الجامعة السورية الخاصة
كلية الطب البشري
قسم الجراحة

Thyroid and Parathyroid Glands Surgical Diseases

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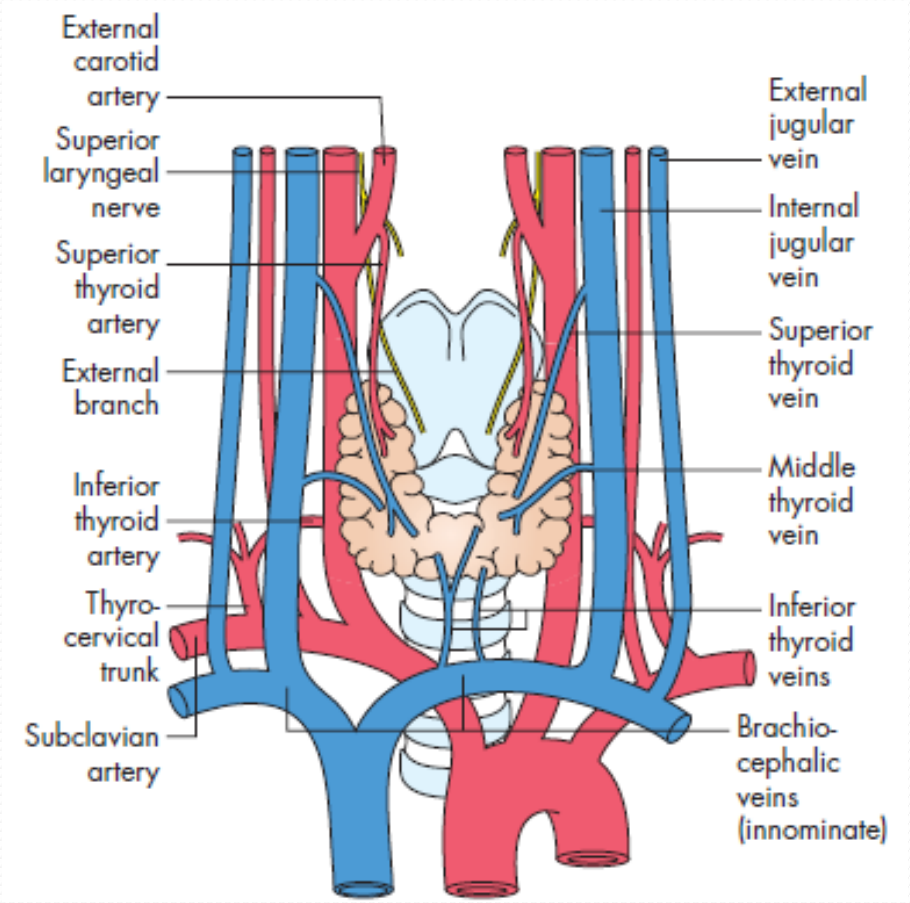
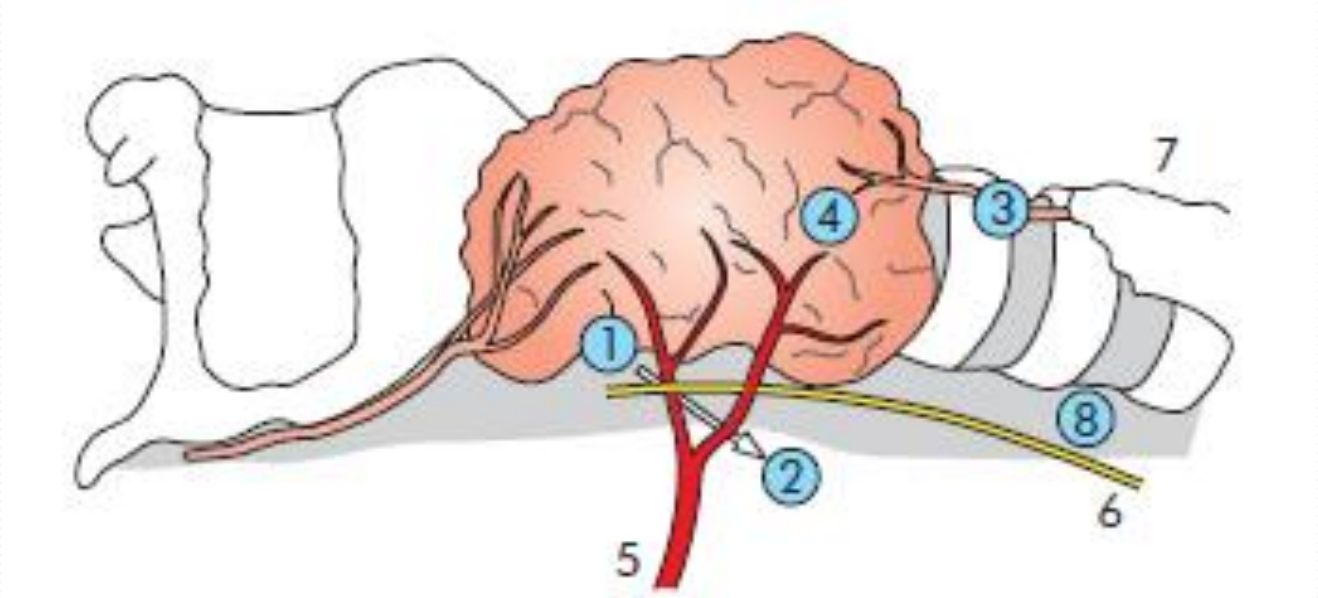
SURGICAL ANATOMY

1. The normal thyroid gland weighs 20–25 g.
2. The arterial supply is rich, and extensive anastomoses occur between the main thyroid arteries and branches of the tracheal and oesophageal arteries .
3. There is an extensive lymphatic network within the gland.
4. Although some lymph channels pass directly to the deep cervical nodes .
5. The subcapsular plexus drains principally to the central compartment juxtathyroid nodes



The thyroid gland from the front.



Surgical anatomy of the thyroid.

1 and 2, common sites for the superior parathyroid gland

3 and 4, common sites for the inferior parathyroid gland

5, inferior thyroid artery; 6, recurrent laryngeal nerve; 7, thymus; 8, oesophagus

TESTS OF THYROID FUNCTION

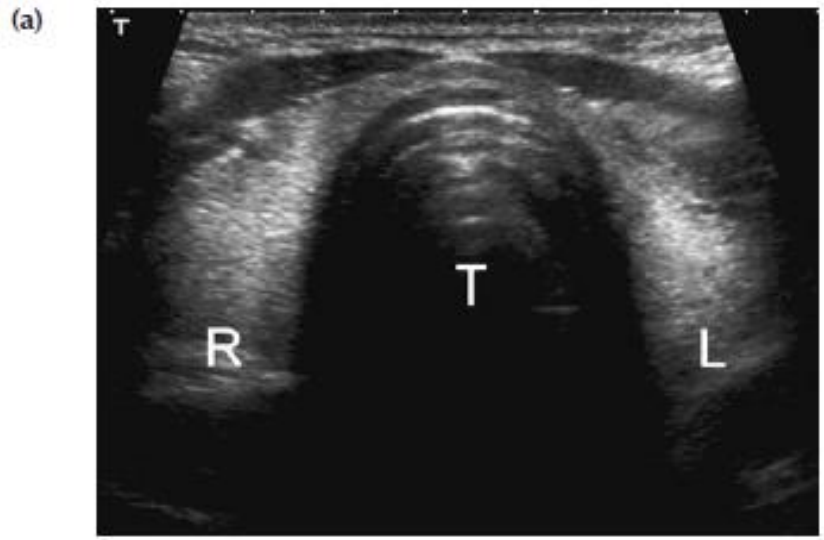
Only a small number of parameters need to be measured as a routine .

1. ***Serum TSH .***
2. ***Thyroxine (T_4) and tri-iodothyronine (T_3)***
3. ***Thyroid autoantibodies .***

Thyroid Imaging

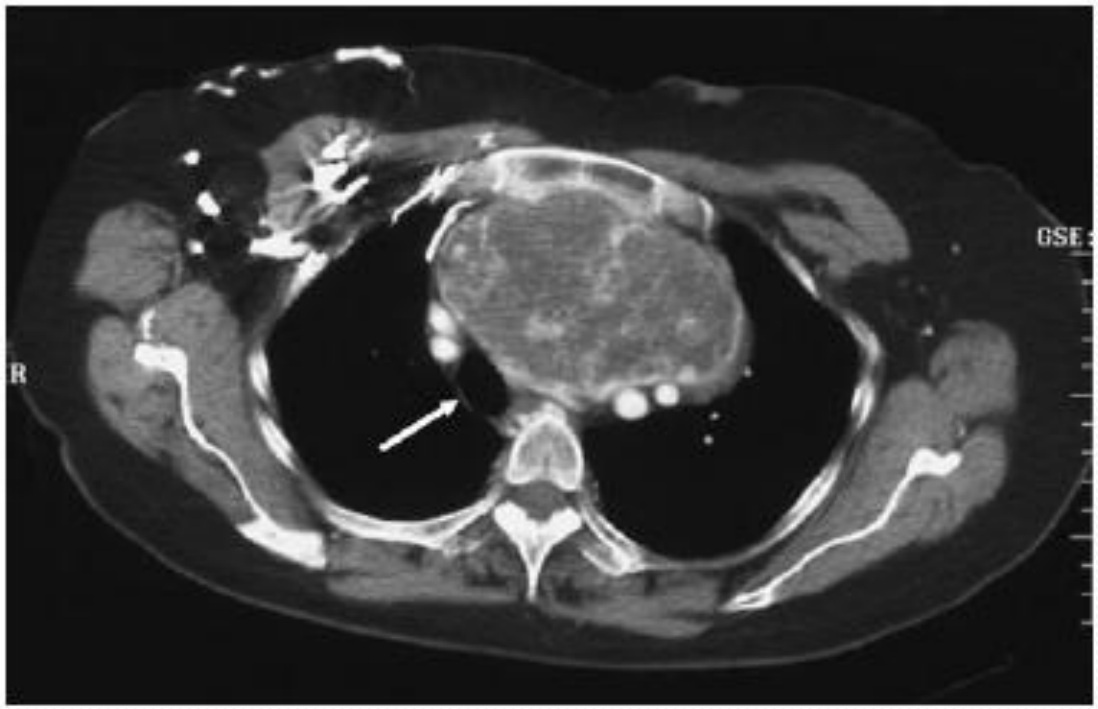
1. ***Chest and thoracic inlet radiography .***
2. ***Ultrasound imaging .***
3. ***Isotope scanning .***
4. ***Computerized tomography .***
5. ***Magnetic resonance .***
6. ***Positron emission tomography scanning .***

Chest radiograph showing a retrosternal goitre with tracheal displacement.

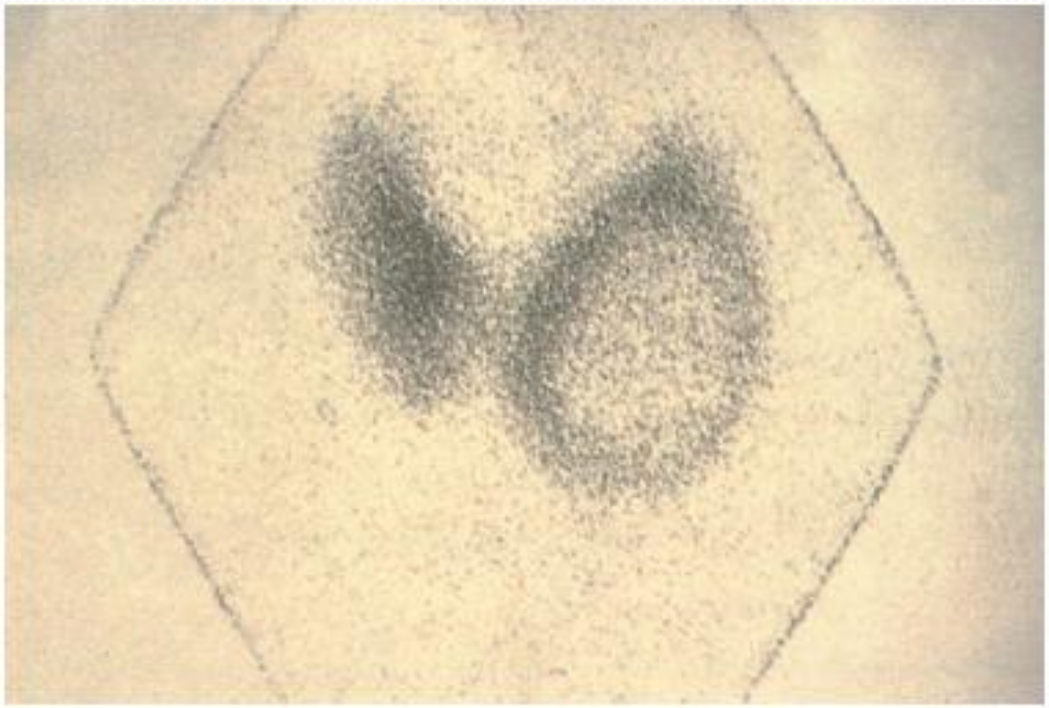


(a) Transverse scan of a normal thyroid.

(b) Longitudinal scan of normal jugular lymph nodes (white arrows



Computerized tomography scan of the chest showing retrosternal goiter with tracheal displacement (arrowed).



Technetium thyroid scan showing a ‘cold’ nodule that does not take up isotope expanding the left thyroid lobe.

Thyroid investigations

Essential

- Serum: TSH (T_3 and T_4 if abnormal); thyroid autoantibodies
- FNAC of palpable discrete swellings; ultrasound guidance may reduce the 'Thy1' rate

Optional

- Corrected serum calcium
- Serum calcitonin (carcinoembryonic antigen may be used as an alternative screening test for medullary cancer)

Imaging:

- chest radiograph
- thoracic inlet if trachea deviation/retrosternal goitre.
- ultrasound,
- CT and MRI scan for known cancer, some reoperations and some retrosternal goitres isotope scan if discrete swelling and toxicity coexist

Fine-needle aspiration cytology

- **FNAC** is the investigation of choice for discrete thyroid swellings .
- There is a trend to use ultrasound to guide the needle to achieve more accurate sampling and reduce the rate of unsatisfactory aspirates .

Simple goitre

Aetiology

- A result of stimulation of the thyroid gland by TSH .
- A result of inappropriate secretion from a microadenoma in the anterior pituitary (which is rare).
- In response to a chronically low level of circulating thyroid hormones.
- In endemic goitre is dietary deficiency of iodine .

Diffuse hyperplastic goitre

- The goiter appears in childhood in endemic areas
- It usually occurs at puberty when metabolic demands are high.
- If TSH stimulation ceases the goiter may regress;
- It tends to recur later at times of stress such as pregnancy.
- The goiter is soft, diffuse and may become large enough to cause discomfort.
- A colloid goiter is a late stage of diffuse hyperplasia when TSH stimulation has fallen off and when many follicles are inactive and full of colloid .

Nodular goitre

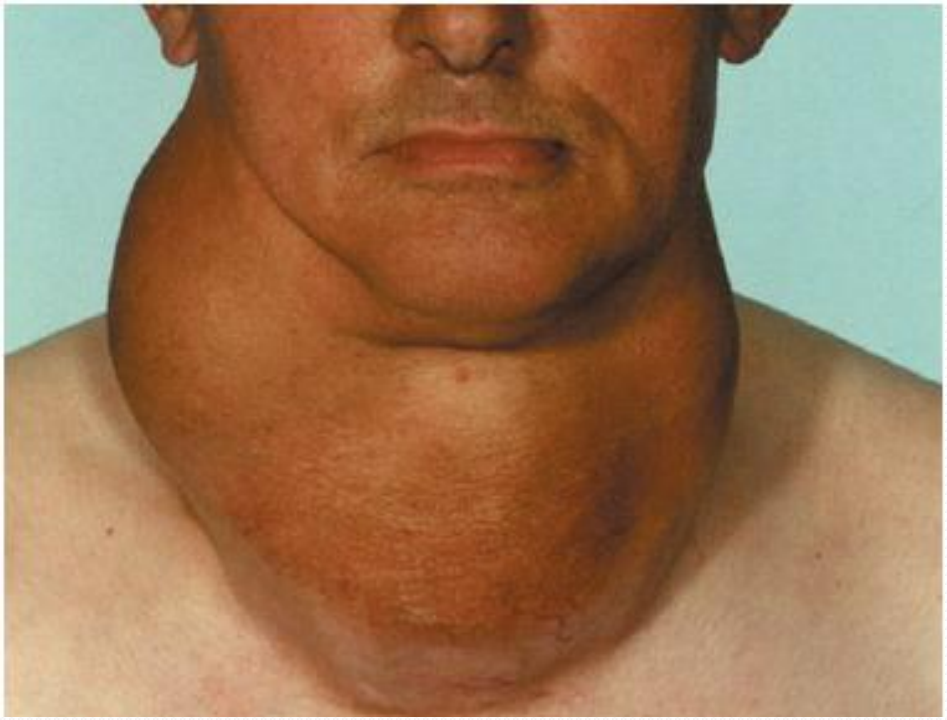
- Nodules are usually multiple, forming a multi nodular goiter .
- Nodules may be colloid or cellular, and cystic degeneration and hemorrhage are common, subsequent calcification.
- All types of simple goiter are more common in females than males because of the presence of Estrogen receptors in thyroid tissue.

Retrosternal goitre

- Very few retrosternal goiters arise from ectopic thyroid tissue.
- Most arise from the lower pole of a nodular goiter.
- Is often symptomless and discovered on a routine chest radiograph .
- Dyspnea, particularly at night, cough and stridor (harsh sound on inspiration).
- Dysphagia.
- Engorgement of facial, neck and superficial chest wall veins
- Obstruction of the superior vena cava .
- Recurrent nerve paralysis is rare; the goiter may also be malignant or toxic.

Chest radiograph showing a retrosternal goiter with tracheal displacement.

Colloid goiter.



Large multi nodular goiter.

Diagnosis

- Usually straightforward.
- The patient is Euthyroid .
- The nodules are palpable and often visible .
- The goiter is painless and moves freely on swallowing.
- Hardness and irregularity, due to calcification, may simulate carcinoma.
- A painful nodule or the sudden appearance or rapid enlargement of a nodule raises suspicion of carcinoma.

Investigations

- Thyroid function tests .
- Circulating thyroid antibodies tested .
- Plain radiographs of the chest and thoracic inlet .
- Ultrasound and CT .
- FNAC is only required for a dominant swelling in a generalized goiter.
- Core biopsy .

Complications

- Tracheal obstruction .
- Retrosternal extension of the goiter .
- Acute respiratory obstruction may follow hemorrhage into a nodule impacted in the thoracic inlet.
- Secondary thyrotoxicosis (Transient episodes of mild hyperthyroidism are common, occurring in up to 30% of patients) .
- Carcinoma : increased incidence of cancer (usually follicular) has been reported from endemic areas.

Indications for operation in thyroid swellings

Neoplasia

- FNAC positive .
- Clinical suspicion, including:
  - Age
  - Male sex
  - Hard texture
  - Fixity
  - Recurrent laryngeal nerve palsy
  - Thyroid cold nodule
  - Lymph adeno pathy

Recurrent cyst

Toxic adenoma

Thyrotoxicosis

Pressure symptoms

Cosmetics

Patient's wishes

Thyroid operations

- Total lobectomy .
- Isthmusectomy .
- Subtotal lobectomy .
- Total thyroidectomy = 2 × total lobectomy + isthmusectomy .
- Subtotal thyroidectomy = 2 × subtotal lobectomy + isthmusectomy .
- Near-total thryroidectomy = total lobectomy + isthmusectomy + subtotal lobectomy .
- Lobectomy = total lobectomy + isthmusectomy .

Preoperative preparation

- The aim is to make the patient biochemically euthyroid at operation.
- Control of hyperthyroidism if present by giving . Carbimazole 30–40 mg day is the drug of choice for preparation for 8-12 weeks till Euthyroid , the dose may be reduced to 5 mg 8-hourly .
- An alternative method of preparation is to abolish the clinical manifestations of the toxic state using β-blocking drugs , Propranolol or nadolol controls symptoms very rapidly.
- Iodine may be given with Carbimazole or β-blocker for the 10 days before operation.

Postoperative complications

Immediate complication

- ***Hemorrhage***
- ***Respiratory obstruction***
- ***Recurrent laryngeal nerve paralysis and voice change .***

Delayed complication

- ***Thyroid insufficiency .***
- ***Parathyroid insufficiency .***
- ***Thyrotoxic crisis (storm) .***
- ***Wound infection .***
- ***Hypertrophic or keloid scar .***
- ***Stitch Granuloma .***

Clinical features of thyroid cancers

- The annual incidence of thyroid cancers is : about 3.7 cases per 100 000 population .
- Female–male sex ratio is 3:1 .
- Older patients have more aggressive disease with a worse prognosis.
- The most common presenting symptom is a thyroid swelling .
- A 5-year history is not uncommon in differentiated growths.
- Enlarged cervical lymph nodes may be the presentation of papillary carcinoma.

- Recurrent laryngeal nerve paralysis is very suggestive of locally advanced disease.
- Anaplastic growths are usually hard, irregular and infiltrating.
- A differentiated carcinoma may be suspiciously firm and irregular .
- Small papillary tumours may be impalpable, even when lymphatic metastases are present.
- Pain, often referred to the ear, is frequent in infiltrating growths.

Classification of thyroid neoplasms

Benign Follicular adenoma

Malignant

Primary

Papillary
Follicular
Follicular epithelium – undifferentiated
Anaplastic
Parafollicular cells
Medullary
Lymphoid cells
Lymphoma

Secondary

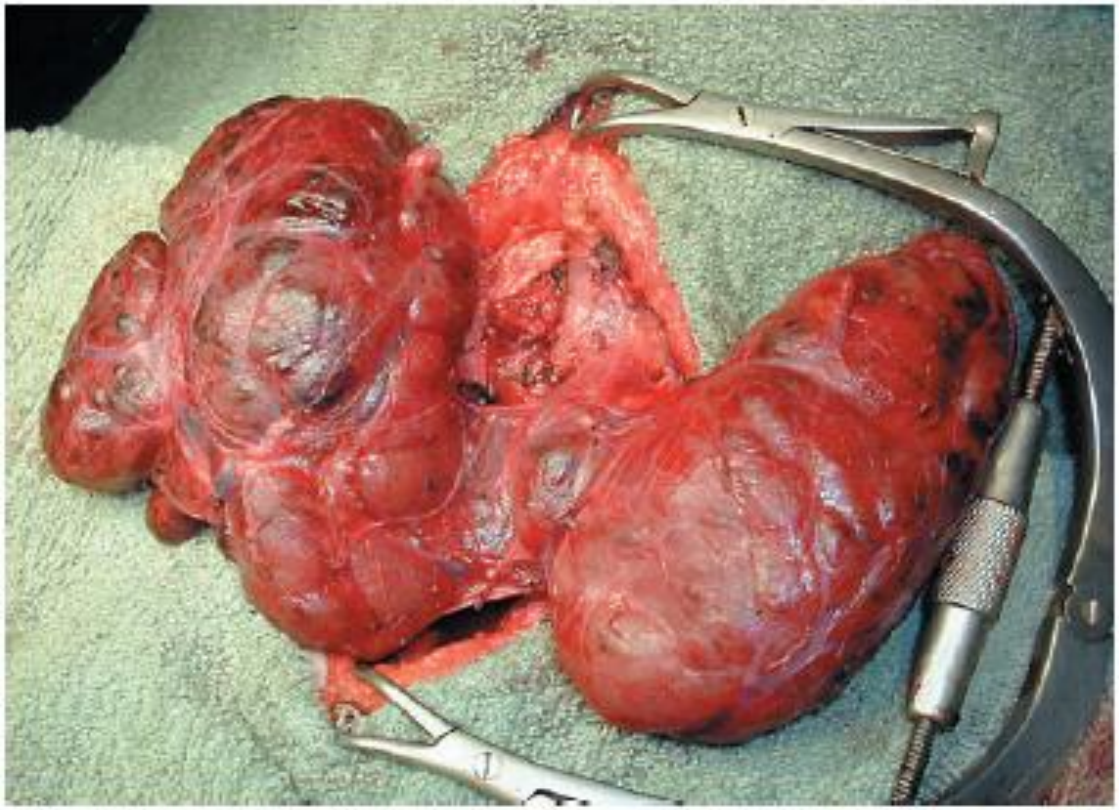
Metastatic
Local infiltration

Relative incidence	(%)	Relative incidence	(%)
Papillary carcinoma	60	Medullary carcinoma	5
Follicular carcinoma	20	Malignant lymphoma	5
Anaplastic carcinoma	10		

Relative incidence of primary malignant tumor of the thyroid gland

Major differences between papillary and follicular carcinoma

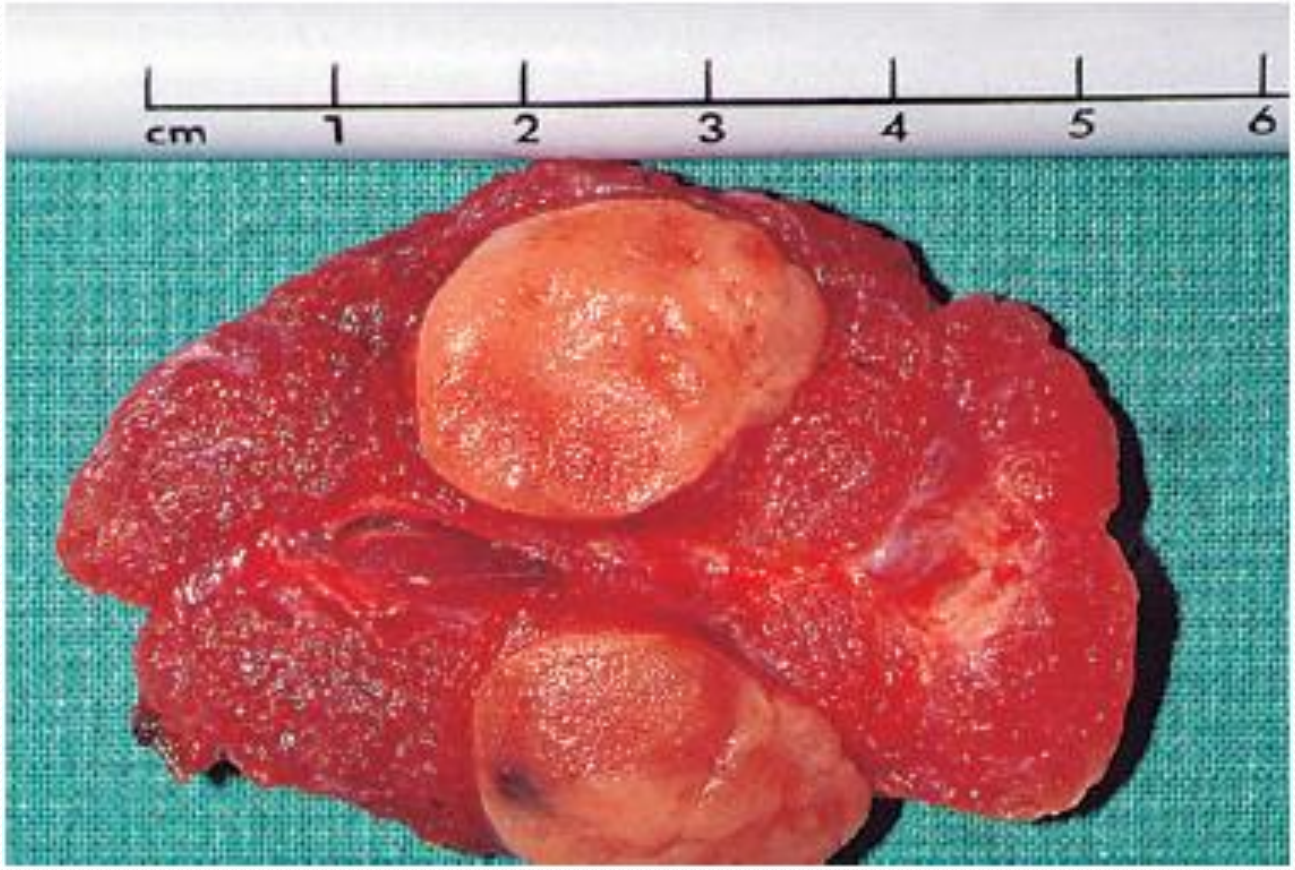
	Papillary (%)	Follicular (%)
Male incidence	22	35
Lymph node metastases	35	13
Blood vessel invasion	40	60
Recurrence rate	19	29
Overall mortality rate	11	24
Location of recurrent carcinoma		
Distant metastases	45	75
Nodal metastases	34	12
Local recurrence	20	12



Total thyroidectomy for dyshormonogenetic goitre in a 14-year-old girl.

Total thyroidectomy specimen from a young girl, showing a small medullary cancer in the right lobe.

Metastasis in the humerus from a carcinoma of the thyroid

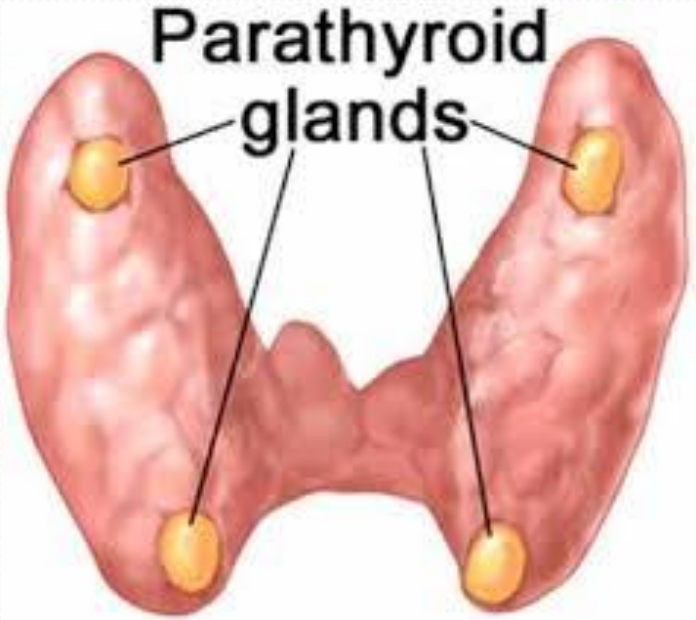


Follicular neoplasm of the thyroid presenting as an isolated swelling.

PARATHYROID

Primary hyperparathyroidism

- Primary HPT is more commonly sporadic than familial.
- Hypercalcaemia .
- Raised serum PTH levels .
- The normal response to hypercalcaemia is PTH suppression.

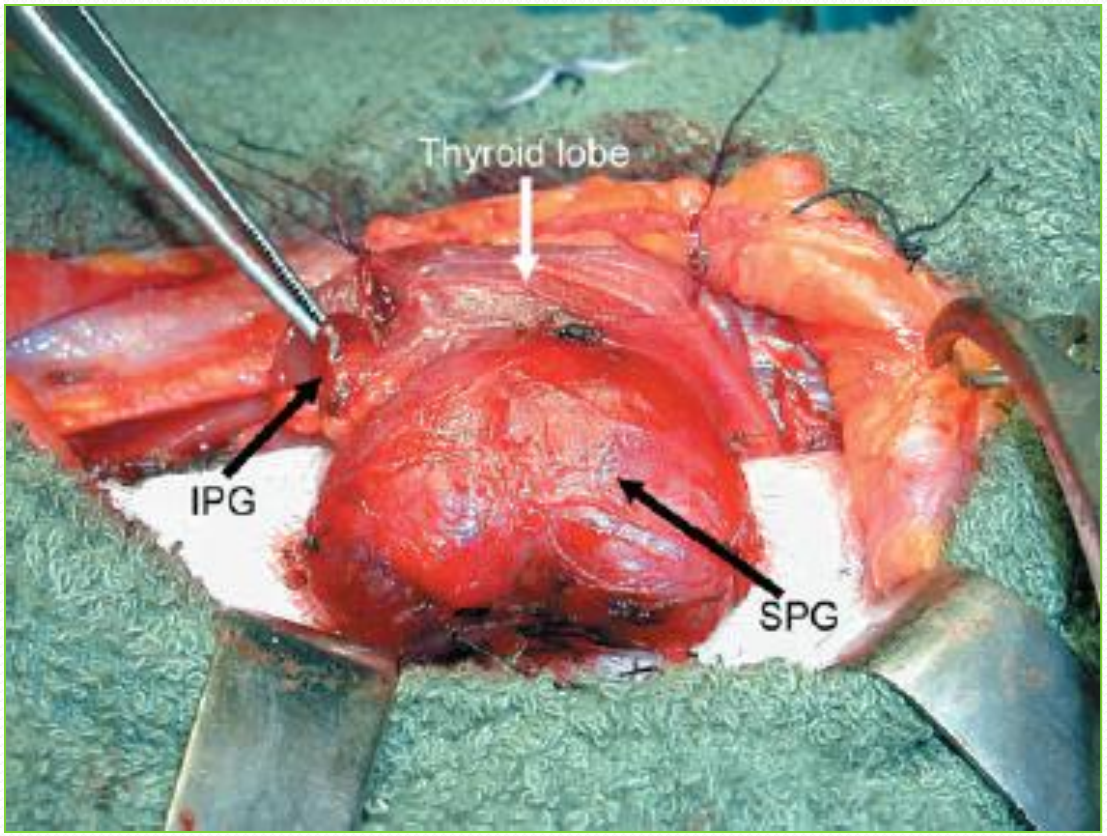


Epidemiology

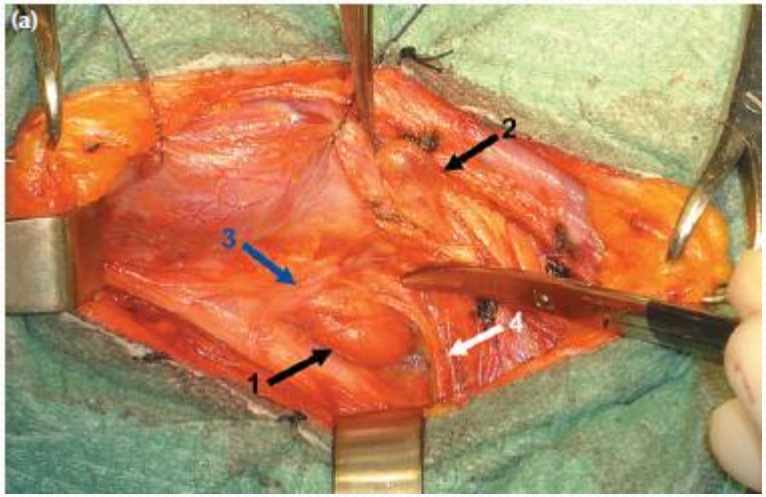
- HPT increases with age .
- It affects women more than men.
- Approximately 1% of adults are hypercalcaemic.
- Familial HPT occurs as part of the following genetically determined conditions:
- MEN-1 (multiple endocrine neoplasia type 1; Werner's syndrome).
- MEN-2A (Sipple's syndrome) and rarely MEN-2B.
- Familial isolated HPT

Pathology

- 85% of patients with sporadic primary HPT have a single adenoma .
- 13% have hyperplasia affecting all four glands .
- 1% will have more than one adenoma or a carcinoma.
- There is a weak correlation between the size of an adenoma and the level of PTH .
- Parathyroid carcinomas are large tumours and typically much more adherent or even frankly invasive than large adenomas.



Parathyroid adenoma.



Parathyroid hyperplasia

Clinical presentation

- Stones .
- Bones .
- Abdominal groans .
- Psychic moans .

Diagnosis

- Inappropriate (elevated or normal) PTH levels .
- High serum calcium are diagnostic of primary HPT .
- Hypophospataemia .
- Elevated urine calcium excretion are confirmatory .
- High-frequency neck ultrasound is non-invasive identify 75% of enlarged gland but cannot visualise the mediastinum.
- Nodular thyroid disease is a confounding factor.
- Technetium-99m (99mTc)-labelled sestamibi (MIBI) isotope scans 75% accuracy .
- CT, PET and MRI are not indicated prior to first-time neck exploration.