A DISSERTATION ON

"A CROSS SECTIONAL STUDY OF PREVALENCE OF MALIGNANCY IN SOLITARY NODULE OF THYROID"

Submitted to

THE TAMIL NADU DR. M. G. R. MEDICAL UNIVERSITY

In partial fulfilment of the requirements

For the award of degree of

M.S (Branch I)-GENERAL SURGERY

GOVERNMENT KILPAUK MEDICAL COLLEGE & HOSPITAL

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

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MAY 2020

DECLARATION BY THE CANDIDATE

I hereby declare that the dissertation entitled "**A CROSS SECTIONAL STUDY OF PREVALENCE OF MALIGNANCY IN SOLITARY NODULE OF THYROID** is a bonafide and genuine research work carried out by me under the guidance of **Dr. S.VIJAYALAKSHMI M.S., DGO**., Professor and chief, Department of general surgery, Govt Kilpauk Medical College,Chennai.

Date : Chennai
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Certified that this is the bonafide dissertation done by **Dr. K.BOOPATHERAJAN** and Submitted in partial fulfillment of the e requirements for the Degree of M.S. General Surgery, Branch I of The Tamilnadu Dr. M.G.R Medical University, Chennai.

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This is to certify that this dissertation work titled " **A CROSS SECTIONAL STUDY OF PREVALENCE OF MALIGNANCY IN SOLITARY NODULE OF THYROID** " of the candidate **Dr. K.Boopatherajan** with registration number **221711153** for the award of Masters in Surgery in the branch of Branch I- General Surgery. I personally verified the www.urkund.com website for the purpose of plagiarism check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows 13% (Thirteen) of plagiarism in the dissertation.

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The Institutional Ethical Committee of Govt. Kilpauk Medical College, Chennai reviewed and discussed the application for approval "A CROSS SECTIONAL STUDY OF PREVALENCE OF MALIGNANCY IN SOLITARY NODULE OF THYROID" submitted by Dr.K.Boopatherajan, MS General Surgery, Government Kilpauk Medical College and Hospital , Chennai - 10.

The Proposal is APPROVED.

The Institutional Ethical Committee expects to be informed about the progress of the study any Adverse Drug Reaction Occurring in the Course of the study any change in the protocol and patient information /informed consent and asks to be provided a copy of the final report.

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LIST OF ABBREVATIONS

USG	Ultrasonogram
TBG	Thyroid binding globulin
T4	Thyroxine
T3	Tri-iodotyrosine
HPE	Histopathological examination
FNAC	Fine needle aspiration cytology
RLN	Recurrent laryngeal nerve
SNT	Solitary nodule thyroid
MNG	Multinodular goiter
MIT	Monoiodotyrosine
DIT	Diodotyrosine
MTC	Medullary thyroid carcinoma
ATC	Anaplastic thyroid carcinoma
AG	Adenomatous goiter
TR	Thyroid hormone receptor

PART-I

INTRODUCTION

Nodules of the thyroid gland are relatively common with a prevalence of 4-7% in the general population. They can be detected by simple palpation of the thyroid gland. The prevalence increases to upto 50% when the examination is combined with an ultrasonography.

Depending on the number, the nodules are classified as solitary or multiple. Solitary nodules are found to be four times more common among the women than men. Solitary nodule can either be single or it can be a dominant nodule in a multinodular gland which cannot be palpated.

The nodules are mostly asymptomatic and detected on a routine clinical examination. They can be benign or malignant. Benign nodules can be simple cysts, thyroid adenoma or colloid nodules. Malignant nodules include papillary carcinoma , follicular carcinoma , medullary carcinoma or secondaries from other sites.

Since thyroid nodules are common, their risk of malignancy has be borne in the surgeon’s mind while dealing with it. Thus identification of patients with significant malignant risk is a must and evidence based guidelines has to be available for the management of these patients. Moreover Warren H Cole (1949) has quoted that solitary nodules have significantly higher incidence of malignancy than multinodular goiter.

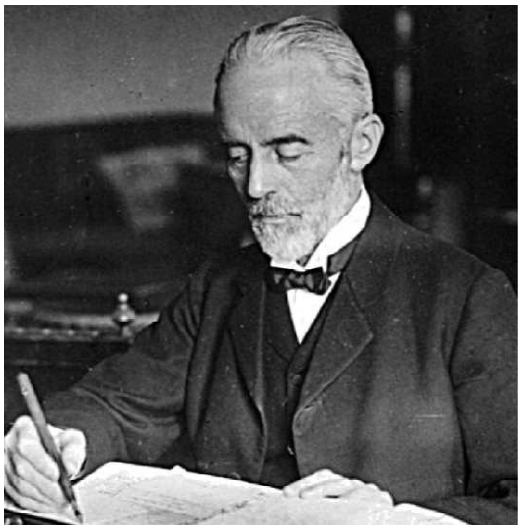
REVIEW OF LITERATURE

HISTORY:

The term thyroid gland is derived from Greek thyreoeidesis which means-‘ shield like’ is attributed to Thomas Wharton The term Goiter is derived from the latin word-guttur which means throat. Goitre is defined as an enlargement of the thyroid gland. They have been recognized since 2700 B.C. Albrechyton Haller classified thryroid gland as a ductless gland in 1776. He reported that thyroid gland has many other functions such as lubrication of larynx, acts as a reservoir for blood for continuous flow to brain and to beautify women’s necks.

The credit to first thyroid surgery as a treatment for goiter was given to Roger Frugardi in 1170. When medical treatment fails two setons where inserted at right angles to goitre and was tightened till the goiter seperates. The wound was then treated with caustic powder . This method made thyroid surgery very hazardous with high mortality rates. However in the second half of nineteenth century, advances in general anesthesia, hemostasis and antisepsis made surgeons to do thyroid surgery with reduced morbidity and mortality[1]

Emil Theodor Kocher (1841– 1917) and C.A. Theodor Billroth (1829–1894), performed thousands of operations with increasingly successful results were the most notable thyroid surgeons. However when thyroid surgery was being performed increasingly new issues like myxedema and cretinism began to become apparent post operatively. Kocher in 1909 was awarded the Nobel prize for medicine for his works on the physiology , pathology and surgery of thyroid gland[2].



Theoder Kocher, Father of thyroid surgery

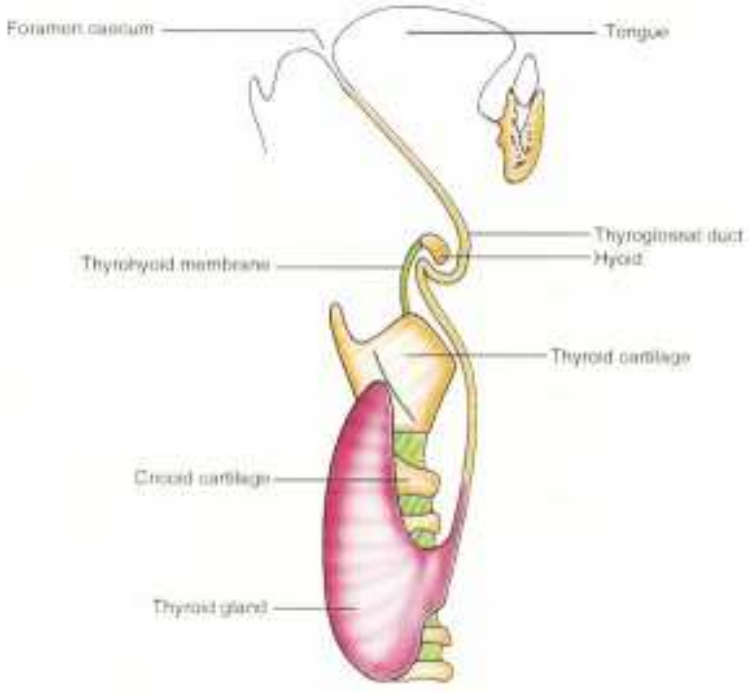
Kocher Billroth

ANATOMY OF THYROID GLAND

EMBRYOLOGY:

Thyroid gland appears at the third week of gestation as a thickening of the epithelium of the pharyngeal floor at the level of first pharyngeal pouch. This site is termed as the foramen caecum visible in the adult tongue. Thyroid gland then remains connected with the foramen caecum by a small solid duct- The thyroglossal duct which passes anterior to the hyoid bone .

The gland first appears as an irregular plate , which develops two wing shaped lateral enlargement connected to each other by the isthumus.



Thyroid follicles starts to appear by second to fourth month of gestation. Colloid formation and uptake of radioactive iodine begins by the eleventh week of gestation.

The ventral portion of the fourth and fifth branchial pouches forms the Epithelial structures, the paired lateral anlages. This forms the ultimo-branchial body forms the C-cells (calcitonin) dispersed among the thyroid follicles. C-cells now has now been identified be be developing from the neural crest cells [3]. They belong to a group of cells known as APUD(amine precursor uptake and decarboxylation) cells.

CONGENITAL ANOMALIES OF THYROID GLAND

1. LINGUAL THYROID

Instead of the normal cervical position, thyroid gland lies beneath the epithelium of the tongue at the level of foramen caecum. This can be diagnosed with the help of radioactive iodine scintigraphy. Aberrant thyroid gland may be present anywhere from foramen caecum to the normal site.

2. PERSISTENT REMNENTS OF THYROGLOSSAL DUCT

The normal remnants of the thyroglossal duct are the foramen caecum and the pyramidal lobe of thyroid. Thyroglossal cysts are not infrequent and accounts for 62.8 % of all congenital masses of the neck.

3. LATERAL ABBERANT THYROID

The thyroid tissue is found to be located lateral to the jugular vein. The following are its morphological variations present.

Thyroid tissue may be found as a nodule attached to the main gland by a connective tissue

Abberant thyroid gland may be present within the lymph nodes

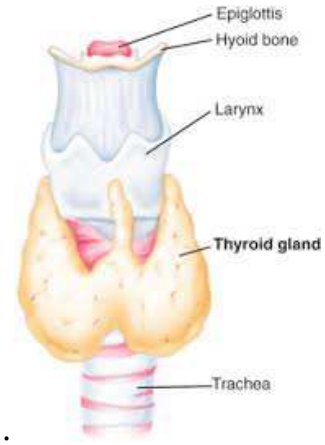
4. STRUMA OVARI

The ovarian thyroid gland – although it is not related to the thyroid gland anatomically , it is an extraordinary ectopic thyroid gland. Ovarian thyroid may occur along with ovarian dermoid and teratoma.

ANATOMY

Thyroid gland consists of two lateral lobes connected to each other by means of isthumus and pyramidal lobe.A thin epithelial tube or a fibrous cord like structure – the thyroglossal duct extends between the foramen caecum and the thyroid gland [4].

Thyroid gland extends from C6 to T1. In adults it weighs about 30 grams . Its dimensions are approximately 5cm x 3 cm x 3 cm . The isthumus connecting the lobes is 1.3 cm wide. The capsule of the thyroid gland consists of connective tissue which is continuous with its septa. It is a true capsule

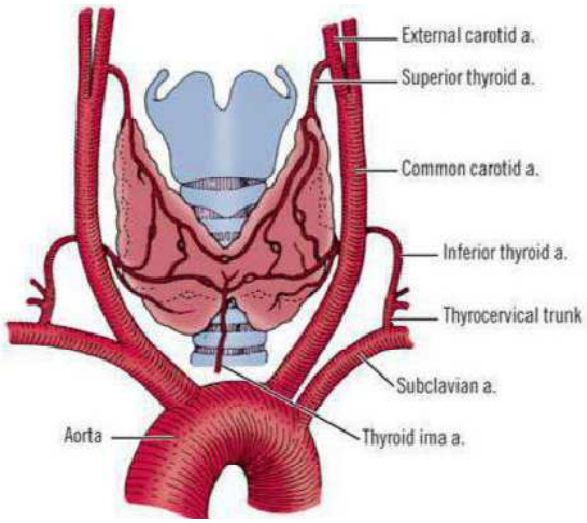


Surrounding the true capsule is a layer of well developed fascia which is derived from the pretracheal fascia. It is also called the perithyroid sheath or the surgical capsule. It is the false capsule of thyroid. This fascia is well developed anteriorly and laterally. It is thin and loose posteriorly which permits the enlargement of the gland posteriorly. A thickening of this fascia called the ligament of berry fixes the thyroid gland posteriorly to the cricoid cartilage.

Superiorly between the true and the false capsule lie the superior parathyroid gland. The inferior parathyroids may lie within the thyroid parenchyma or over the fascia. The levator muscles of thyroid connects the thyroid gland to the hyoid bone. These muscles may be vestigial and may be inconstant in its location, occurrence or innervations.

BLOOD SUPPY

ARTERIAL SYSTEM



Thyroid gland is supplied by the superior thyroid artery,inferior thyroid artery and the throidea ima artery. The superior thyroid artery arsies from the external carotid artery, just above or below the common carotid bifurcation. It then passes anteriorly downwards and reaches to supply the superior pole of the thyroid gland. During this course the artery runs parallel to the external branch of the superior laryngeal nerve which supplies the cricothyoid muscle and the cricoppharyngeus muscle[5].

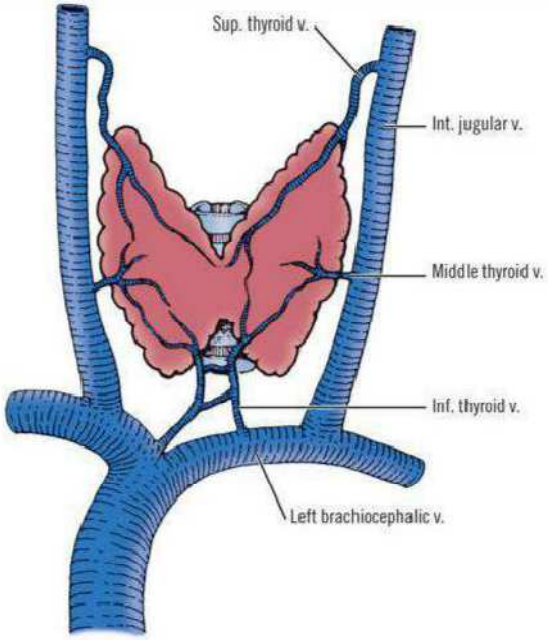
At the superior pole of the gland, the ***superior thyroid artery*** divides into anterior and posterior branches. The anterior branch anastomoses with the contralateral superior thyroid artery and the posterior branch anastomoses with branches of the inferior thyroid artery. From the posterior branch, parathyroid artery passes to the superior parathyroid gland.

The ***inferior thyroid artery*** arises from the thyrocervical trunk or can arise directly from the subclavian artery. It ascends posterior to the carotid artery and the internal jugular vein pierces the prevertebral fascia and crosses the ascending laryngeal nerve. It suppies the lower pole of the gland

Thyroidea ima artery is unpaired and is inconstant. It can arise from the right brachiocephalic artery or the right common carotid artery or the arch of aorta. It supplies the isthumus of thyroid gland.

VENOUS DRAINAGE

The veins form a plexus which may lie on the surface or in the substance of the gland.



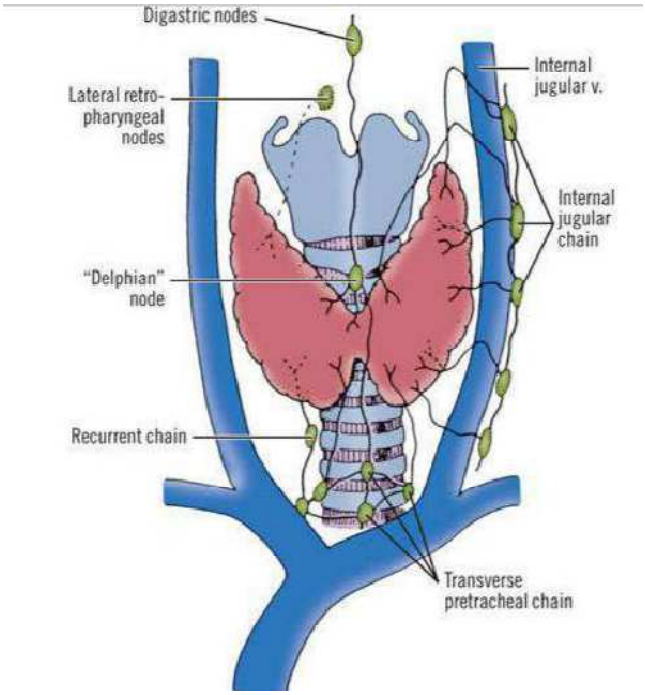
The ***superior thyroid vein*** emerges from the superior pole of the thyroid accompanying the superior thyroid artery, passes superiorly and laterally , crosses the omohyoid muscle and the common carotid artery and enters the internal jugular vein along with the common fascial vein.

The ***middle thyoid vein*** arises from the lateral surface of the gland , and does not accompany any artery. It then crosses the common carotid artery and opens into the internal jugular vein.

The ***inferior thyroid vein*** is the most variable and is the largest vein of the thyroid. On the right side It leaves the lower border of the gland, passes anteriorly to brachiocephalic artery and drains into the right brachiocephalic vein. The left vein crosses the trachea and drains into the left brachiocephalic vein[6].

LYMPHATIC DRAINAGE

Many patterns of lymphatic drainage of thyroid has been proposed. Hollinshead conceptualization is being discussed here.



PATTERNS OF DRAINAGE

1.MEDIAN SUPERIOR DRAINAGE

3 to 6 vessels arises from the superior margin of the isthumus and the medial margin of the two lobes. They pass anterior and superior to larynx and drains into the digastrics lymph nodes and the prelaryngeal nodes(dephian nodes) above the isthumus. Secondary drainage is to the upper jugular node and the pretracheal nodes.

2.MEDIAN INFERIOR DRAINAGE

Vessels arises from the lower part of tht isthumus and lower medial parts of the lateral lobes drains into the pretracheal and the brachiocephalic nodes.

3.RIGHT AND LEFT LATERAL DRAINAGE

Vessels arising from the lateral border of each lobe passes superiorly and upwards along the superior thyroid artery and vein. Inferiorly they pass along with the inferior thyroid artery.

Lymphatic trunks arise from the lateral border of the thyroid lobes. Few vessels pass laterally and posteriorly to the carotid sheath to drain into the internal jugular chain. Sometimes the vessels drains into the right jugular vein, subclavian vein ot the thoracic duct directly.

4.POSTERIOR DRAINAGE

The posterior vessels that arise from the inferior and medial surfaces drain into the nodes that lie along the recurrent laryngeal nerve. Occasionally they drain into the retropharyngeal nodes[7].

INNERVATION:

Innervation is by the sympathetic system- superior , middle and the inferior cervical ganglia.

1. RECURRENT LARYNGEAL NERVE:

Both the right and left recurrent laryngeal nerves are closely related to the thyroid gland. The right nerve loops around the subclavian artery from posterior to anterior and crosses behind the common carotid artery and ascends in the tracheoesophageal groove. Then it travels posterior to the right lobe and enters the larynx behind the cricothyroid joint and the inferior cornu of thyroid cartilage.

On the left side the recurrent nerve arises distal to the origin of left subclavian artery from the arch of aorta where the vagus crosses . it winds around the ligamentum arteriosum and the aorta and ascends similar to the right nerve.

2. SUPERIOR LARYNGEAL NERVE:

The superior laryngeal nervea arises inferior to the lower sensory ganglion of the vagus just external to the jugular foramen. It then passes inferiomedial to the carotid artery. At the superior cornu of hyoid bone it then divides into a sensory branch- the internal laryngeal and a motor branch- external laryngeal nerve which supplies th cricothyroid and the cricopharyngeus muscle.

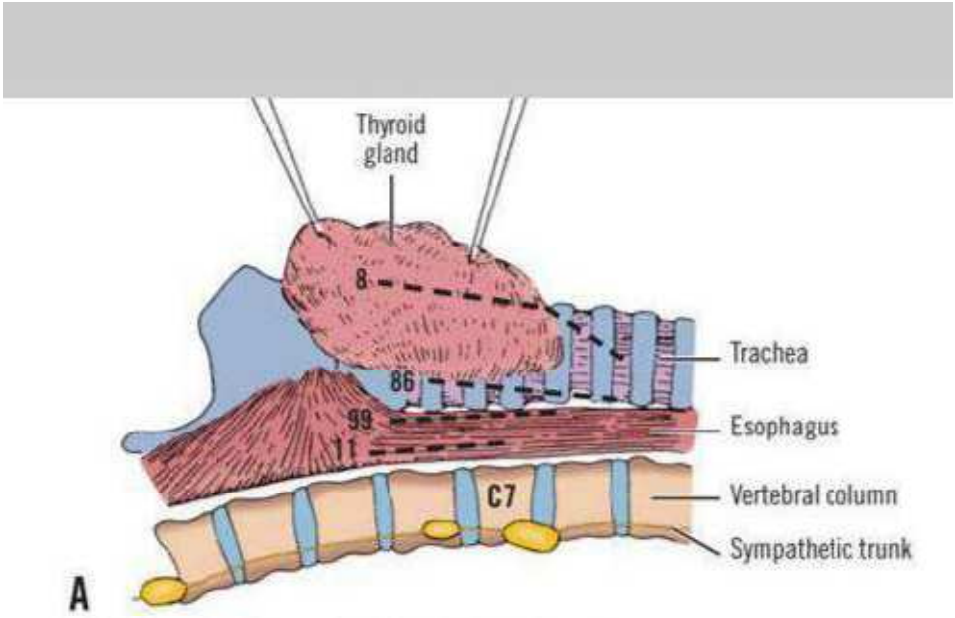
a,INTERNAL LARYNGEAL NERVE:

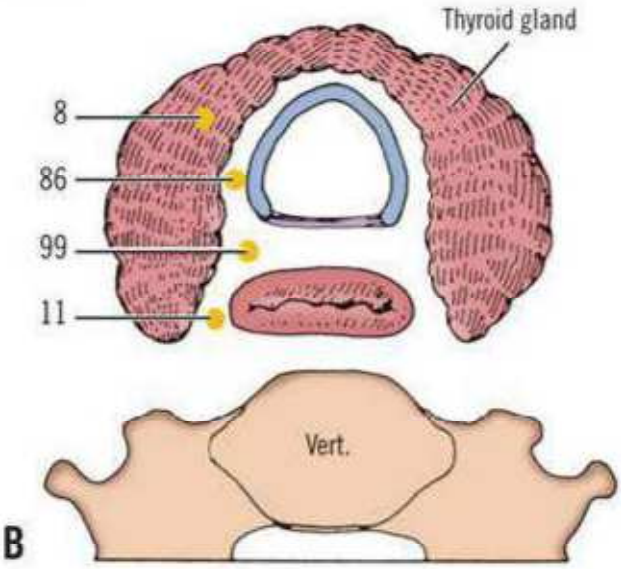
Internal laryngeal nerve can be identified only rarely during the surgery. This can be done only when the upper pole of thyroid is enlarged and when it rises above the thyroid cartilage. It provides sensory fibres to the larynx and piriform recess of the laryngopharynx. It pierces the thyrohyoid membrane with the superior laryngeal branch of superior thyroid artery and enters to supply the larynx.

b.EXTERNAL LARYNGEAL NERVE:

This branch along with the superior thyroid artery and the vein, it passes beneath the sternothyroid muscle , posteromedial to the vessels. It then passes below the lower border of thyrohyoid muscle and innervates the cricothyroid muscle[8]. Its major functions are

phonation, overall regulation of breathing by controlling the expiratory resistance.





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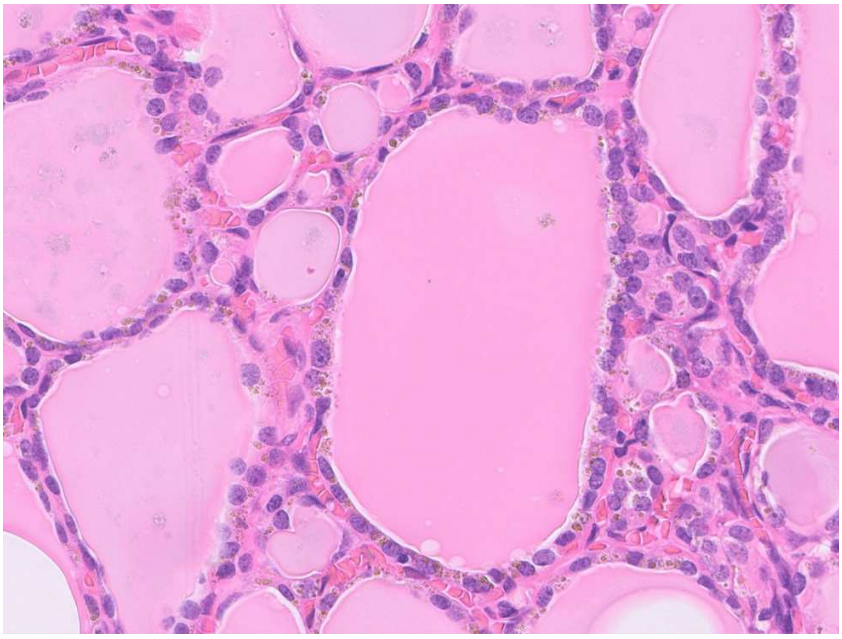
HISTOLOGY



The epithelial cells form the thyroid follicles. This can be cuboidal or squamous. The follicles are separated by a connective tissue rich in blood vessels lymphatic tissue with small bundles of nerves. The gland is surrounded by a capsule which is a layer of connective tissue. Multiple septa arises from the capsule and extends within the thyroid parenchyma dividing it into multiple lobules.

Each follicle has a gelatinous collection in the centre . The follicular cells are of two types- the follicular and the parafollicular C cells.

The functions of the follicular cells are synthesis of thyroglobulin , resorption of thyroglobulin, iodination and release of hormone into the blood and lymphatics[9].

The parafollicular c cells contain secretory granules and are found in the stroma between the follicles and in the follicular epithelium.

PHYSIOLOGY

Thyroid gland produces the metabolic hormones thyroxine(T4) and triiodothyronine(T3) and calcitonin which regulates the calcuium metabolism. The thyroid follicle with the colloid centre is the site for production of thyroid hormones. The centre of the follicle is filled with the protein, Thyroglobulin, within which T4 and T3 are synthesized and stored[10].

IODINE METABOLISM:

Iodine, which is the most essential element for the production of thyroid hormones can be absorbed from the GIT as inorganic iodide. It rapidly enters the extracellular iodide pool. Thyroid gland stores about 90% of the total body iodine with less than 10% present in the extracellular space. Iodide will be stored as throid hormone or as inorganic amino acid. This is transported against an electrical and chemical gradient into the follicular cells from the extracellular space through a transmembrane protein of the follicular cells. Once iodine enters into the cells, it rapidly diffuses to the apical surface

of the cell from where it moves to the exocytic vesicles. It is then oxidized and bound to thyroglobulin. The transport is regulated by TSH.

THYROID HORMONE SYNTHESIS:

The oxidized and bound organic iodide then couples thyroglobulin with tyrosine to form monoiodotyrosine (MIT) or a diiodotyrosine(DIT). This is dependent on thyroid peroxidase, which is an extracellular catalytic agent. Thyroid peroxidase along with thyroglobulin is very specific to the thyroid follicular cells and thus both are important for the diagnosis and management of autoimmune thyroid disease and also for a well differentiated carcinoma. Monoidiothyronine and diiodothyronine are inert biologically. These residues couple to form the biologically active T4 and T3. Both are bound to thyroglobulin and are stored in the colloid centre of the follicle. The thyroid hormones are stored for about 2 weeks . Most of the hormone released is in the form of T4. In the peripheral tissues it gets deiodinated and is converted to T3.

THYROGLOBULIN

It is a glycoprotein specific to the thyroid follicular cell. It facilitates the convertion of MIT and DIT to T3 and T4. During this process small quantities of thyroglobulin also enters the blood stream and hence can be assayed. Peripheral thyroglobullin can be measured to evaluate benign and malignant neoplasms of the thyroid gland. It has a good predictive value fot the recurrence of well differentiated thyroid carcinoma or to evaluate metastasis after total thyroidectomy[11].

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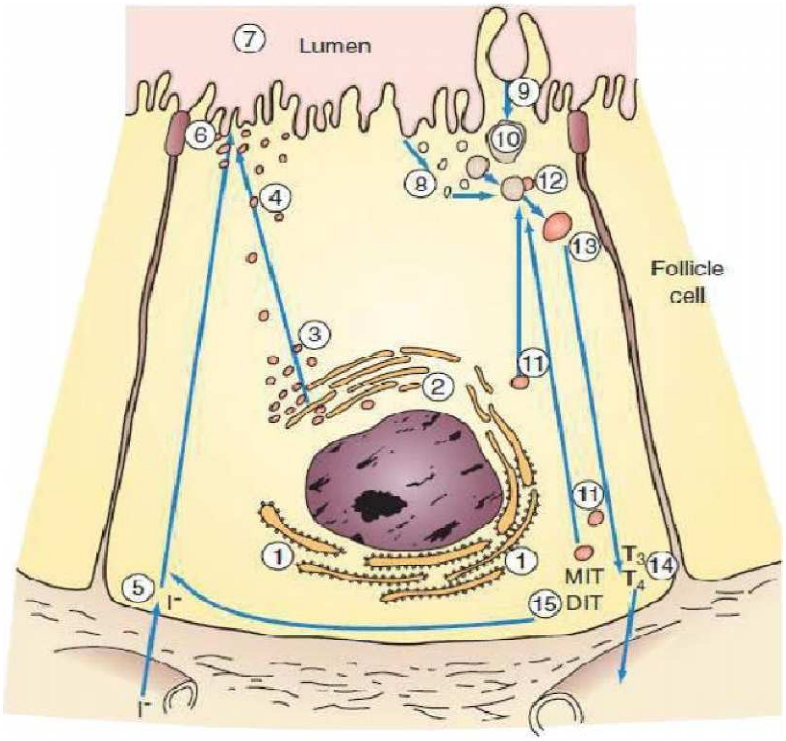

REGULATION OF THYROID HORMONE SECRETION

TSH is the major regulating hormone of the thyroid circulation and thyroid gland activity. It also stimulates the follicular cell growth and differentiation, iodine uptake and release of T4 and T3 from thyroglobulin. TSH is a glycoprotein secreted by the anterior pituitary gland in a pulsatile anner. It is made of two subunits. The α subunit and the β subunit. TSH activates the TSH receptor thereby interacts with the G protein and stimulates production of cyclic AMP. Increase in the cAMP levels stimulates the thyroid hormone production

When the peripheral levels of T3 and T4 are increased due to some pathological event. TSH secretion is decreased by a negative feedback loop. Peripheral T$ is

deiodinated and converted to T3 locally in the pituitary, which inturn inhibits TSH synthesis and release. This is called primary hyperthyroidism. The causes can be Grave's disease, thyroiditis, thyroid nodules , gynecological malignancies or exogenous thyroid hormone. Central hypothyroidism can be caused by abnormalities at the level of pituitary or hypothalamus with decreased levels of TSH.

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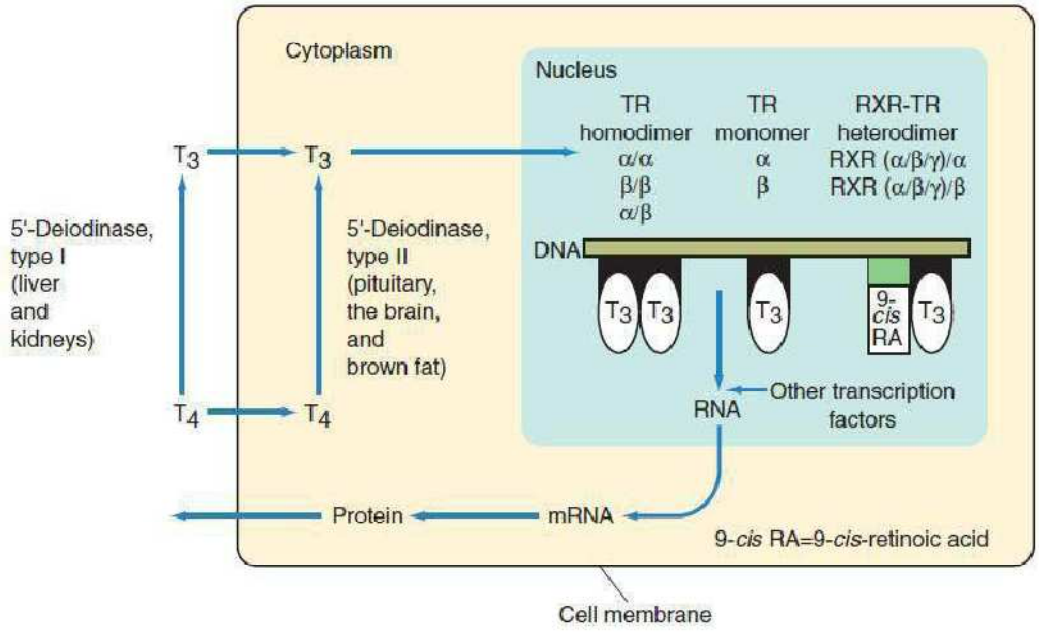
PERIPHERAL ACTION OF THYROID HORMONES



T3 is biologically more potent than T4 in the periphery and it has an high affinity to the thyroid hormone receptor. T4 is converted to T3 in the periphery , inside the cell. T3 travels inside the nucleus and binds to the TR which leads to RNA transcription and expression of mRNA. This is subsequently translated into the protein.

T4 is also bound to prealbumin and albumin. In pregnancy and states with elevated esterogen levels like usage of oral contraceptives, esterogen replacement therapy or use

of selective esterogen receptor modulators like tamoxifen or raloxifen use causes elevation of TBG levels causes higher levels of total T4 in the periphery. Decreased TBG levels are found in anabolic steroids – testosterone usage, nicotinic acid and corticosteroids. These conditions are clinically euthyroid as free T4 levels are normal.

Peripheral conversion of T4 to T3 can be impaied in sepsis malnutrition, use of propylthiouracil, high dose of steroids, iodinated agents, amiodarone use and use of betablockers.

SOLITARY NODULE THYROID

EPIDEMIOLOGY:

Solitary nodule of the thyroid is a common clinical entity with an incidence of 4% in the general population. However with increasing age the incidence seems to increase. Eventhough 25% of the clinically detectable solitary nodule of thyroids turns to be benign, about 10-30% may turn malignant. This turns out to be of an increased concern to the surgeons worldwide. Again the incidence of malignancy in those patients undergoing surgery is also increasing(10-20%) due to the improved patient selection[13].

Though thyroid nodule seems to occur in all ages, the maximum incidence is found to be between 30-40 years. Solitary nodule is quite rare in the childhood. The incidence of carcinoma is 50% in age group less than 25 years andis 75% in ages 15 and below.

Thyroid disorders are predomimant in the female population when compared to the males . The female : male ratio is 6:1 . This occurs due to the variation of thyroid hormones during female reproductive periods like puberty pregnancy and lactation. The solitary nodule too is found to be more prevalent in the females. However the incidence of malignancy of solitary nodule thyroid is more in the men(26%) when compared to women(9%).

Thus a clinical diagnosis of solitary nodule of thyroid may warrant further probing into various pathological and radiological investigations as the incidence of malignancy is 10%. Also a dominant nodule in multinodular goiter must also be considered as a solitary nodule and must be evaluated thoroughly for this same reason.

AETIOLOGICAL FACTORS

1.ADENOMATOUS NODULES:

Adenomatous nodules occur due to the compensatory mechanism when the synthesis of thyroid hormone is deficient. This thyroid hormone regulated by TSH is secreted by the anterior pituitary which in turn is regulated by negative feedback mechanism by the levels of the hormones in blood and by the TRH secreted by hypothalamus.

When the levels of T3 and T4 are low in the circulation they stimulate the anterior pituitary to secrete TSH which acts on the follicular cell and causes hyperplasia and hypertrophy which inturn traps iodine and synthesizes more T3 and T4 . This process might not be uniform. This results in the formation of several foci a few of which may be very small or big. Degeneration and fibrosis also occur and results in nodularity. If such a nodule attains a large size singly, solitary adenomatous nodule occurs which may be detected clinically[14].

2. ETIOLOGY OF THYROID NEOPLASM:

i) Exposure to ionizing radiation:

This exposure can be from external sources or internal sources. External sources can be due to administration of external beam radiation treatment or environmental exposure or previous nuclear weapon attack or nuclear power accidents. Internal sources can be injection of isotopes of iodine which gets concentrated in the thyroid gland causing radiation induced damage to the gland. The type of damage caused may be cellular injury which alters the cell division and nucleic acid replication. The injured cells may produce less amount of thyroid hormones leading to stimulation of TSH.

The nature of injury depends on the amount , duration of radiation received, age at which the radiation was recived and the latent period. Around 30% of the exposed children develop thyroid nodules and about 30% are malignant[15].

ii) Diet:

Iodine deficient endemic areas have an increased incidence of follicular cancer ,whereas iodine rich areas have an increased incidence of papillary cancer.

iii) Ingestion of radioisotopes of iodine:

Iodine 131 administered for diagnostic thyroid scans is the most common mode of exoposure leading to 50 rads of external beam radiation. Though there is only a small increase in the incidence of thyroid malignancies from this, the more dangerous type of radioisotopes can be I 129 and I 131 -135.

Iv) Sex:

Female sex have an increased risk of thyroid carcinoma and may be attributed to factors like parity , contraceptives, early menopause and late child birth.

However the incidence of the thyroid nodule being malignant is more in men compared to women.

v) Heredity

Other than medullary carcinoma there is no clear association with a familial syndrome or any genetic basis. Familial medullary carcinoma can be transmitted as autosomal dominant .

AETIOLOGY OF HASHIMOTO'S THYROIDITIS:

Hashimoto's thyroiditis is an autoimmune disorder and is the most common autoimmune disorder reported. There may be a painless diffuse enlargement of the thyroid gland discovered incidentally.

PATHOLOGY

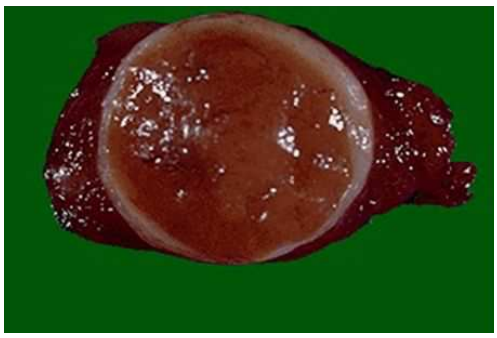
1. COLLOID/ ADENOMATOUS NODULE:

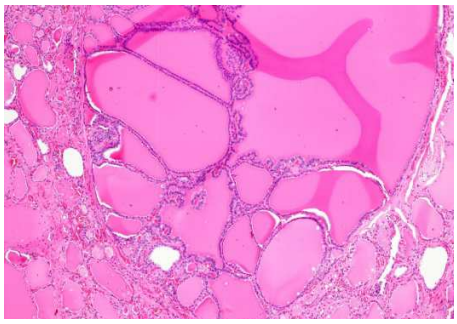
Increased TSH stimulates the thyroid gland leading to goiter. When the circulating level of thyroid hormones fall, the TSH secretion increases. Goiter occurs commonly among the women due to the presence if esterogen receptors in the thyroid tissue. Thus persistent stimulation by TSH causes diffuse hyperplasia of the gland and there is uniform uptake of iodine. Once the TSH stimulation caeses to continue the goiter regresses. When there is a fluctuating stimulation of TSH , a mixed pattern of hyperplasia develops. There may be areas of active lobules and areas of inactive lobules. The active lobules become more vascular until there occurs an hemorrhage leading to central necrosis with surrounding rim of active follicle. These necrotic lobules coalesces to form nodules. This process repeats and leads to the formation of nodular goiter[16].

Most of the nodules are biologically inactive and only the active follicle may be present in the intermodal tissue. When the nodules are multiple, leads to formation of multinodular goiter. The nodules may be colloid filled,cellular , degenerated or with hemorrhage. Sometimes a dominant nodule in a multinodular goiter may present as solitary nodule clinically.

On gross appearance, the surface appears nodualar. Cut surface may show a circumscribed nodule. These nodules may undergo cystic change, hemorrhage fibrosis or calcification.

On HPE the nodules appears like clusters of tiny active looking follicles. Once the walls are lost the follicles become colloid cysts. Sometimes there may be areas of necrosis with macrophages filled with hemosiderin..





The adenomas can be further classified into follicular adenoma, papillary adenoma and atypical adenoma.

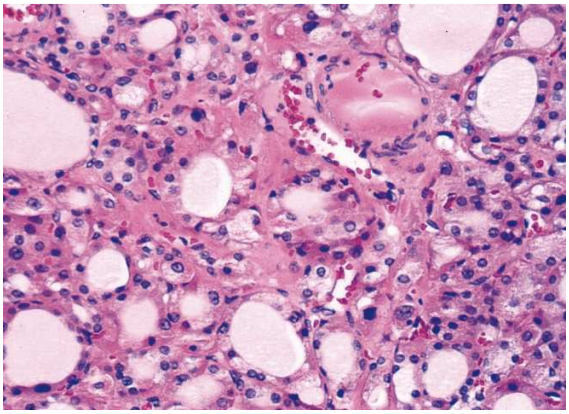
Follicular adenomas cannot be differentiated from follicular carcinoma clinically or by ultrasound or by FNAC. The only way to identify is to detect capsular or angioinvasion.

Depending upon the size of follicles and the degree of formation of follicle, they can be classified into[17]Macrofollicular adenoma

- Normofollicular adenoma
- Microfollicular adenoma
- Oxyphillic adenoma
- Trabecular adenoma
- Follicular adenoma of clear cell type
- Atypical follicular adenoma of clear cell type
- Hyper functioning adenoma

2. HURTHLE CELL ADENOMA

Also known as Askanazy or Langehans tumor. They account to about 4.5 to 10% of all primary epithelial tumours. It is composed of large eosinophic cells, with abundant fine granular cytoplasm . on cut section its is grayish brown in colour and has a solid surface. They have a distinct capsule and may be cystic or hemorrhagic. Hurthle cells may be associated with other conditions such as thyroiditis, Grave's disease and other thyroid nodules.



3. EMBRYONAL ADENOMA:

Also known as the trabecular adenoma. They are the most poorly differentiated tumors of the follicular group. They are densely packed with columns of polyhedral cells which forms follicles. They do not present since birth and so not arise from immature tissue. They arise from mature thyroid epithelial cells.

4. TOXIC ADENOMA:

This is a true follicular adenoma which has started to function autonomously and secretes excess of thyroxine to produce toxic symptoms. They are well circumscribed lesions with a well defined capsule. It may involve a whole lobe or a part of it. The HPE features are similar to follicular adenoma cells and may be columnar with small and large follicles with watery colloid.

5. PAPILLARY ADENOMA

This is a very rare tumor composed of benign papillae with stroma and no capsular invasion. The tumor may be cystic frequently and is called papillary cystadenoma. The diagnosis should be made if there is slight pleomorphism of the nuclei and failure to demonstrate capsular invasion despite extensive search. Thus the pathologists now consider all the papillary tumors to be malignant unless proven otherwise as it is very difficult to exclude invasion of the capsule.

6. ATYPICAL ADENOMA:

These tumors are referred to as ground of tumor as they have unusual microscopic features like hyperchromatasia, nuclear mitotic figures and large nuclei with a spindle cell growth pattern. These adenomas histologically appear as carcinoma but have a benign behavior. When there is no evidence of capsular or blood vessel invasion then the tumor is said to be benign. On gross appearance it has a fleshy appearance surrounded by a capsule and on cut section they appear transparent with firm to hard consistency. On HPE they are cellular with compactly arranged cells. They are further classified into follicular type, solid type, alveolar type and focal atypical type[18].

MALIGNANT TUMORS OF THYROID

1. Well differentiated
    a. Papillary carcinoma
    b. Follicular carcinoma
2. Poorly differentiated
    a. Hurthle cell carcinoma
    b. Papillary carcinoma variants
        i. Insular variant
        ii. Tall cell variant
        iii. Columnar variant
    c. Medullary carcinoma
    d. Anaplastic carcinoma –undifferentiated
    e. Others
        i. Lymphoma
        ii. Squamous cell carcinoma
        iii. Sarcoma
        iv. Metastatic tumors

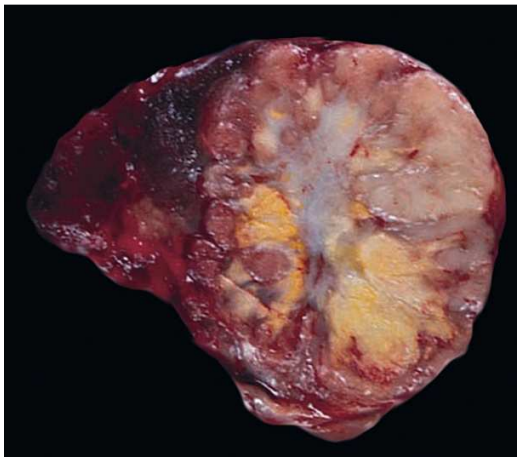
PAPILLARY CARCINOMA OF THYROID

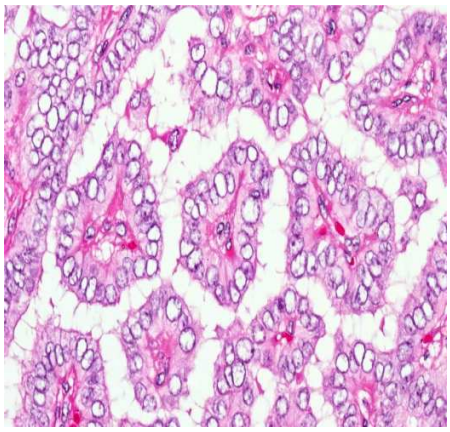
It is the most common carcinoma of thyroid at all ages. The peak age of presentation is 4^{th} to 5^{th} decades with male : female ratio of 1:3. The most important feature of this tumor is its multicentricity. It spreads through the intraglandular lymphatics and through the subcapsular and pericapsular lymphatics to the lymphnodes. Occult or microcarcinoma are tumors of 1cms or less size, non palpable and are usually identified incidentally during surgery, histopathology or autopsy.

It has a very good prognosis with 10 years survival rate of 95% [19] .

On gross appearance papillary ca are dirty white, hard ,non encapsulated tumors. Sometimes there may be a diffuse infiltration of the gland. Other times it might be so small that it is discovered incidentally on HPE section of thyroid removed for someother reason.

On HPE the it is diagnosed based on the papillary architecture. True papillae may be present with fibrovascular core and may be lined by a single row of nuclei. The nuclei are described as ground glass or orphan annie nuclei. There may be a grooved nucleus in the deep folding of the nuclear membrane. Psammoma bodies may be present- calcific laminated areas specific for papillary carcinoma.





The subtypes are the poorly differentiated insular variant, the tall cell variant and the diffuse sclerosing variant. Insular variant is a poorly differentiated tumor. Tall cell variant has a bad prognosis. Diffuse sclerosing variant is more aggressive.

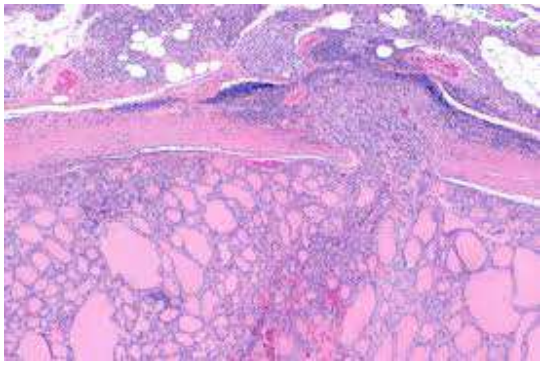
Cervical metastasis may be present in half of the patients with papillary CA. lymph node metastasis may also be present and sometimes it may overshadow a small primary. When lymphnode is totally replaced by thyroid it can be called lateral aberrant thyroid.

FOLLICULAR CARCINOMA

Next only to papillary carcinoma it is the next most common thyroid carcinoma with incidence of 20-25 % especially in iodine deficient areas. It is more common among the female gender . They are more aggressive than papillary carcinoma and has a lower survival rate. Lymph node metastasis is uncommon. But distant metastasis is common that the patients may present inititally with distant metastasis[20].

On gross appearance they are fleshy solid tumors with larger size and may have a focal necrosis or hemorrhage.

On HPE they have features similar to follicular adenomas.they form cords or trabeculae with microfollicles. They have no pleomorphism and are not multicentric like papillary carcinoma.



Follicular carcinoma can be divided into

- Encapsulated or minimally invasive
- Widely invasive

Minimally invasive carcinoma are encapsulated and resemble adenoma. But like adenoma they are not colloid rich. Carcinoma can be differentiated from adenoma by capsular invasion or blood vessel invasion. The invasion can be focal and thus multiple sections are required before it is established.

Widely invasive carcinoma includes both encapsulated and non encapsulated carcinoma with capsular and vascular invasion demonstrated by HPE.

Prognosis of minimally invasive carcinoma is better than widely invasive carcinoma. Presence of distant metastasis during diagnosis is the most unfovourable risk factor.

Distant metastasis is more common and is usually via the hematogenous route to the bone and lungs. Like papillary carcinoma lymphnode metastasis is rare.

POORLY DIFFERENTIATED CARCINOMA

1. HURTHLE CELL CARCINOMA

Hurthle cell carcinoma, accounts to 3% of total thyroid malignancies and can be classified as a subtype of follicular carcinoma as it closely resembles it.

This occurs in the 6^{th} to 7^{th} decade. They are mostly multifocal and bilateral. They frequently metastasize to the lymph nodes. Distant metastasis is often a poor prognostic sign.

On gross appearance, the tumor appears solid and vascular. They are encapsulated and the invasive tumors grow in a multinodular fashion.

The growth pattern may be papillary , follicular or trabecular. Follicular variant is the most common. The follicles are usually large and have long fibrovascular septa. They can be misinterpreted as follicular hyperplasia.

2. MEDULLARY CARCINOMA:

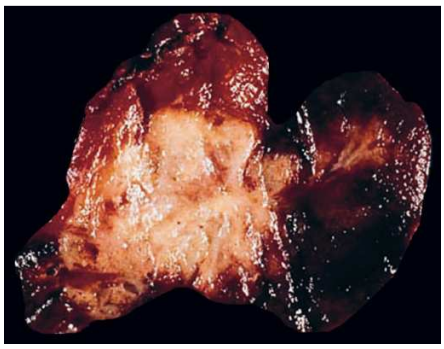
They account to 5 to 10 percent of all thyroid malignancies and involves the parafollicular c cells. They are derived from the neural crest cels. Medullary carcinoma are usually sporadic and the familial cases are autosomal dominant[21].

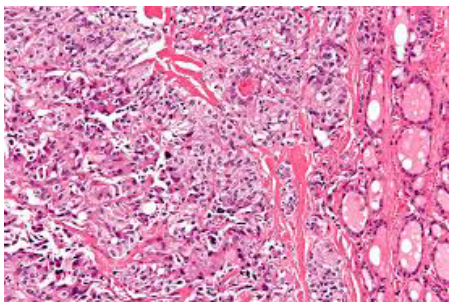
These tumors apart from secreting calcitonin and carcino-embryonic antigen, also secretes calcitonin gene related peptide, serotonin , prostaglandins and histainadases. The excess calcitonin is not associated with hypercalcemia. Presence of a neck swelling with elevated levels of calcitonin is diagnostic of medullary carcinoma. Calcitonin is thus a sentitive tumor marker but the better predictor of prognosis is CEA.

It shows local invasion and metastases to cervical , mediastinal nodes and to distant organs like lung , liver and bones.

On gross appearance it is solid,well circumscribed and non encapsulated with a grayish yellow cut surface.

On HPE there is proliferation of polygonal cells with granular cytoplasm with medium sized nucleus separated by highly vascular stroma . The nucleus resembles other neuroendocrine tumors. They have stippled “salt and pepper” chromatin





Factors with favourable outcome are age less than 40 years, females, association with MEN 2 a, and tumor confined to thyroid.

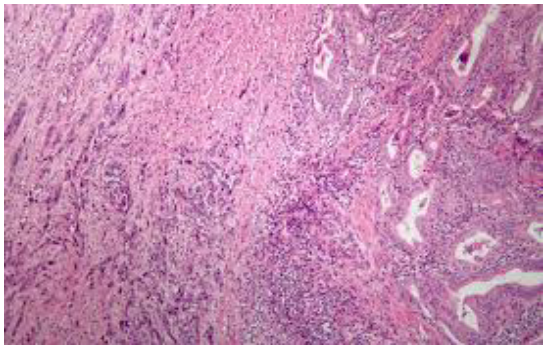
Factors with bad prognosis are association with MEN 2 b, tumor necrosis and high mitotic index.

3. ANAPLASTIC CARCINOMA:

They are very rare tumors with less than 1% of all thyroid cancers. They are common in the 7^{th} to the 8^{th} decade. It presents in an aggressive manner . It presents with dysphagia and painful neck swelling. Distant metastases to lungs and bone are common.

On gross appearance the tumor appears bulky, firm and are locally invasive with extensive intrathyroid extension[22].

On HPE they are poorly differentiated with a mixture of giant cells, spindle cells, squamous cells and fibrosis. They have abundant mitotic figures and necrosis with vascular invasion.



4. LYMPHOMAS

They are very rare tumors accounting to less than 1% of thyroid cancers and are mostly non B cell type.

SECONDARIES IN THYROID

Secondaries to thyroid are very rare . They can arise from renal cell carcinoma, malignant melanoma , breast carcinoma and bronchogenic carcinoma.

THYROID CYST

It is a common cause of colloid degeneration with absence of epithelial lining. When a follicular adenoma involutes it presents like a cyst. 30% of solitary nodules are cystic in nature. Cysts can be found in papillary carcinoma too. Surgery in indicated if it is a complex cyst and if the size of the cyst is more than 4 cms. On aspiration blood appear but re-acculmulation can occur.

THYROIDITIS

Types are

- Hashimoto thyroiditis
- Sub acute lymphocytic thyroidis
- Sub acute granulomatous thyroiditis
- Acute suppurative thyroiditis
- Riedel’s thyroiditis

HASHIMOTO ’S THYROIDITIS :

It is an autoimmune disorder and is the most common autoimmune disorder too. It presents as a painless diffuse enlargement of the thyroid in the young adults. There will be high circulating antibodies to thyroid peroxidase, thyroglobulin, and antibodies against TSH receptors. This immune mediated damage causes goiter and thyroid failure[23].

Nodules of thyroid occurs in Hashimoto’s thyroiditis frequently. On gross appearance the surface is friable, nodular with grayish yellow colour resembling a lymph node. Necrosis and calcification are typically absent.

On HPE there is disrupted epithelial cells with oxyphilic changes of the remaining epithelial cells. The distinctive features are lymphocytic infiltration of the stroma with oxyphilic change of the epithelium. Plasma cells, giant cells and histiocytes can be present.

SUBACUTE GRANULOMATOUS THYROIDITIS

It is also called as de Quervain’s thyroiditis, giant cell thyroiditis. It is more common among the women in the third decade. Viral etiology has been described and is attributed ot Mumps virus and unidentified cytopathic virus. It follows an acute respiratory infection. The symptoms are painful neck swelling with fever and other constitutional symptoms.

During the acute phase thyrotoxicosis can occur due to destruction of the follicle. During this period ESR can be elevated and radioactive iodine uptake will be low. Following the acute phase a period of transient euthyroid phase occurs following which hypothyroidism can occur which can last for a few months.

On gross appearance the thyroid gland is enlarged to twice its size with a firm consistency.

On HPE there are areas of inflammation and foreign body granulomas are present. Caseation necrosis is absent. Fibrosis may be present.

ACUTE SUPPURATIVE THYROIDITIS

Acute bacterial infections of thyroid gland is very rare. It is more commonly occurring in the children and is preceded by acute upper respiratory tract infection or otitis media[24]. Because of the rich blood supply and lymphatic drainage, high iodine content and distinct fascial plane by which it is separated from the other neck structures the gland is resistant to infections. Staphylococcus aureus and streptococcus pyogenes are the most common organisms encountered. Infection can spread through direct inoculation or through the blood stream or the lymphatics.

RIEDEL'S THYROIDITIS

Also known as Riedel's struma or the invasive fibrous thyroiditis. It is a rare disorder of unknown etiology and affects the women. It is characterized by progressive extensive fibrosis of the gland causing compression of the adjacent structures-trachea and esophagus. The patients are usually euthyroid.

Physical examination describes it as 'woody' feel. On gross examination the gland is asymmetrical. Cut portion is stony hard and cuts with resistance due to the dense fibrous tracts extending from the capsule to the muscle.

On HPE the extensively hyalinized fibrous tissue replaces the area and is infiltrated by connective tissue. There is patchy inflammation with predominant lymphocytes and plasma cells[25].

TNM Staging

TNM Staging for Thyroid Cancer

Primary Tumor (T)	
TX	Primary tumor cannot be assessed
T0	No evidence of primary tumor
T1	Tumor ≤ 2 cm in greatest dimension, limited to thyroid
T2	Tumor >2 cm and ≤ 4 cm in greatest dimension, limited to thyroid
T3	Tumor >4 cm in greatest dimension, limited to the thyroid or Any tumor with minimal extrathyroid extension (e.g., extension to sternothyroid muscle or perithyroid soft tissues)
T4a	Tumor of any size extending beyond the thyroid capsule to invade subcutaneous soft tissues, larynx, trachea, esophagus, or recurrent laryngeal nerve
T4b	Tumor invades prevertebral fascia or encases carotid artery or mediastinal vessels
All Anaplastic Carcinomas Are Considered T4 Tumors	
T4a	Intrathyroidal anaplastic carcinoma—surgically resectable
T4b	Extrathyroidal anaplastic carcinoma—surgically unresectable
Regional Lymph Nodes (N)	
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Regional lymph node metastasis
N1a	Metastasis to level VI (pretracheal, paratracheal, and prelaryngeal/Delphian lymph nodes)
N1b	Metastasis to unilateral, bilateral, or contralateral cervical or superior mediastinal lymph nodes
Distant Metastasis (M)	
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis

Edge SB, Byrd DR, Carducci M et *al. AJCC cancer staging manual, 7th edn. New York: Springer, 2009*

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CLINICAL FEATURES

HISTORY:

- **SWELLING:** Mostly the patients present with a slow growing asymptomativ swelling. Sudden increase in size may suggest hemorrhage or malignancy.
- **PAIN**: patients might experience mild pain at the site of nodule. Acute onset of pain in a previously painless nodule might suggest hemorrhage . pain is also present in Riedel's thyroiditis. Malignant swellings present with late pain due to invasion of the deeper structures
- **PRESSURE SYMPTOMS:** due to compression of an enlarging thyroid gland there may be history of hoarseness of voice due to involvement of recurrent laryngeal nerve. Other symptoms like dyspnoea(due to tracheal compression) and dysphagia (due to esophageal compression) can occur.
- **TOXIC SYMPTOMS/ HYPOTHYROIDISM**: toxic symptoms may be the presenting feature in a toxic adenoma or a rare functioning carcinoma. Other symptoms of hyperthyroidism such as increased perspiration, increased thirst, heat intolerance and weight loss despite good appetite may be present. Symptoms such as palpitations , faigue, tremors nervousness may be present which may be due to increased adrenergic stimulation. There may be frequent bowel movements and diarrhea. Female patients may present with ammenorhea , decreased fertility and increased miscarriages[26].

- **CONSTITUTIONAL SYMPTOMS** of hypothyroidism like easy fatiguability, malaise, weight gain, constipation, cold intolerance and menorrhagia may occur. In severe cases facial puffiness can occur due to subcutaneous deposition of glycosaminoglycans. The skin appears dry, rough. The hair is dry , brittle with excessive hair fall. Libido and fertility gets impaired in both males and females

FAMILY HISTORY

This history is significant in medullary carcinoma thyroid

PAST HISTORY

Papillary carcinoma can occur in patients with previous history of head and neck irradiation.

GENERAL AND PHYSICAL EXAMINATION

On the basis of the physical examination itself one can assess about the functional status of the thyroid gland[27].

Features of hyperthyroidism are

- weight loss,facial flushing
- warm clammy exteremities
- proptosis
- tachycardia, atrial fibrilltion
- widened pulse pressure, congestive cardiac failure
- fine tremors
- muscle wasting and weakness with exaggerated tendon reflexes

Features of hypothyroidism

- facial and periorbital puffiness
- dry and rough skin
- brittle hair
- loss of outer third of eyebrows
- bradycardia,
- cardiomegaly ,
- reduced cardiac output and
- pericardial effusions

EXAMINATION OF THE SWELLING

Usually a solitary nodule will be appreciated by palpation when it is around 1 cm diameter. Unless adherent to the neighbouring structures due to malignant infiltration, a thyroid nodule usually moves with deglutition. If the lower border of the swelling is palpable we can rule out retrosternal extension. The consistency of the swelling can be variable and sometimes deceptive. a simple thyroid cyst may have a firm consistency. Soft nodule does not rule out malignancy as papillary carcinoma can present as a soft nodule.

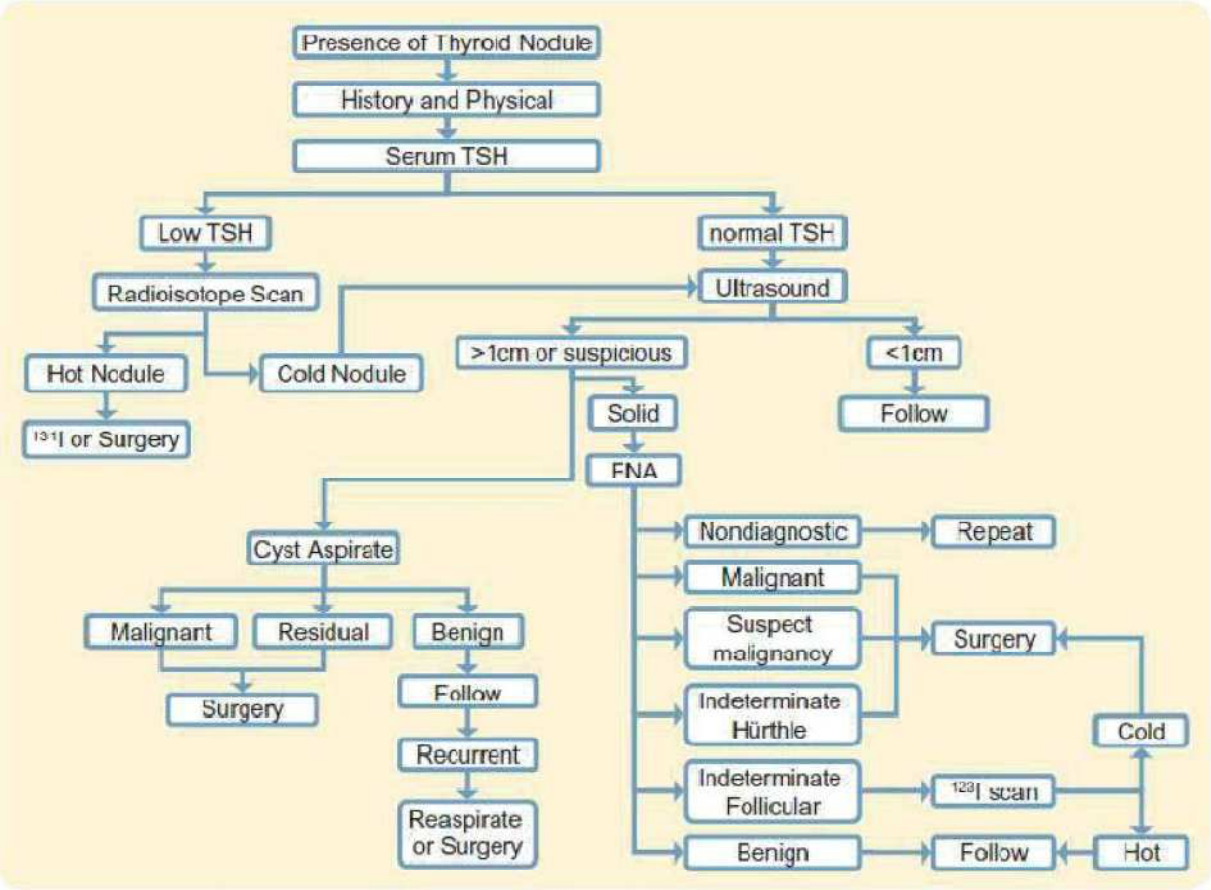
When the nodule is hard it suggests malignancy. But however hard nodules can also be due to calcification in an adenomatous nodule. When there is cystic degeneration in papillary carcinoma the nodule may have cystic consistency[28].

Restricted mobility suggests infiltration due to malignancy. There might be deviation of trachea to the opposite side due to the pressure exerted.

In cases of malignant thyroid swelling the carotid pulsation may be absent at the level of the gland- BERRY'S SIGN.

Regional lypmhnodes may be enlargerd. The pretracheal, paratracheal and the deep cervical nodes may be enlarged due to lymphatic metastasis.

ALGORITHM FOR MANAGEMENT OF SOLITARY NODULE



INVESTIGATIONS

Just like any other general surgery case posted for a surgical procedure, routine investigations like complete blood analysis including haemoglobin, BT, CT, urine analysis, blood sugar and chest Xray has to be done to assess if the patient is fit to undergo the surgical procedure.

OTHER INVESTIGATIONS

- **ECG** - hypothyroidism shows low voltage flat ST waves where as in hyperthyroidism sinus tachycardia, atrial fibrillation and features of left ventricular hypertrophy can be seen.
- **SLEEPING PULSE RATE** – To differentiate tachycardia due to anxiety from thyrotoxicosis. Count of more than 90/min during sleep suggests hyperthyroidism.
- **INDIRECT LARYNGOSCOPY** – a routine IDL examination has to be done before thyroidectomy to assess if the patient has a previous paresis or paralysis of vocal cord.
- **RADIOLOGY**- To determine the postion of trachea and retrosternal extension of the swelling. It can also make out calcification in papillary carcinoma or a long standing nodular goiter
- **BASAL METABOLIC RATE**- It measures oxygen consumtion per minute and in hyperthyroid patients it will be raised

SPECIFIC TESTS FOR THYROID FUNCTION

Even if most of the patients with solitary nodule are euthyroid, the functional status of thyroid needs to be documented by means of a series of tests as follows as no single test constantly yields a reliable diagnosis.

❖ TOTAL THYROID HORMONE LEVELS

Direct measurement of circulating thyroid hormone levels is the most useful index of thyroid function. Total T4 and total T3 are measured by radioimmune assays.

Normal value for T4 ranges from 55-155nmol/lit and for T3 1-3nmol/lit. however factors that increase TBG levels may reveal a fallaciously elevated T4 and T3. Thus this test has limited usefulness[28].

❖ TESTS FOR THYROID BINDING PROTEINS

In this test the unoccupied thyroid binding sites on TBG is measured and is done bt T3 resin uptake test. In hyperthyroidism the number of free binding sites is found to be low as most of them will be occupied by the hormone and in hypothyrosidism the number of unoccupied sites are high.

❖ **FREE THYROID LEVELS:**

Free T4 can be measured by equilibrium dialysis or RIA(radioimmuno assay). Dialysis method is still the gold standard but is restricted to the research labs as only a small number of samples can be processed and is time consuming. RIA provides valuable and excellent index of the functional thyroid status. Normal levels of fT4 is 1.3 to 3.5 nmol.litre and fT3 – 160-170 nmol/liter.

❖ **THYROID STIMULATING HORMONE LEVELS:**

The measurement of TSH is a very sensitive test of thyriod functional status. The normal value of TSH is 0.3 to 5 mIU/liter. It is raised in primary hypothyroidism and negligible in hypothyroidism..

❖ **TESTS OF HYPOTHALAMIC-PITUITARY AXIS:**

When thyrotropin releasing hormone (TRH) is given intravenously the level of TSH increases from the basal level about 1μu/ml at 20 minutes and falls to normal by 120 minutes in normal persons.

❖ **RADIOACTIVE IODINE UPTAKE TEST:**

This test is not done routinely except when there are signs of toxicity associated with nodularity.

❖ THYROID SCINTIGRAPHY:

Radionuclide agents have been useful to delineate the presence , size and function of thyroid nodules. The isotopes used are I 123 at dose of 1-2 Ci and I 131. I 123 has an advantage of low dose radiation with short half life[29].

99Tc pertechnate can be used when the patient is on thyroid blocking agents or when the patient is unable to use oral medications or when the study has to be completed within 2 hours and thyroid function measurement is not needed.

INDICATIONS:

- To determine the size of the gland
- To classify the nodule into hot nodule or hyperfunctioning nodule/ warm nodule or neutral nodule and a cold nodule or a hypo functioning nodule.
- To determine retrosternal extension
- To differentiate a hyperactive multinodular gland with a dominant nodule from an autonomously functioning nodule.
- To assess the residual thyroid tissue left behind after total thyroidectomy
- To detect secondaries from a differentiated thyroid carcinoma

LIMITATIONS

- Cannot differentiate between a malignant and benign nodule
- Small nodules, nodules in the periphery and isthumus cannot be adequately visualized
- Artifacts like asymmetricity of a lobe or a tortuous carotid artery may distort a normal gland

❖ **ULTRASONOGRAPHY**

This is a simple and non invasive method to study the thyroid structure. High resolution ultrasonography sensitively identifieis impalpable nodules as small as 0.3 cm diameter. It can differentiate between solid and cystic lesions. It can be used to obtain the accurate measurement of the nodule size and as a guide for FNAC of a complex cystic lesion located posteriorly and to assess cervical lymphadenopathy.

❖ **CT SCAN AND MRI**

Computerized tomography and Magnetic resonance imaging has no place in the routine evaluation except to determine the extent of a large cervical or retrosternal thyroid and to evaluate spinal metastasis..

❖ TISSUE DIAGNOSIS:

1. FINE NEEDLE ASPIRATION CYTOLOGY:

FNAC has been widely used in the diagnosis and assessment of thyroid nodules and has increased the incidence of malignancy with reduction in the number of cases requiring thyroid surgery thereby reducing the cost. This is a highly accurate and cost effective diagnostic tool providing valuable information during the clinical assessment. It has a sensitivity of 83% and specificity of 92% for malignant lesions. However it cannot differentiate an adenoma from carcinoma.

2. CORE NEEDLE BIOPSY

This procedure has to be done under local anesthesia to establish a diagnosis in a difficult case with a large hard fixed mass, to differentiate anaplastic carcinoma from thyroid lymphoma. Only a small caliber needle can be used in the evaluation of solitary nodule thyroid.

3. SERUM THYROGLOBULIN

This may be elevated in patients with follicular or papillary carcinoma. The normal levels are 1-43 ng/ml. This test lacks specificity and is of limited use in preoperative evaluation as it is also elevated in thyroiditis, follicular adenoma and multinodular goiter. It can be used for followup after total thyroidectomy. Levels of more than 10ng/ml indicates recurrence or metastasis.

4. SERUM CALCITONIN:

Calcitonin secreted by the parafollicular C cells serves as a marker in diagnosis and followup of medullary carcinoma. Elevated calcitonin levels in a patient with thyroid mass in medullary carcinoma unless proven otherwise.

5. MEASUREMENT OF ANTITHYROID ANTIBODIES

Anti microsomal antibodies are postitive in patients with Hashimoto's thyroiditis and anti TSH antibodies are found in Grave's disease

MANAGEMENT

INDICATIONS FOR SURGERY:

- Pressure symptoms
- Malignancy
- Cosmesis

The mode of treatment differs for different etiologies and is as follows:

1. **ADENOMATOUS NON–TOXIC NODULES**

Since the cause for these nodules are decreased thyroxine synthesis, they should be treated by thyroxine replacement 0.1 to 0.2 mg per day and the serum levels of T3,T4 and TSH has to be measured in serial intervals to adjust the dose of oral thyroxine given. Some nodules may regress after therapy. If the nodule is cosmetically unacceptable or causes pressure effects then hemithyroidectomy is done. These patients have to be followed up regularly and throxine replacement therapy has to be started to prevent recurrence.

2.LYMPHOCYTIC THYROIDITIS

Since the disease process eventually causes hypothyroidism, the treatment is basically a conservative one with oral thyroxine replacement therapy and careful follow up of the T3, T4, TSH levels. Surgical procedure is indicated only when there are pressure symptoms or a cosmetic need.

3) TOXIC NODULE:

This is a nodule which has started to function autonomously leading to hyperthyroidis. It can be managed either by surgery or radioactive iodine. Radioactive iodine is the treatment of choice but the patient should have a completed family- either postpenopausal or sterilized, there should not be any pressure effect of the swellin and cosmetically it should be acceptable as the size of the swelling might not regress with radioiodine. When surgery is indicated hemithyroidectomy can be done.

4) THYROID CYST:

Thyroid nodules being cystic is very common and the nodules are mostly benign. Only rarely a papillary carcinoma with cystic degeneration can present as a cyst. Initially all cysts are subjected to FNAC and sent to cytopathology. Biopsy is indicated if there are solid areas in the cyst to rule out malignancy. Simple cysts can be treated with simple aspiration though more than one procedure might be needed as recurrence is common.

When the cysts are more than 4 cm in diameter or when it is a complex cyst with solid and cystic components, surgery is indicated.

5) **BENIGN NEOPLASMS:**

Benign neoplasms of thyroid are very difficult to separate. Thus a surgery with limited resection like hemithyroidectomy can be done and the specimen is sent for histopathological evaluation. If the report confirms benign adenoma no further treatment is required. If malignant , it should be treated as given below.

6) PAPILLARY AND FOLLICULAR CARCINOMA:

The gold standard treatment for papillary carcinoma is surgical excision. However the extent of resection , lymph node dissection have to be decided based on the individual cases because of the overall good prognosis, slow growth of tumors and chances for recurrence even years after surgery.

A) Surgery (Total thyroidectomy/Near total thyroidectomy):

This is excision of the entire thyroid gland with preservation of the parathyroids and recurrent laryngeal nerves.

This is a preferred procedure due to the following reasons

- Radioactive iodine can be used for diagnosis and treatment of recurrence or metastasis
- Serum thyroglobulin can be used as a sensitive marker to diagnose persistent or recurrent disease.
- Since 85% of the tumors are multifocal, this surgery eliminates the sites of recurrence in the contralateral lobe.
- Improves survival by reducing recurrence.
- Decreases the risk of progression to anaplastic carcinoma
- Reduces the need for a second surgery.

POST-OPERATIVE MANAGEMENT:

Adjuvant therapy :

i) Suppressive therapy with thyroxine:

After total thyroidectomy or near total thyroidectomy thyroxine replacement therapy is essential in the postoperative period. It is not only used to replace the thyroxine, it is also used to suppress TSH thereby reducing the growth stimulus for any residual thyroid cells. TSH suppression reduces the tumor recurrence rates too. The average dose od oral Levothyroxine is 100micrograms per day and is started even before discharge of the patient. The adequacy of replacement is verified by measuring T4 and TSH .

ii) Post operative radio iodine:

Patients who have underwent total or near total thyroidectomy for a papillary or follicular carcinoma has to be considered for radioiodine abalasion with I 131. Even when the resection is thought to be completer, radioactive iodine abalation is essential to eradicate residual cancer cells. Low dose abalation with less than 30 mCi can be given on outpatient basis for low risk patients. However for patients with higher risk such as older patients or those with imcomplete resection of the primary or with invasive or metastatic tumors, higher abalative doses of 100 to 150 mCi should be used

iii) Chemotherapy

This is the most effective non surgical mode of management of a well differentiated thyroid cancer.is radioactive iodine abalation.

PART-II

AIM OF THE STUDY

- To investigate the prevalence of solitary nodule thryroid at Government Royapettah hospital Chennai
- To evaluate the prevalence of adenoma and carcinoma as a cause for solitary nodule of thyroid.
- To determine the percentage of solitary nodule of thyroid turning out to be malignant.
- To determine the association of solitary nodule of thyroid with age and sex.
- To investigate thyroid hormone profile and status in patient with solitary nodule of thyroid.
- To determine the role of Fine needle aspiration cytology in solitary nodule of thyroid

MATERIALS AND METHODS

This study was a prospective nonrandomized hospital based observational study carried out in 50 patients who presented clinically with solitary nodule of thyroid who attended the outpatient department of the department of general surgery, Government Royapettah hospital, Chennai.

The period of study was from Febrauary 2019 to September 2019.

INCLUSION CRITERIA

- Patients of age more than 18 of both the genders.
- Patients attending the outpatient department or admitted for surgery, with clinical or radiologically detected solitary nodule admitted at department of the general surgery , Government Royapettah hospital

EXCLUSION CRITERIA

- Patients with age less than 18 years
- Patients with previous history of head and neck irradiation.
- Patients who did not consent for the study
- Patients with diffuse thyroid swelling.

After explaining about the importance and the need for the study and the various procedures that are likely to be involved, to the patient and the care giver in their own language, consent was obtained from both the patient and the care giver who were willing to participate in the study. The respective findings were recorded in a proforma sheet.

- Literature approval of the hospital ethical committee is attached.
- In all these patients demographic data, namely, name, sex, and the place of residence was obtained.
- A detailed clinical history was elicited from the patient regarding the duration of the swelling , presence and absence of pain, presence of obstructive symptoms like dyspnea,dysphagia , odynophagia, hoarseness of voice etc. a detailed history to elicit hypothyroid and hyperthyroid features was obtained
- A detailed clinical examination of neck was done along with regional lymph node examination to rule out metastasis.
- Detailed systemic examination of other systems- respiratory system, cardiovascular system, abdomen and genitalia and central nervous system, Indirect laryngoscopy examination was done
- Basic routine blood investigations for the surgical procedure was done –complete blood count, renal function tests, blood grouping and typing, thyroid function tests levels was done.
- Chest X ray , X ray neck, ECG was done
- Ultrasound neck, USG abdomen , contrast enhanced CECT neck was done.

- Anti thyroid drugs, blood transfusions , beta blockers and other preoperative preparation was done depending on individual requirement as indicated and was recorded.
- Fine needle aspiration cytology was done for the patient.
- Indicated surgical procedure for the swelling was done . The patient position, type of surgery planned, incision, was performed depending on the individual requirement and the preoperative findings were recorded.
- The specimen will be sent for histopathological examination and the report was correlated with the clinical findings.
- Special investigations like Radioisotope scan was not done as it was not available in our hospital
- Each patient was carefully followed up in the postoperative period and the course of the development of the patient was recorded in the proforma.
- Post operative thyroid function tests and serum calcium was monitored and thyroxine and calcium supplements was started according to the reports.
- In patients with malignancy after HPE confirmation post operative chemo radiotherapy was planned.
- The patients were advised to regularly attend the surgical out patient department for follow up . Any complications were noted and managed accordingly.

STATISTICAL ANALYSIS:

- Data will be entered in excel sheet and evaluated using statistical software
- Qualitative data was analyzed using proportions
- Quantitative data was analyzed using mean, median and standard deviation

SAMPLE SIZE:

Based on the statistics in the prior study named a study of incidence of malignancy in solitary nodule of thyroid by Anita ravimohan et al

sample size is calculated using the formula

Sample size = 4PQ/D.

The minimal sample size required is **50**

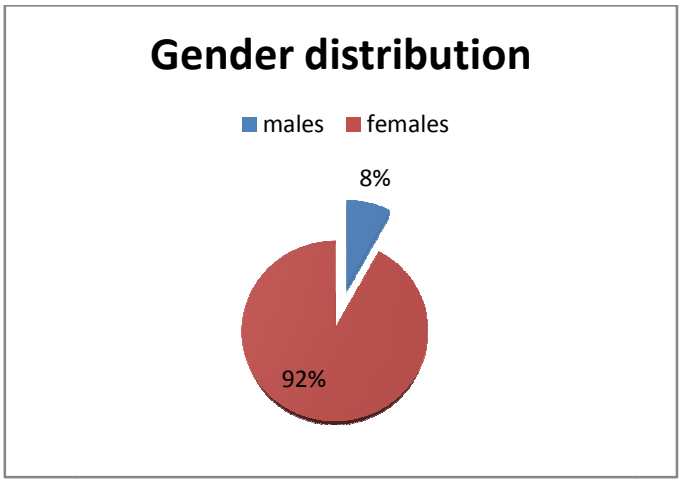
RESULTS

Total of 50 patients with solitary nodule of thyroid gland was studied and the following were the conclusions drawn:

GENDER DISTRIBUTION:

Gender	No.of patients	%
Male	4	8%
Female	46	92%
Total	50	

Solitary nodule of thyroid was found to be more prevalent among the females. out of the total 50 cases included in the study, 46 patients (92%) were females and only 4 patients were males (8%).

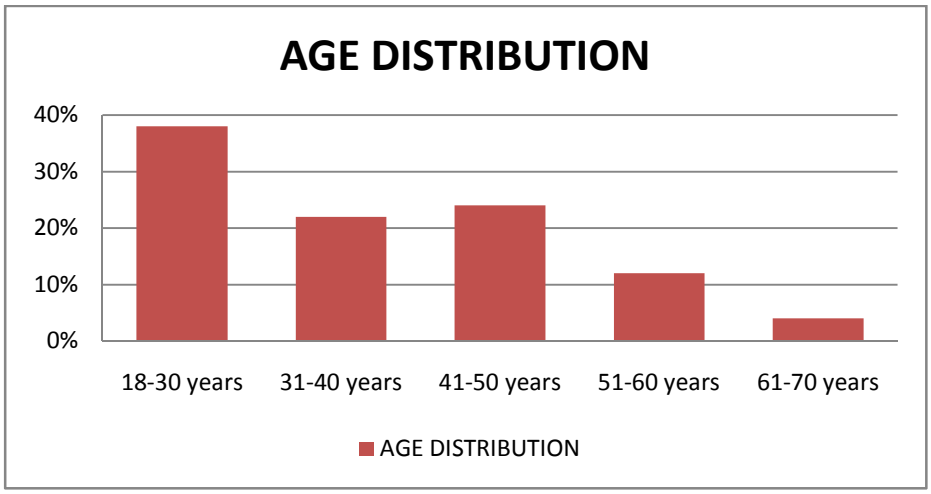


Out of the 50 study subjects malignancy was detected in 6 patients. Out of the 6 patients 5 patients were females. Thus malignancy was also found to be more prevalent among the female gender.

AGE DISTRIBUTION:

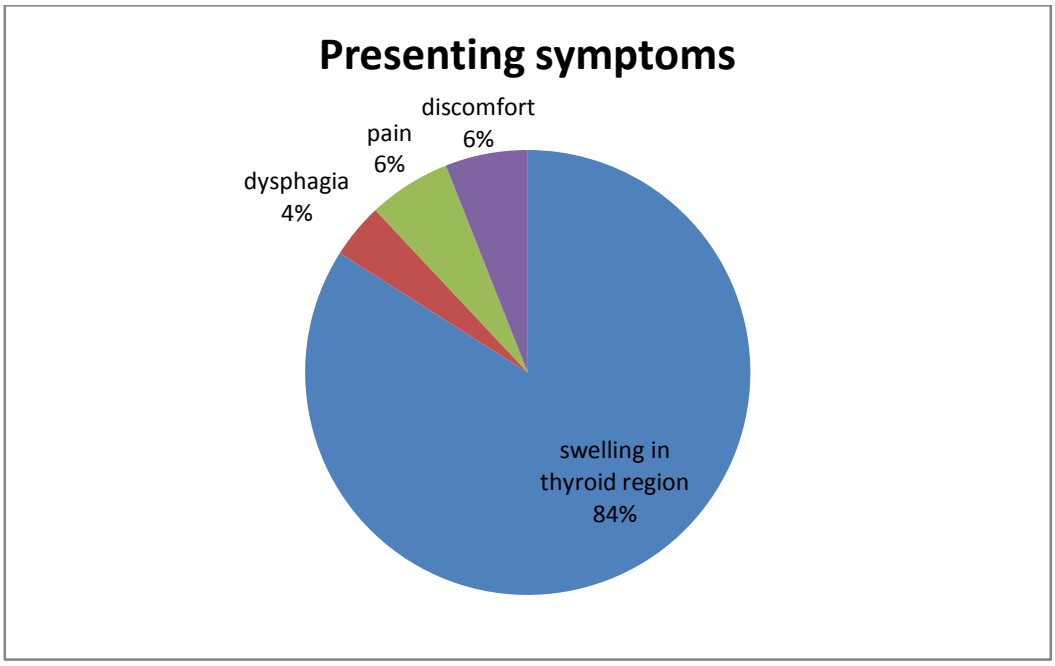
The age range of patients in this study was from 18 to 64 years. The mean age of presentation was 36.54 years. The solitary nodule incidence peaked between the 2nd to 3rd decade. About 30 cases(60%) of the patients were in this age group.

Age distribution	No of patients	%	Mean
18 - 30 yrs	19	38%	36.54
31 - 40 yrs	11	22%	
41 - 50 yrs	12	24%	
51 - 60 yrs	6	12%	
61 - 70 yrs	2	4%	
Total	50		



CLINICAL FEATURES

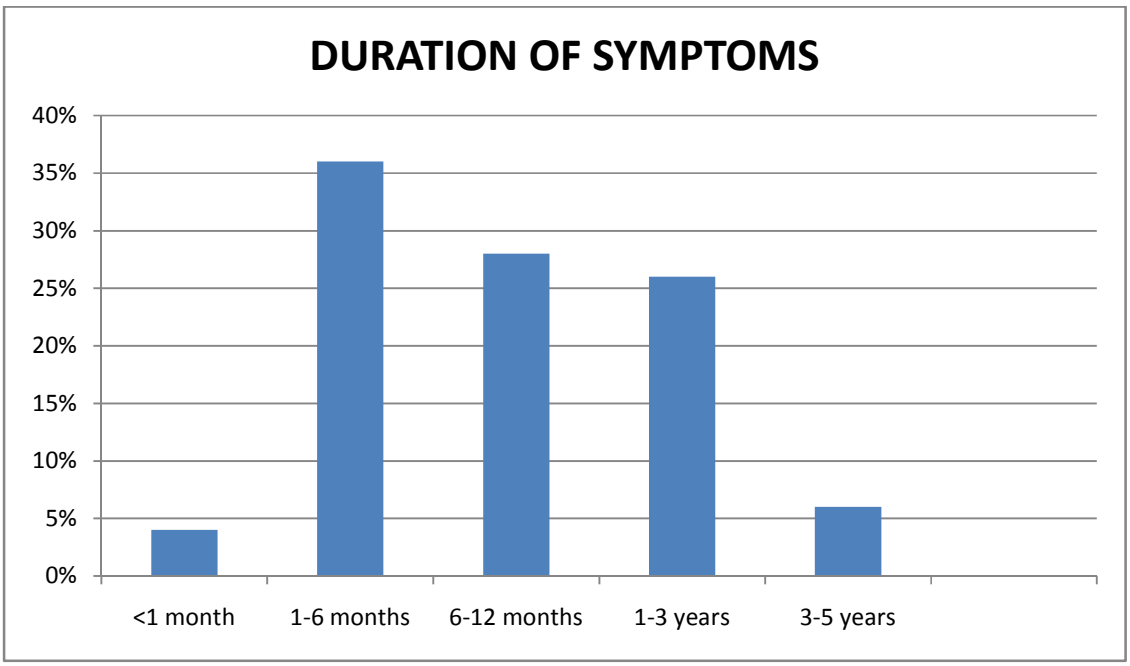
Almost all patients in the study group presented to us with the chief complaints of swelling in the thyroid region. Only a few of them presented with mild degree of dysphagia(2 patients), pain(3 patients) and discomfort(3 patients). Two patients had features of toxicity and one patient had features of hypothyroidism. All these three patiets correlated with their thyroid profile.



DURATION OF SYMPTOMS

In our study group the average range of duration of symptoms ranged from 20 days to 5 years. Mean duration of presentation was 6.3 months.

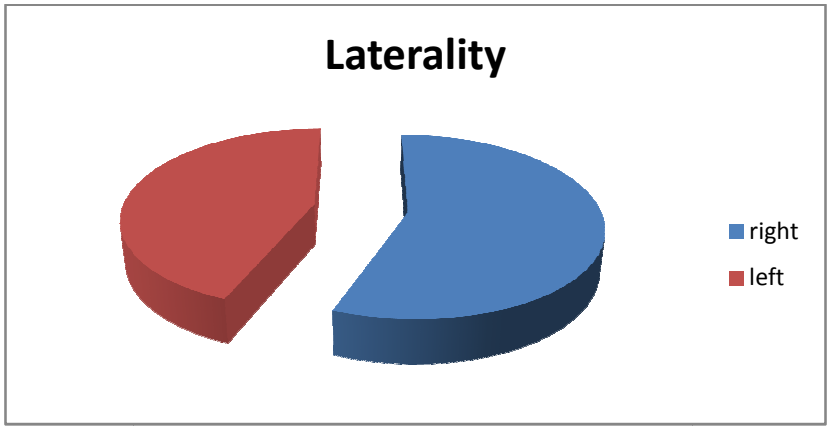
Duration of symptoms	No of patients	%	Mean
<1 month	2	4%	6.3 months
1-6 months	18	36%	
6-12 months	14	28%	
1-3 years	13	26%	
3-5 years	3	6%	
Total	50		



LATERALITY:

Out of the 50 patients with solitary nodule studied, 28 cases presented with right sided nodule while the rest 22 cases presented with a nodule on the left thyroid gland.

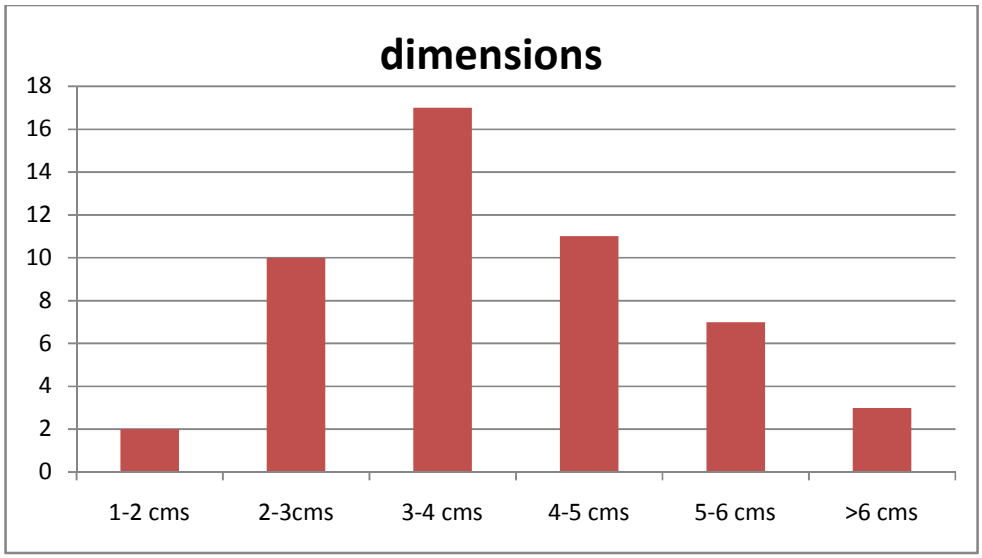
Laterality	No of patients	%
Right sided	28	56%
Left sided	22	44%
Total	50	



DIMENSIONS OF THE NODULE:

In this study the dimension of the nodule observed clinically ranged from 2cms to 12 cms. The average size of the nodule at presentation was 4 cms. The size of the nodule correlated with the average duration of the swelling.

Size of the nodule	No of patients	%	Mean
1-2 cms	2	4%	4.42cms
2-3 cms	10	20%	
3-4 cms	17	34%	
4-5 cms	11	22%	
5-6 cms	7	14%	
>6 cms	3	6%	
Total	50		



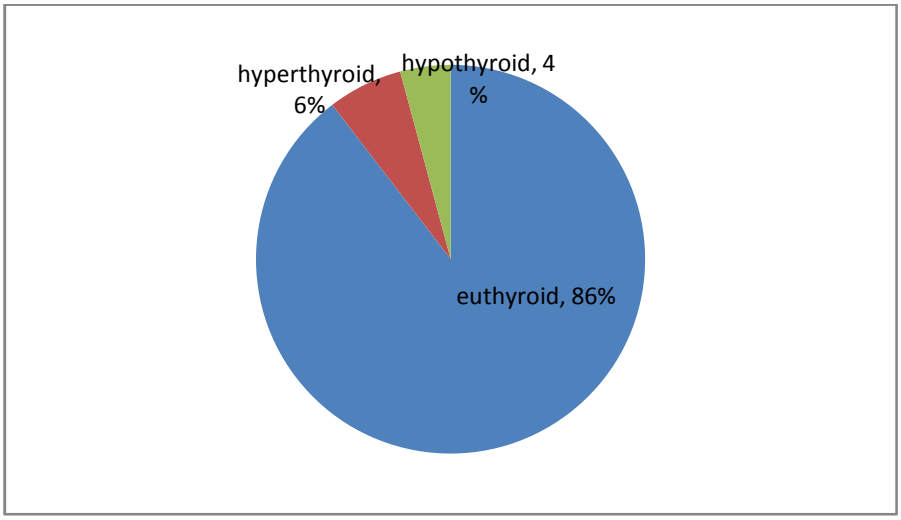
THYROID HORMONE PROFILE

Out of the 50 patients studied only three patients(6%) showed toxic symptoms and on evaluation was found to be hyperthyroid. 4 patients(8%) were hypothyroid . The rest of the patients were found to be euthyroid with normal thyroid hormone levels.

The three patients with hyperthyroidism were treated with antithyroid drugs and were made euthyroid. HPE in the postoperative period revealed that out of 3 cases 2 cases were toxic follicular adenoma and one to be multinodular goiter.

The 4 patients with hypothyroid profile were treated with thyroxine. These patients were proceeded with hemi thyroidectomy. Postoperative HPE revealed MNG in three patients and follicular adenoma in one patient.

Thyroid hormone profile	No of patients	%
Euthyroid	43	86%
hyperthyroid	3	6%
hypothyroid	4	8%
Total	50	



ULTRASOUND

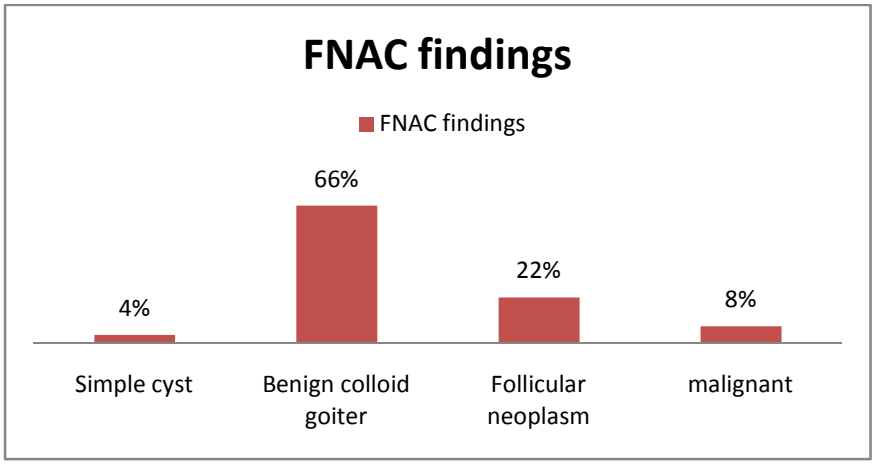
Patients who were included in the study as solitary nodule of thyroid were subjected to ultrasound study and was found that 15 cases(30%) were multinodular, two cases (4%)were simple cyst of thyroid and the rest 33 patients(66%) were comfirmed to have a solitary nodule.

Ultrasound diagnosis	No of patients	%
Solitary nodule	33	66%
Multi nodular	15	30%
Simple cyst	2	4%
Total	50	

FINE NEEDLE ASPIRATION CYTOLOGY

FNAC of the nodule was done during evaluation of the patients. The FNAC reports of the patients with solitary nodule was compiled and tabulated as under. They were grouped as simple cysts, benign colloid goiter, follicular neoplasm, malignant.

FNAC finding	No of patients	%
Simple cyst	2	4%
Benign colloid goiter	33	66%
Follicular neoplasm	11	22%
Malignant	4	8%
Total	50	

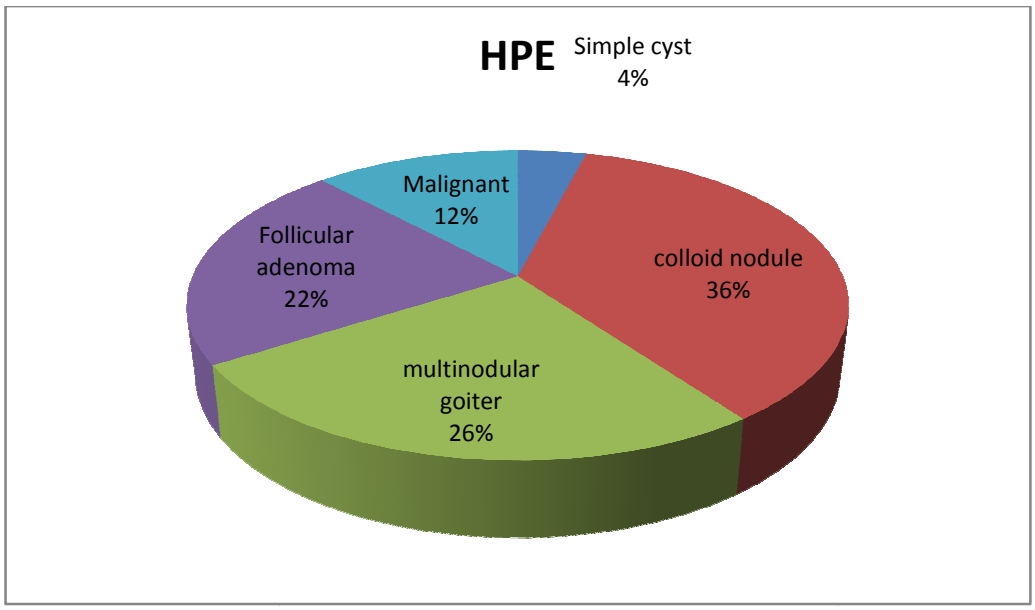


Out of the 11 patients diagnosed as follicular neoplasm on FNAC 2 patients turned out to be follicular carcinoma. FNAC laid the diagnosis of four cases as papillary carcinoma which was postoperatively confirmed to be the same on HPE.

AETIOLOGY OF SOLITARY NODULE THYROID

In our study the most common cause for solitary nodule as confirmed with HPE was colloid nodule. 18 cases(36%) were reported to have colloid nodule. Following it the multinodular goiter – 13 cases(26%) and follicular adenoma -11 cases(22%) were the next most common causes of solitary nodule of thyroid.

Pathological diagnosis	No of patients	%
Simple cyst	2	4%
Colloid nodule	18	36%
Multinodular goiter	13	26%
Follicular adenoma	11	22%
Malignant	6	12%
Total	50	



MALIGNANCY:

Out of the 50 cases in our study group, 6 cases(12%) turned out to be malignant. Out of these 4 cases(67%) were papillary carcinoma and 2 cases(33%) follicular carcinoma.

TYPE OF CARCINOMA	No of patients	%
Papillary	4	67%
Follicular	2	33%
Medullary	0	0%
Anaplastic	0	0%
Lymphoma	0	0%
Total	6	

SURGERY / OPERATIVE PROCEDURE DONE:

Based on the clinical diagnosis and the cytology, all the 50 patients were posted for a surgical procedure. Among them, 22 patients had underwent total thyroidectomy and the rest 28 patients underwent hemithyroidectomy and the samples were sent for histopathological analysis. In the post operative period suppressive dose of thyroxine was started for patients who underwent total thyroidectomy. Out of the 22 patients who underwent total thyroidectomy 7 patients had features suggestive of hypocalcemia on the 3rd postoperative day and were started on supplementary oral calcium and vitamin D3. The cases were followed up at regular intervals and two cases had voice change without any change in the vocal cord movements.

DISCUSSION

Thyroid nodule is a frequently encountered problem in the clinical practice. It usually presents clinically as a solitary nodule. Any discrete swelling in an otherwise impalpable thyroid gland is defined as solitary node of thyroid.

The observations and results of our study were compared to the other available pilot studies and are summarized as follows.

AGE DISTRIBUTION

Studies	Mean age at presentation(years)
Present study	**36.54**
Das et al	35
Talepoor et al	38.6
REHMAN A.U.et al.	34.7

- In our study the mean age at presentation was 36.54. This correlated with the mean age reported by *Das et al, Talepoor et al and REHMAN A.U.et al.*
- The peak incidence was found to be between the 3rd to 4th decade. Most of the previous studies too report the same peak incidence as 3rd to 4th decade[33].

GENDER DISTRIBUTION:

AUTHORS	**SEX INCIDENCE**
Present study	**1:11.5**
Dorairajan et al	1:9
Das DK et al	1:5.3
Gupta et al	1:5

- In our study the ratio of males to females was 1:11.5. This correlated with Dorairajan et al who reported a ratio of 1:9
- This high incidence among the female sex can be attributed to the change in the hormonal profile during puberty , menstrual cycles, pregnancy and menopause.

DISTRIBUTION OF LESIONS BY FNAC

Authors	Non neoplastic	Neoplastic	Ratio
Present study	**36**	**14**	**2.57:1**
Das et al	346	85	4.07:1
Kanur et al	32	15	2.13:1
Nagada et al	51	18	2.83:1

- In our study neoplastic lesions included both benign adenomas and malignant lesions. The ratio of non neoplastic lesions to neoplastic lesions was 2.57:1 which was comparable to other studies of Kanur et al and Nagada et al.

DISTRIBUTION OF MALIGNANCIES BY FNAC

- In our study FNAC reported 4 cases of malignancy which were confirmed to be papillary carcinoma in the post operative HPE. Out of the 11 cases reported as follicular adenoma 2 cases turned out to be malignant. Percentage of malignancy reported by FNAC was 8% and was comparable to the studies of Karur et al and Sarada et al. However it should be borne in mind that FNAC cannot differentiate between an adenoma and both the follicular this it underestimates the percentage of malignancy.

Authors	**Percentage of malignancy**
Present study	**8%**
Sarada A K et al	10.8%
Karur K et al	18%
Mundsad B et al	4.1%

AETIOLOGICAL INCIDENCE:

Authors	**Colloid nodule**	**Follicular adenoma**	**Carcinoma**	**Others**
Present study	**36%**	**22%**	**12%**	**30%**
Kapur et al	28%	50%	11%	11%
Zagman et al	83%	9%	8%	-
Bhansali et al	71%	20%	9%	-

In our study the most common etiology was colloid nodule which is comparable to other studies of Zagman et al and Bhansali et al. The other common causes are multinodular goiter and follicular adenoma.

PREVALENCE OF MALIGNANCY

Authors	Percentage
Present study	12%
Rehman et al	11.4%
Kapur et al	16%
Bhansali S K et al	9%

- In the literature available the prevalence of malignancy in solitary nodule of thyroid ranges from 5 to 30%. In out study malignancy was identified in 12% cases which is comparable to the other pilot studies.

CONCLUSION

Our study was a prospective hospital based observational analysis of 50 patients with solitary nodule of the thyroid presented to Government Royapettah hospital, Chennai and the following conclusions were arrived.

- Solitary nodule of thyroid is more common among the female sex.
- The peak incidence of solitary nodule of thyroid is in the 3rd to 4th decades.
- The most common presenting complaint in a patient with solitary nodule is swelling.
- Majority of the patients with solitary nodule are euthyroid at presentation. However hyperthyroid and hypothyroid status can also exist.
- Incidence of malignancy is more among the men presenting with solitary nodule when compared to the female sex
- Colloid nodule is the most common cause of solitary nodule.
- Papillary carcinoma is the most common malignancy associated with solitary nodule when compared to follicular carcinoma.

SUMMARY

Summary following detailed analysis of 50 cases with solitary nodule of the thyroid gland is as follows:

- Solitary nodule is common among the females with M:F ratio of 1:11.5
- The peak age of presentation is between 3rd to 4th decade accounting to 60% of the total cases
- Most common presentation of solitary nodule is swelling in the thyroid region.
- Majority of the nodules are benign(88%)
- Most patients are euthyroid(94%) at the time of presentation. However hyperthyroidism and hypothyroidism can occur
- On evaluation colloid nodule (36%) was the most common cause of solitary nodule
- The prevalence of malignancy in solitary nodule is 12%
- Carcinoma is more prevalent among the males(25%) presenting with solitary nodules than the females
- Most common malignancy in solitary nodule is papillary carcinoma(67%) followed by follicular carcinoma(33%).
- Surgery is the treatment of choice for solitary nodule of thyroid

ANNEXURES

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STUDY PROFORMA

I **PATIENTS RECORD**

1. Name:
2. Age:
3. Sex:
4. OP / IP number:
5. Address:

II **COMPLAINTS**

1. Swelling:
    a. duration
    b. Onset
    c. Progression
    d. Pain present/absent
2. Obstructive symptoms
    a. dysphagia
    b. Odynophagia
    c. Dyspnea
    d. Hoarseness of voice
3. Dry skin/ cold or heat intolerance
4. weight gain/weight loss
5. Hair loss/ palpitations/ tremor
6. Constipation/ diarrhea
7. Menstrual symptoms
8. Symptoms suggestive of malignancy
    a. Rapid increase in size
    b. Presence of other swelling(s) in neck – lymph nodes
    c. Recent onset of pressure symptoms/change in voice
    d. Chest symptoms- cough/breathlessness/hemoptysis
    e. Loss of weight and loss of appetite

9. PAST HISTORY:

a. h/o any drug intake
b. h/o irradiation to neck in childhood
c. h/o diabetes/hypertension/tuberculosis/asthma/allergy

10. FAMILY HISTORY

a. h/o similar complaints in family members
b. similar complaints in locality

11. PERSONAL HISTORY

a. Diet:
b. Appetite:
c. Sleep
d. Bowel and bladder habits:
e. Habits:

12.GENERAL PHYSICAL EXAMINATION

a. Appearance: Pallor:
b. Look: Anxious/dull/normal Icterus:
c. Built: thin/moderate/obese Cyanosis:
d. Skin: Clubbing:
e. Hands: warm/moist/cold Lymphadenopathy:
f. Nutrition:
g. Tremors:

h. VITALS:

pulse – rate:
rhythm:
volume:
character:

i. Respiratory rate:
j. Temperature:
k. BP.:

EXAMINATION OF THYROID SWELLING

INSPECTION

a. Site
b. Size
c. Shape
d. Margins
e. Surface
f. Extent of the swelling
g. Visible pulsations
h. Lower border of swelling- visible/not visible
i. Movement with deglutition or protrusion of tongue
j. Skin over the swelling

PALPATION

a. Warmth
b. Tenderness
c. Consistency
d. Mobility/ fixity to underlying structures
e. Lower border of the swelling
f. Skin over the swelling pinchable/not pinchable
g. Palpable pulsation/thrill

PERCUSSION

Resonant / dull note over manubrium sterni

AUSCULATION

Bruit

REGIONAL LYMPH NODE EXAMINATION

OTHER SYSTEMS EXAMINATION

a. Respiratory system
b. Cardiovascular system
c. Abdomen and genitalia
d. Central nervous system
e. Per Rectal examination
f. Per vaginal Examination

CLINICAL DIAGNOSIS:

INVESTIGATIONS:

HB%: Total Count:

Differential Count: ESR:

Bleeding Time: Clotting Time:

Urine Routine: Albumin- ECG:

Sugar & microscopy-

Random Blood Sugar: Blood Urea:

Serum Creatinine: Chest-X-Ray:

HIV -1&2: HBsAg:

SPECIFIC INVESTIGATIONS:

FNAC of nodule:

Thyroid Profile:

Indirect Laryngoscopy:

Plain X-Ray Neck:

USG Neck:

S.Calcium

TREATMENT:

PREOPERATIVE

SURGICAL PROCEDURE DONE

Hemi/total thyroidectomy

+/- neck dissection

Intra op/ post op complications

HPE EXAMINATION

Microscopic

Macroscopic

POST OPERATIVE

Thyroid function tests/

Serum calcium

FOLLOW UP

சுயஒப்புதல்படிவம்

ஆய்வுசெய்யப்படும்தலைப்பு'**A CROSS SECTIONAL STUDY OF CLINICAL PREVALENCE OF MALIGNANCY IN SOLITARY NODULE THYROID, Department of General Surgery, Govt Royapettah hospital.**

பங்குபெறுபவரின்பெயர் :

பங்குபெறுபவரின்வயது :

பங்குபெறுபவரின்எண் :

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. நான் இவ்வாய்வில் தன்னிச்சையாக பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த சட்டசிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகிக் கொள்ளல்லாம் என்றும் அறிந்து கொண்டேன்.

இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்து மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்கு பெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதிதே வையில்லை என அறிந்துகொள்கிறேன். இந்த ஆய்வின் மூலம் கிடைக்கும் தகவலையோ, முடிவையோ பயன்படுத்திக் கொள்ள மறுக்கமாட்டேன்.

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்றும் உறுதியளிக்கிறேன்.

பங்கேற்பவரின்கையொப்பம்

இடம் :

தேதி :

ஆய்வாளரின்கையொப்பம்

ஆய்வாளரின்கையொப்பம்

நோயாளி தகவல் தாள்

ஆய்வுசெய்யப்படும்தலைப்பு 'A CROSS SECTIONAL STUDY OF CLINICAL PREVALENCE OF MALIGNANCY IN SOLITARY NODULE THYROID, Department of General Surgery, Govt Royapettah hospital.

தைராய்டு கட்டியில் இருந்து புற்று நோய் சதவீதம் கண்டறியும் ஆய்வு .

நம்பகத் தன்மை:

உங்கள் மருத்துவ பதிவேடுகள் மிகவும் ரகசியமாக வைத்துக் கொள்ளப்படும். மற்ற மருத்துவர்கள், விஞ்ஞர்னிகள், இந்த ஆராய்ச்சி ஆதரவாளர்களின் பிரதிநிதிகள் ஆகியோரிடம் அவை வெளிப்படும். இந்த ஆய்வின் முடிவுகள் அறிவியல் பத்திரிக்கைகளில் பிரசுரிக்கப்படலாம்.

ஆய்வில் பங்கேற்கும் நோயாளியின் கடமைப் பொறுப்புகள்:

உங்களை கவனித்துக் கொள்ளும் மருத்துவருடன் நீங்கள் முழுமையாக ஒத்துழைக்க வேண்டும் மற்றும் உங்கள் மருத்துவரால் குறிப்பிடப்படும் வைத்தியத்தை தவறாமல் பின்பற்ற வேண்டும் என்றும், என்னென்ன செய்யக்கூடாது என்றும் என்னென்ன செய்ய வேண்டும் என்றும் கூறப்பட்டுள்ள வற்றிலிருந்து சற்றும் விலகக்கூடாது என்றும் நீங்கள் எதிர்பார்க்கப்படுகிறீர்கள்.

ஆய்வில் உங்கள் பங்கேற்பு மற்றும் உரிமைகள்:

இந்த ஆய்வில் உங்கள் பங்கேற்பு தன்னிச்சையானது. மற்ற காரணங்கள் எதையும் கூறாமலேயே நீங்கள் இந்த ஆய்விலிருந்து எந்த நேரத்திலும் விலக்கிக் கொள்ளலாம். எந்த ஒரு நேரத்திலும் உங்களுக்கு திருப்தி இல்லை என்று உணர்ந்தாலோ அல்லது வேறு ஏதேனும் உடல் நலக்குறைவு உண்டானாலோ உங்களை கவனித்து

வரும் மருத்துவரிடம் உடனடியாகத் தெரிவிக்கவும். சிகிச்சை உங்களுக்கு பொருத்தமாக இருக்காது என்று தோன்றினால் உடனடியாக நிறுத்தப்படும். உங்கள் சம்மதம் இன்றியே கூட ஆய்வு நிறுத்தப்படுவது சாத்தியமே.

வேறு ஏதேனும் கேள்விகள் பிரச்சினைகள் பற்றி நீங்கள் கேட்க விரும்பினால் கீழ்க்கண்ட நபரை தொடர்பு கொள்ளவும்.

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MASTER CHART

serial number	Name	sex	Age	duration of symptoms	pressure symptom	toxic sym	site	size (in cm	consisten	lymphnod	thyroid pr	USG	FNAC	Surgery	HPE
1	supraja		28	F	7MONTHS	-		L	4*4	firm	-	-	SN	FN	HT	FA
2	monika		44	F	2YEARS	Discomfort		R	6*3	firm	-	hypo	MNG	NCG	TT	CN
3	rani		40	F	1YEAR	-		R	6*4	cystic	-	-	SC	CG	HT	SCT
4	sarala		21	F	5MONTHS	-		L	3*3	firm	-	-	SN	NCG	HT	MNG
5	chandra		19	F	6 months	-		R	3*4	hard	-	-	SN	PC	TT	Fol var PC
6	saroja		41	F	3 months	-		R	3*3	firm	-	hypo	SN	FN	TT	CN
7	saral beevi		64	F	3MONTHS	-		L	5*3	cystic	-	-	SC	CG	HT	SCT
8	muthuselvi		44	F	2 years	-		R	5*5	firm	-	-	MNG	CG	TT	CN
9	shalini		39	F	9MONTHS	-		L	4*3	firm	-	-	SN	FN	HT	FA
10	ambujam		30	F	2YEARS	-		L	4*4	firm	-	-	SN	FN	HT	FA
11	karuppan		57	M	3MONTHS	-		L	5*5	firm	-		SN	CG	TT	CN
12	rasitha		21	F	2MONTHS	discomfort		R	7*4	firm	-	-	MNG	CG	TT	CN
13	nirmala		27	F	6MONTHS	-	+	L	3*3	firm	-	hyper	SN	FN	HT	FA
14	meena		48	F	2YEARS	-		R	6*3	firm	-	-	SN	CG	HT	MNG
15	ramayee		46	F	5MONTHS	-		L	3*3	cystic	-	-	SN	CG	HT	MNG
16	manjula		24	F	1YEAR	-		R	3*3	firm	-	-	SN	FN	HT	MNG
17	kala		31	F	1YEAR	-		R	4*4	firm	-	-	SN	CG	HT	CN
18	jegadhambal		24	F	1YEAR	-	+	L	4*3	firm	-	hyper	MNG	NCG	TT	CN
19	menaka		58	F	5MONTHS	-		R	3*3	firm	-	-	MNG	NCG	TT	CN
20	saraswathi		31	F	1YEAR	-		L	5*5	firm	-	-	SN	CG	HT	MNG
21	vanitha		52	F	1.5YEARS	-		L	5*5	firm	-	-	SN	NCG	HT	MNG
22	divya		24	F	5YEARS	-		R	4*5	firm	-	-	MNG	NCG	TT	CN
23	muthurani		57	F	3MONTHS	-		L	2*3	firm	-	-	MNG	NCG	TT	CN
24	ambika		61	F	2MONTHS	pain		L	6*3	cystic	-	-	SN	CC	HT	MNG
25	priya		21	F	1YEAR	-		R	4*4	firm	-	-	SN	CG	HT	FA

26	renuka	22	F	8MONTHS	-		R	4*5	firm	-	-	MNG	NCG	TT	CN
27	govindammal	40	F	2YEARS	-		R	4*2	firm	-	-	MNG	NCG	TT	CN
28	kasthuri	51	F	2YEARS	-	+	R	3*3	firm	-	-	SN	FN	HT	FA
29	marimegalai	30	F	5MONTHS	-		R	4*4	firm	-	-	MNG	OG	TT	CN
30	malathi	39	F	4MONTHS	-		R	3*3	firm	-	-	MNG	NCG	TT	CN
31	abhirami	23	F	3YEARS	dysphagia		R	10*8	firm	-	hypo	SN	FN	HT	FA
32	nazeem	35	F	2YEARS	pain		R	6*6	firm	-	-	SN	OG	HT	MNG
33	nagammal	44	F	1YEAR	-		L	4*3	firm	-	-	SN	OG	HT	MNG
34	priyadharshini	38	F	3YEARS	-		L	5*4	hard	-	-	SN	PC	TT	PC
35	vasanthi	20	F	1MONTH	-		L	2*2	firm	-	-	SN	PC	TT	PC
36	lakshmi	39	F	3MONTHS	-		R	3*3	firm	-	-	SN	FN	HT	FC
37	elumalai	31	M	10MONTHS	dysphagia		R	6*4	firm	-	-	SN	NCG	HT	FA
38	revathy	30	F	6MONTHS	-		L	3*3	firm	-	-	SN	FN	HT	FA
39	asha	18	F	4YEARS	Discomfort		L	6*5	firm	-	hypo	MNG	NCG	TT	CN
40	hema	28	F	2YEARS	-		R	4*4	firm	-	-	SN	OG	HT	FA
41	roshini	25	F	10MONTHS	-		L	4*3	firm	-	-	MNG	OG	TT	CN
42	sahana	24	F	20 DAYS	-		L	4*5	firm	-	-	SN	OG	HT	AG
43	ulagammal	41	F	6MONTHS	-		L	6*4	firm	-	-	SN	NCG	TT	MNG
44	malar	30	F	3MONTHS	pain		R	4*5	firm	-	-	SN	OG	HT	MNG
45	govindan	34	M	1YEAR	-		R	3*3	firm	-	-	SN	PC	TT	PC
46	baskar	36	M	2.5YEARS	-		R	6*4	firm	-	-	SN	OG	HT	FA
47	sundari	54	F	2YEARS	-		L	4*3	firm	-	-	SN	FN	TT	FC
48	kuppayee	44	F	5MONTHS	-		R	3*4	firm	-	-	SN	OG	HT	FA
49	esther	49	F	1YEAR	-		R	3*3	firm	-	-	MNG	AG	TT	CN
50	sasikala	42	F	2YEARS	-		R	4*4	cystic	-	-	SN	OG	HT	MNG

KEY TO MASTER CHART

B	Benign
CA	Carcinoma
CG	Colloid goiter
CN	Colloid nodule
FA	Follicular adenoma
FC	Follicular carcinoma
FN	Follicular neoplasm
HT	Hemithyroidectomy
L	Left
MNG	Multinodular goiter
NCG	Nodular colloid goitre
TT	Total thyroidectomy
PC	Papillary carcinoma
R	Right
SC	Simple cyst of thyroid
SNT	Solitary nodule thyroid
STT	Sub total thyroidectomy
TT	Total thyroidectomy