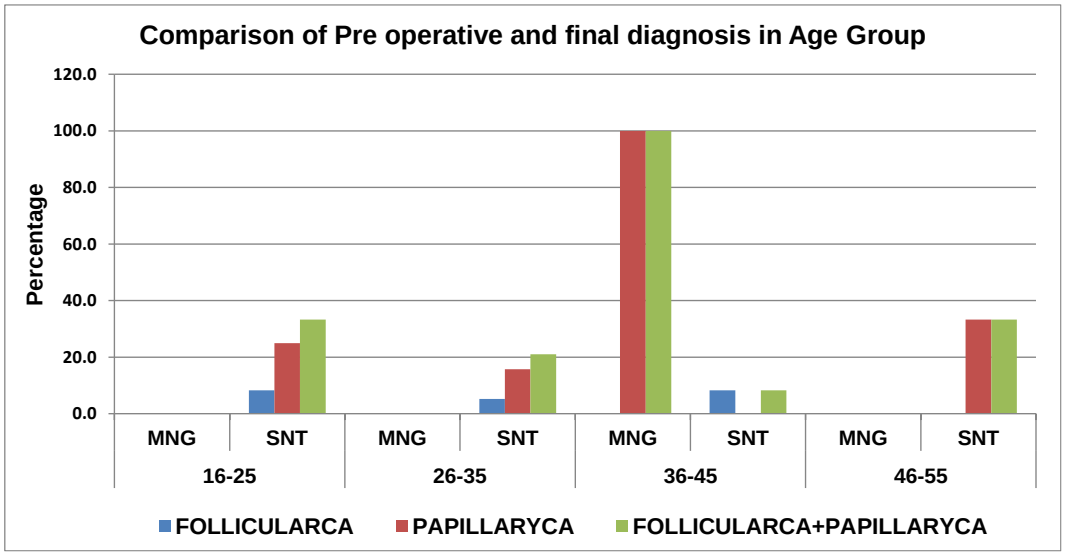
Among 54 patients Hemi thyroidectomy has done in 35 patients 64.8%

Among 54 patients near total thyroidectomy has done in 7 patients 13%

Among 54 patients total thyroidectomy has done in 12patients 22.3%

Age Group		Final Diagnosis			Total
		F.Ca	P.Ca	FOLLICULARCA+ PAPILLARYCA	
16-25	MNG	0	0	0	2
	SNT	1	3	4	12
26-35	MNG	0	0	0	4
	SNT	1	3	4	19
36-45	MNG	0	1	1	1
	SNT	1	0	1	12
46-55	MNG	0	0	0	1
	SNT	0	1	1	3

Note : F.Ca – Follicular carcinoma, P.Ca – Papillary carcinoma



Among 12 patients 4 persons has malignancy in 16-25 age group (33%)

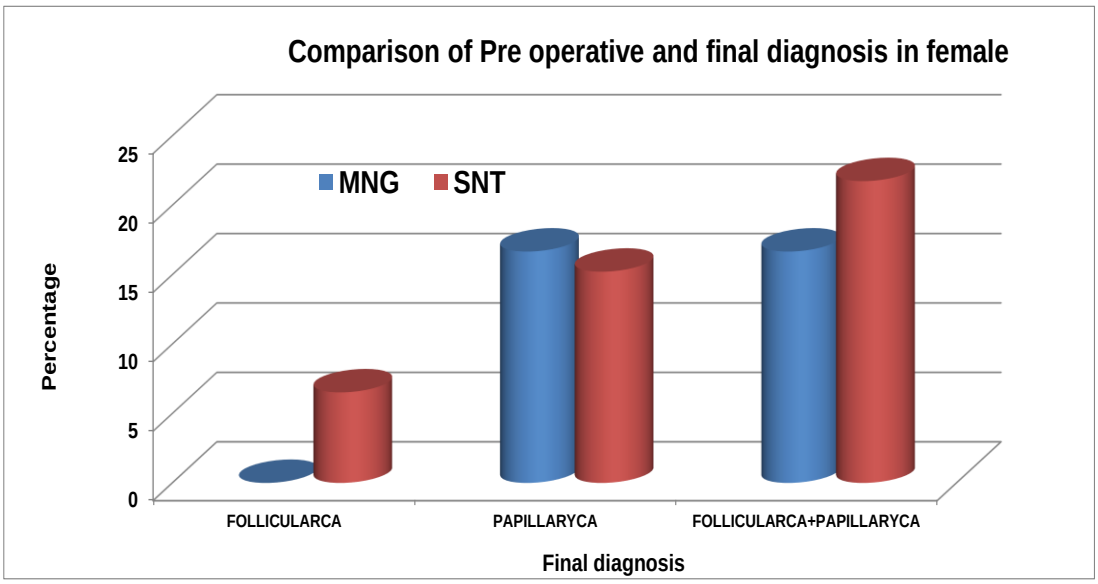
Among 19 patients 4persons has malignancy in 26-35 age group (21%)

Among 12 patients 1 person has malignancy in 36-45 age group (8.3%)

Among 3 patients 1 person has malignancy in 46-55 age group (33%)

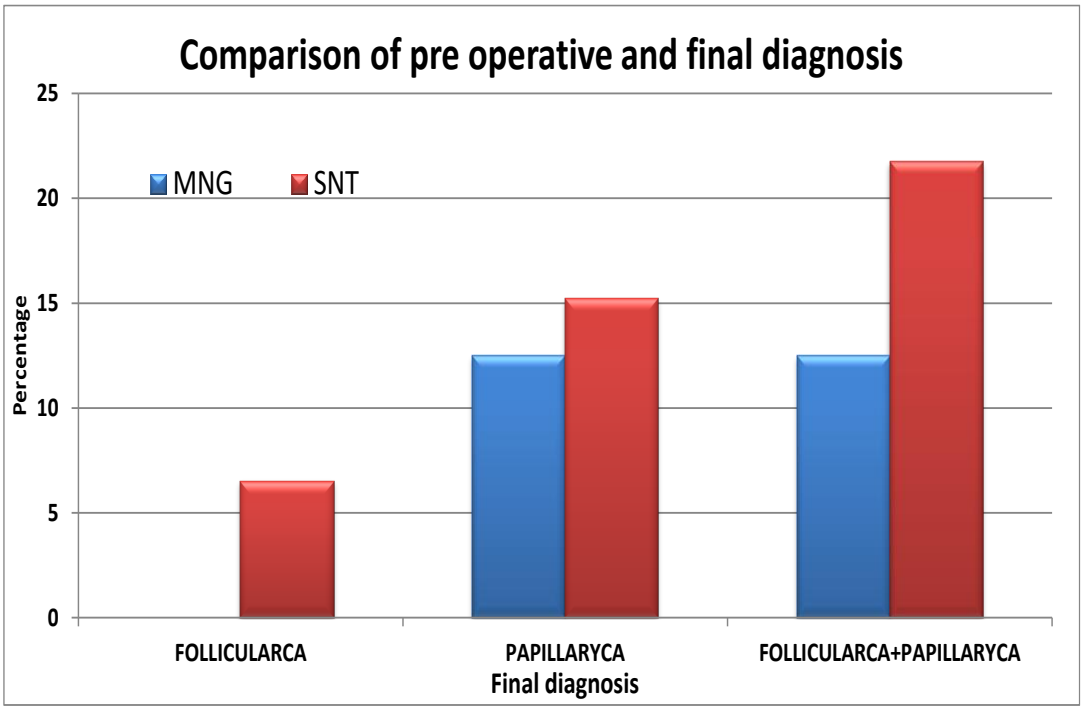
Sex		Final Diagnosis			
		F.Ca	P.Ca	FOLLICULARCA+ PAPILLARYCA	Total
Female	MNG	0	1	1	6
	SNT	3	7	10	46

Note : F.Ca – Follicular carcinoma, P.Ca – Papillary carcinoma



		Final Diagnosis			Total
		F.Ca	P.Ca	FOLLICULARCA+ PAPILLARYCA	
Pre oper	MNG	0	1	1 (12.5%)	8
	SNT	3	7	10(21.7%)	46
Total		3	8	11	54

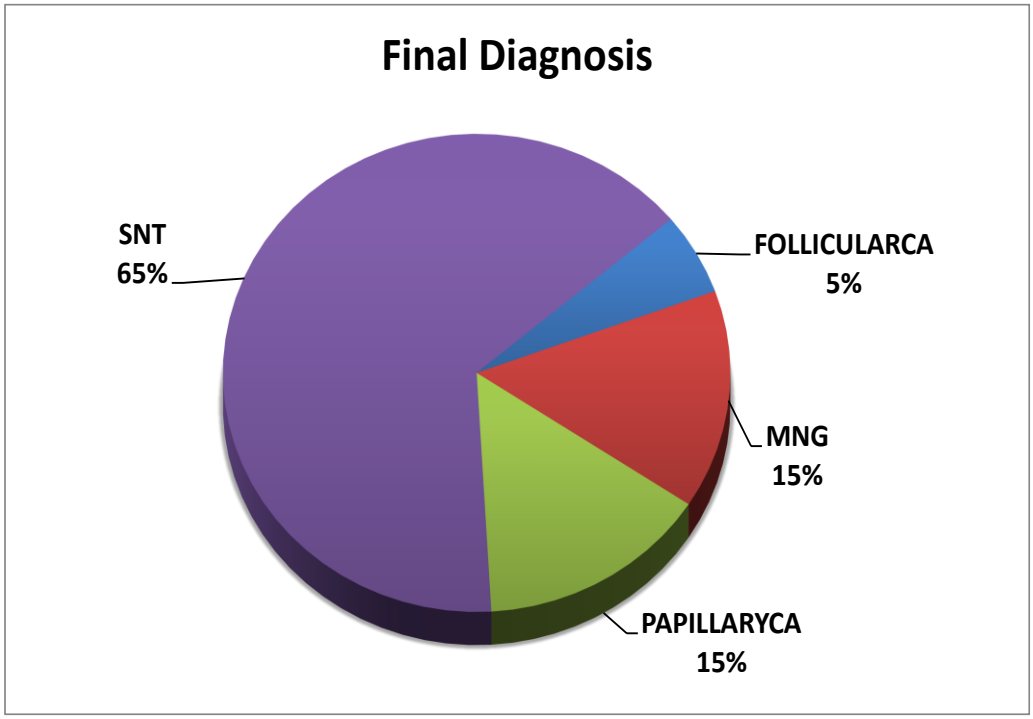
Note : F.Ca – Follicular carcinoma, P.Ca – Papillary carcinoma



Among the 46 patients of SNT 10 persons found to has malignancy 21.7%

Among the 8 patients of MNG 1 person found to has malignancy 12.5%

Final Diagnosis	Frequency	Percent
SNT	35	65
MNG	8	15
PAPILLARYCA	8	15
FOLLICULARCA	3	5



Total No. of	Papillary	Follicular	Total
Malignancy in both SNT & MNG	3	8	11

Among the 54 patients papillary carcinoma found in 8 persons (14.8)

Among the 54 patients follicular carcinoma found in 3 persons (5.5%)

Total No of malignancies found in 54 patients are 11 (20.3%)

Malignancy Type	Total No of patients	Percentage
Papillary Carcinoma	8	72.6
Follicular Carcinoma	3	26.3

DISCUSSION

INCIDENCE OF MALIGNANCY IN NODULAR GOITRE

Thyroid cancer is the ninth most common cancer in the female population. These nodules are present in 4 – 7% of population. Fewer than 5% of this nodules are malignant. The most sensitive clinical predictor of malignancy in goiter is painless hard lump (51%). FNAC is fast accurate and inexpensive.

MALIGNANCY IN SOLITARY NODULE

The prevalence of nodular goitre is usually high even in iodine sufficient areas, the incidence of cancer is considered to be low. FNAC is the most important advance in the management of thyroid nodules in the past decades. The treatment of this patients has been the focus of many controversies over the years. Even in improvement in treatment modalities some questions remain un resolved.

A single or multiple nodules present as common and important clinical entity. The frequency of thyroid nodules which are single on physical examination, increases throughout the life. In the large Framingham database it has been estimated that the life time risk for developing thyroid nodule is 5 to 10% of which 10-13% are carcinomas. Most benign and almost all malignant thyroid nodules give normal thyroid function test. So TFT is not useful in distinguishing a benign from malignant nodule.

Ultra Sound can differentiate between solid and cystic lesions but unfortunately there are no sonographic criteria at present that distinguish benign from the malignant nodules.

FNAC is the diagnostic procedure of choice in SNT because it is safe and inexpensive leads to better prediction of patients has undergoing surgery than any other test. The success of FNAC depends on experience of the person who performs the procedure and cytopathologist who interpreting the cells that are obtained.

The main indication of surgery is malignancy, suspicious cytologic features and the symptoms due to the nodule itself. Incidence of malignancy in a solitary nodule is 20%

Red flags for malignancy are male gender, extremes of age, rapid growth, symptoms of invasion, past history of radiation to head and neck.

INCIDENCE OF MALIGNANCY IN MULTI NODULAR GOITRE

MNG is the commonest indication for thyroidectomy in endemic areas. Pre operative evaluation for thyroid malignancy by means of FNAC is difficult in MNG. Owing to the presence of multiple nodules, malignancy is frequently an unexpected postoperative finding. Patients with MNG have been considered as lower risk of malignancy than those with solitary nodules. However literature review has shown that the incidence of malignant tumors in patients with solitary nodule thus not differ much from MNG but the patient with tumor from underlying MNG are rising high percentage of the patients have lymphnode involvement and distant metastasis at initial presentation. The

overall incidence of malignancy in worldwide was 4-11% it is comparable to our study which is 12.5 %. Papillary carcinoma is most common among this.

An article published in Bahrain medical bulletin on December 2006 vol. 28, quoted that the "study on frequency of malignancy in nodular goiter" of 110 patients shows that 24%, which is comparable to our study.

An article published in Journal of Endocrine practice on Aug 2009 pg.7-13 quoted that a "study of incidence of malignancy in nodular goiter" is 16%, which is comparable to our study.

An article published in surgery today of vol. 27 page 495, quoted that a study of malignancy in nodular goitre is around 5-15%. Which is comparable to our study.

An article published at September 2005, pg 85-90, at Turkey the study of postoperative analysis of thyroidectomy specimens shows 18% of malignancy in SNT and 15% of malignancy in MNG among 518 patients, it is comparable to our study.

A Study at Guntur Medical College between 2001 – 2004 with 98 patients shows 12% of malignancy in SNT published on 13th Feb' 2010. It various from 4 – 17 %, which is comparable to our study.

An article published in 3rd April 2007 in Singapore by Hee nee pang shows 21% of malignancy in nodular goitre which is comparable to our study.

An article published on 2005 vol. 39, at turkey a 'study of prospective analysis on course of thyroidectomy' shows 18% of malignancy in SNT, and 15% of malignancy in MNG, which is comparable to our study.

An article published at Hong kong Medical Journal on September 2001 vol. 7 quoted that a study on outcomes of thyroid surgery by a surgeon T.L. chow shows 20% malignancy in SNT. which is comparable to our study.

An article published in Asian Pacific Journal of cancer prevention Vol.10, 2009 a study on view of thyroid cancers in Malaysia shows 28 % of malignancy in nodular goiter of 11 year period with predominately papillary type which is comparable our study.

An article published in Bahrain Medical bullet on Dec' 2004 vol. 26, shows 30% of malignancy in nodular goitre in the study of 835 patients.

CONCLUSION

- Average age group of patients present with nodular goitre in our institution is 16-35, it is comparable to other studies.
- Females are predominant sex group presented with nodular goitre.
- Majority of the malignancies are presented as solitary nodule.
- Maximum number of malignancies occurred in 16 to 35 age group.
- Frequency of malignancy is greater in solitary nodular goitre than multi nodular goitre.
- Frequency of malignancy in nodular goitre is 20% it is comparable to other studies.
- Papillary type of carcinoma is the predominant type of malignancy presented.
- All postoperative thyroid specimens should be subjected to detailed histopathology to detect microscopic malignant foci.
- Due to its high accuracy and cost effectiveness FNAC plays significant role in the diagnosis of thyroid malignancy and management.
- Incidence of thyroid malignancy in nodular goitre it present in our hospital is significant. FNAC and Ultra sound are important tools for the assessment of this goitres.
- The risk of malignancy in MNG should not be under estimated as the incidence of malignancy in MNG is raising.
- Dominant nodule in MNG should be considered as significant like solitary nodule.
- Total thyroidectomy in MNG removes the disease process completely and avoids the substantial risk of re-operative surgery.

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PROFORMA

Name :

Age :

Sex :

Onset of Symptoms :

D.O.A. :

D.O.D. :

PRE OP DIAGNOSIS :

POST OP DIAGNOSIS :

DATE OF SURGERY :

SURGERY DONE :

DURATION OF HOSPITALITY :

INVESTIGATION :

THYROID PROFILE :

FNAC :

ENT OPINION :

X-RAY SOFT TISSUE NECK :

HISTOPATHOLOGICAL REPORT :

	AT ADMISSION	**AT DISCHARGE**
HB %		
TC/DC		
BLOOD SUGAR		
UREA		
CREATININE		
SERUM ELECTROLYTES		
BLOOD GROUPING		
USG NECK		