Endocrine Surgery Notes

These notes were written based on slides and past papers , so focus on them but study ur slides for better coverage , best of luck☁️

Thyroid gland

Swelling in the anatomical site(**muscular triangle**) and difficulty in swallowing > thyroid until proven otherwise
Dysnea and dysphagia >retrosternal extension , rare to be malignant
Anatomical changes >Always do **US** (number of nodules , solid vs cystic , malignant or not*[micro calcifications , hypoechoeic nodules, increase vascularity , interupted hallo sign]* , cervical LN)
Thyrotoxic : hyperthyroidism[graves and adenoma] vs **Passive Thyrotoxicosis** [trauma and inflammation[(by **thyroid scan**)
Nodule is more common in female , but in male > higher risk of malignancy
In adult > 90 % benign
In **cyst** , surgery is indicated after the **2nd** recurrence
Most common thyroid nodule > **degenerative**

Cancers

Most common > papillary
RET mutation > medullary
Worst prognosis >anaplastic
Younger age > papillary
75%sporadic > medullary
Not respond to RAI > medullary
Common in iodine deficiency > follicular
BRAF > papillary
With MEN 2 > medullary
Come with compression symptoms>anaplastic
Monofocal > follicular
Parafollicular cells origin > medullary
Appears in Congo red > medullary
Lymphatic spread > papillary
Multifocal >papillary
Hematogenous spread > follicular
Psammoma bodies > papillary
Variant from follicular but multifocal > Hurthle cell carcinoma
diagnosed by FNA most of the time > follicular
difficult to reach a biochemical cure> medullary

Diagnostic category	Description	Risk of malignancy (%)
I	Non-diagnostic/unsatisfactory	1–4
II	Benign	0–3
III	Atypia or follicular lesion of undetermined significance	5–15
IV	Follicular neoplasm or suspicious for follicular neoplasm	15–30
V	Suspicious for malignancy	60–75
VI	Malignant	97–99

<u>Antibodies:anti thyroglobulin, antimicorosomal(TPO)</u>
<1cm nodule, no need for FNA
When to use **US** -FNA ? Posterior , cystic >50%
Thyroglobulin > not diagnostic , for follow up after surgery only+US
>100 calcitonin > medullary

<u>Bethesda</u> 2 observation (false negative 5% repeat within 6-18 m)/ 3 repeat within 3-6 months / 4 diagnostic surgery/ 5,6 surgery

Surgeries :

Normal thyroid 20-25g

Hemi thyroidectomy :3/4 removal (one lobe , isthmus , pyramidal)
Lobectomy : one of the lobes , in follicular cancer (Soitary nodule+indetermined pathology FNA+ patient preferance.
Total : whole thyroid gland , in malignancy
Subtotal : only 5 g left , in graves , multi-nodular goitre
Near total : 1 g left around one parathyroid gland

Medical tx not helpful in lowering the goiter size

Neck dissection:
Lateral (2-5) only if positive (therapeutic)
Central (6)dissected in medullary even if - (most common site of reccurnce)

Complications :
Intra op : Bleeding
Post op :Injury of recurrent laryngeal nerve (uni:hoarseness , bi :respiratory distress)
Expanding hematoma (open , evacuate &remove clots , OR to explore the cause)
Scar
Hypocalcemia

Children treated as adult
Pregnancy: thyroid uptake scan contraindicated
Surgery only between 12-24 weeks under GA

Past papers and dr notes
Most common cause of hypothyroidism > hashimoto
radioactive iodine ablation > multinodular goiter

Age is the most important factor

The only indication for diagnostic thyroid scan is suppressed TSH

Cricothyroid muscle is a landmark of safety.

Never ligate the inferior thyroid artery at stem

Adrenal gland

4 g
Arterial supply : renal artery , aorta , inferior phrenic artery
Venous : RT : IVC , left : renal vein
80% **cortex** (mesoderm >resistance phase), 20% **medulla** (nueroectoderm> alarm phase)

Cortical adenoma

Small <5cm , yellow , with some black color , cured by surgery , ☀**under CT**(sharp , homogeneous , smooth , lipid rich ,>50% washout within 15min , <15Hu)

Conns syndrome (primary , high aldosterone, low renin)

80% solitary adenoma (surgical resection) , 10% bilateral hyperplasia (spironolactone)
(differ by angiographic venous Sampling)

Usually **asymptotic**: headache , flaccid paralysis , polyuria, polydipsia , HTN , hypokalemia ,alkalosis , mild hypernatremia
Investigations: renin , aldosterone ,sodium loading test , ☀**CT**☀

Cushing syndrome

ACTH dependent 85%(Cushing disease [transphenoidal surgery ,radiotherapy] **, ectopic ACTH**(small lung cancer) **, ectopic CRH** (bronchial carcinoid)
ACTH independent 15% (adenoma, carcinoma [adrenalectomy]**,**hyperplasia[medical]/ **exogenous)**

Pheochromocytoma

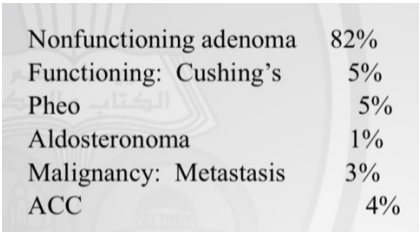
10% (bilateral , extravadrenal , multifocal , normotensive , peds , familial)
In children **25%**(bilateral , extra adrenal , multifocal)
Triad /; headache,sweating , tachycardia , orthostatic hypotension due to decreased venous return
Most sensitive : plasma metaniphrin
Urninary chatecolamin , clonidine supression test (>50% reduction > no pheo), MIBG
Pre op : alpha blocker (**phenoxybenzamine) then** beta blocker

Cortical cancer

Very big , necrosis , hemorrhage, invasion of renal veins ,bad prognosis 5y >20-30% and they usually die in the first 2 years

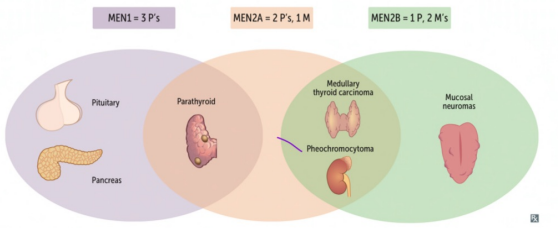
Incidentaloma

>1cm + discovered accidentally
80% non functional
>5cm:surgical removal
<3cm > stable for 1 year > no further test
Functional
Surgery



Nonfunctioning adenoma	82%
Functioning: Cushing's	5%
Pheo	5%
Aldosteronoma	1%
Malignancy: Metastasis	3%
ACC	4%

Parathyroid gland

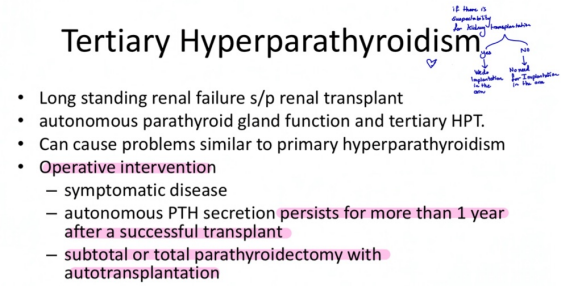


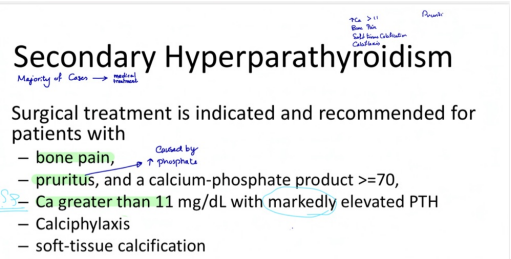
25-40 mg each ، 6 x4x2 mm
Normal function > at least 2 glands
4 gland usually but can be from 3-7
Mass effect very rare > if palpable think of cancer
Between the posterior border of thyroid gland and the fibrous cpasule
M.C cause of **hypo**parathyroidism > iatrogenic after surgery
Superior glands > dorsal to RLN , inferior glands> ventral
Oxyphil cells derived from chief cells and increase as one ages >both secretes PTH
***pre*proparathyroid** hormone > **proparathyroid** > PTH (**84** aminoacids)

Primary hyperparathyroidism and cancer account for 90% of cases of hypercalcemia
Bone turnover > high ALP
Primary hyperparathyroidism
80% single adenoma, 15-20% hyperplasia &multi adenoma, 1% cancer (agrressive, adherant or invade the surrounding structure , **treatment;**bilateral exploration + excsion of tumor, and ipsilateral thyroid lobe + Modified radical neck dissection

Associated w/hyperchloremic metabolic acidosis

Surgery indicated in ;
Ca serym>11.5
GFR <60
Ca urine >400
Reduced cortical and cancellous bone density
Age <50
Presence of signs and symptoms
– Nephrolithiasis
– Osteitis fibrosa Cystica
– Neuromuscular symptoms





Surgery : one is affected > remove it // 4 are affected: subtotal + 50 mg left **or** total with tranplant
Autotransplantation, 12 to 14 pieces inserted into belly of **brachioradialis muscle // in tertiary , if there is no possibility for kidney transplant , no need for implant**

Intraop PTH testing: PTH falls by 50% or more in 10 minutes

Localization (only when surgery in indicated)
Sestamibi :**most common and sensitive** /Sestamibi timed within 3 hours of surgery
Sestamibi-SPECT : ectopic , deep , mediastinum
High resolution US :ectopic glands , redo surgery , Thick neck , multinodular adenoma
MRI,CT :ectopic glands , redo surgery
Complications of surgery
Bone hunger syndrome , hypocalcemia(Chvostek's and Trousseau's sign) , vocal cord paralysis

Dr.notes

Secondary hyperparathyroidism is common, always check vitamin D

Quick PTH is crucial for minimally invasive surgery

With a multiple gland disease keep what is equal to a normal parathyroid

Salivary glands

Major glands
Parotid: Stenson> 2° molar tooth.
Submandibular: Warton >lateral to frenulum.
Sublingual: in Warton duct.
Minor glands
Soft palate, Hard palate , gingiva, lips,all oral mucosa except the upper surface of the tongue

Sialadenitis	Sialolithiasis	NEOPLASMS
Acute : (in parotid) **Viral** : more common,mumps , children w/pancreatitis , orchitis **Bacterial** : staph , elderly post op **Chronic : autoimmune**	Most common in the duct of **submandibular** salivary glands Mx : intra oral removal	-70-80% of Salivary tumors in **Parotids**. - 70-80% of Parotid tumors are **benign**. -80% of benign tumors are **pleomorphic** adenoma.

Benign

Pleomorphic adenoma :
(Epithelium , myoepithlium ,stromal tissue) Solitary, painless , most common , soft , irregular , well defined border , some area are hemorrhagic and infarcted , 10-20 % transform into adenocarcinoma ,5th decade
Warthin :
Cystic , Only in parotid , not transform into malignancy , more in 🚬 , 90%males , bilateral 10%
Non epithelial:
hemangioma, hygroma , lipoma

Malignant

20% in Parotids, 40% in submandibular, 60% in minor salivary glands
2nd most common in parotid > acinar
most common in other glands > adenoid
Most common in parotid >mycoepidermoid
Mets to lung > adenoid
Good prognosis >acinar
rarely involves the lymph nodes > adenoid
rare and aggressive types > squamous and adenocarcinoma

Workup

1-oral exams ,other salivary gland exam , facial nerve exam , cervival LN exam
2-**Antibiotics and sialogram for 10 days to rule out inflammation**
3-CT , MRI 😈(not US)😈
4-FNA

Treatment

Parotid

Benign >☀️ **superficial** parotidectomy , save the nerve
Malignancy > total parotidectomy , save the nerve (if one branch involved remove it)
+ neck dissection for + only
Prophylactic neck dissection only with squamous and adenocarcinoma
Chemo not effective
External beam radiotherapy:effective

Submandibular

Total excision of the mass with preservation of marginal mandibular,hypoglossal,lingual

Minor Salivary Glands

Excised sometimes with adjacent bone

Cervical Lymphadenopathy

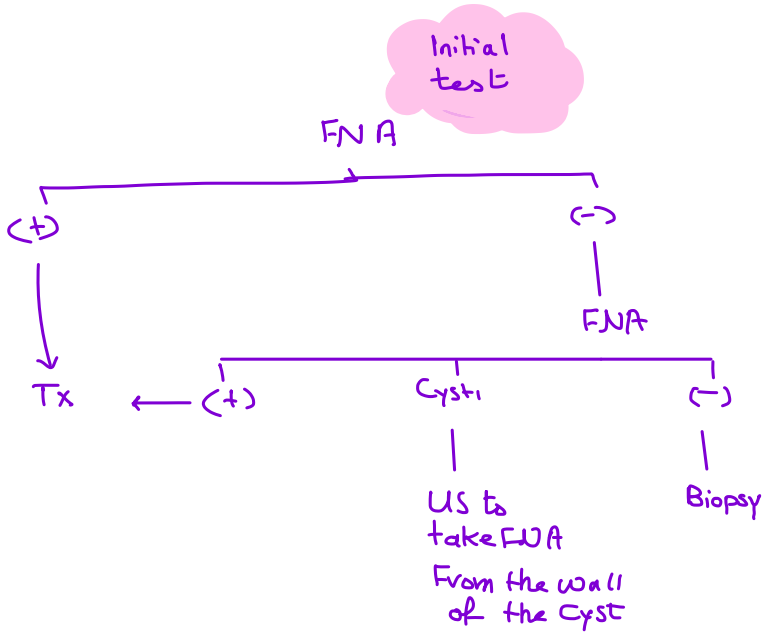
Abnormal in size >1cm , consistency , number
Acute <2weeks ,subacute 2-6 weeks , chronic >6weeks

Risk factors of malignancy

Age
B symptoms (persistent fever >1 week)
Wt loss , night sweat , pallor
Hard nodule , >2cm ,not improved after 4-6 weeks , increasing over 2-3 weeks
Known primary CA
Supraaclavicular LN or in posterior triangle
Signs of autoimmune diseases
Signs of kawasaki disease
Abnormalities in CBC or CXR

LN groups

1a sub-mental
1b submandibular
2a upper jagular anterior
2b lower jagular posterior
5 posterior triangle



Workup

US,CT,CBC ,smear, **FNA,** LN biopsy

Refferal

Localized > 3-4 weeks observation

Routine > 4-6 weeks for <2cm persistent LN
Early> 2-3 weeks for >2cm , autoimmune signs , staedly increase
Emergent > toxic no improvment after 72 hr of starting antibiotics , persistent fever >5days , kawasaki , malignancy signs , CXR or CBC abnormalities , suppurations

Neck Dissection

	Lymph Nodes	Structures
1. **Radical**	Levels I-V	Sternocleidomastoid Internal Jugular Vein Spinal Accessory Nerve
2. **Modified Radical**	Levels I-V (with 3 variations)	1: SAN spared 2: SAN & IJV or SCM spared 3: SAN & IJV & SCM spared
3. Selective		

Neuroendocrine tumors (imp notes only)

Most common > non functional
Most common benign > insulinoma
Most common malignant > gastrinoma
Most malignant > glucagonoma
Least common > smatoststinoma
Only in head > smatoststinoma
Dermatitis , DVT , depression , DM **4D** > glucagonoma
Watery diarrhea, hypokalemia , acidosis , achlorohydra **WDHA**> VIPOMA
F>M > insulinoma
Dx by secretin stimulation test > gastrinoma
Dx by serum >1000 > glucagonoma
Alpha cells > glucagonoma
Delta cells > smatoststinoma, VIPOMA
72 hr fasting test > insulinoma
Head and tail > VIPOMA ,glucagonoma
Universal > insulinoma
Whipple triad + wt gain > insulinoma
25%MEN1 > gastrinoma
21%MEN1>insulinoma
Only 10% malignant
Diarrhea,galstones , steatorrhea , DM > smatoststinoma
Localization by SRS> VIPOMA

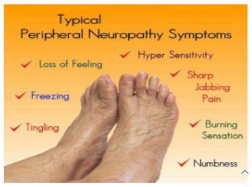
Diabetic foot

Diabetic foot/Etiology

- Neuropathy
- Ischemia
- Infection
- abnormal foot structure and biomechanics
- Weak **healing** power

Diabetic foot/peripheral neuropathy

❑Sensorimotor & peripheral sympathatic neuropathy are major risk factors for ulceration
❑Up to 50%of type2 diabetic patient have significant neuropathy & at risk of foot ulcer
❑ Up to 50% of patients may experience symptoms, most frequently a burning pain, electrical or stabbing sensations, paresthesia, hyperesthesia, and a deep aching pain



Diabetic foot/Foot at Risk

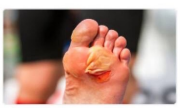
Table 1. Diabetes foot ulcer risk classification IWGDF[4]

Criteria	Description
Group 0	no neuropathy, no deformity, no peripheral vascular disease(PVD)
Group 1	With neuropathy, without deformity or PVD
Group 2	With neuropathy, with deformity or PVD
Group 3	History of foot ulceration or lower extremity amputation

Diabetic foot/how can we prevent ulcerations among patients with Foot at risk?

Treat any pre-ulcerative sign on the foot of a patient with diabetes :

1. removing callus
2. protecting blisters and draining when necessary
3. treating ingrowing or thickened toe nails
4. treating hemorrhage when necessary
5. prescribing antifungal treatment for fungal infections.)



Diabetic foot/how can we prevent ulcerations among patients with Foot at risk?

- Instruct an at-risk patient with diabetes to wear properly fitting footwear to prevent a first foot ulcer, either plantar or non-plantar, or a recurrent non-plantar foot ulcer.
- When a foot deformity or a pre-ulcerative sign is present, consider prescribing therapeutic shoes, custom-made insoles, or toe orthosis

- In patients with a non-healing ulcer for more than 6 weeks
- when the toe pressure less than 30 mmHG or the TcPO2 less than 25 mmHG

consider vascular imaging and revascularization

Diabetic foot/healing issues-promote healing

- Medical management
- Vascular management
- Wound care
- Control infection
- Offloading
- Negative wound therapy
- Alternative therapy

8. Which of the following is NOT TRUE regarding the carotid body:

a) It is innervated through the glossopharyngeal and vagus nerves
b) It is stimulated by hypoxia
c) Carotid body tumour is malignant in 35% of cases
d) Carotid body tumour most commonly occurs in middle age group
e) Carotid body tumour best diagnosed by angiography

Answer: C

- Lateral masses:
  a. **Branchial cyst** (discussed previously)
  b. **Carotid artery aneurysm**
  c. **Carotid body tumor**
     - Carotid body tumors are **the most common paragangliomas of the skull base and neck region (60%).** These tumors develop at the carotid **bifurcation**.
     - Approximately **one-third** are inherited as part of a **genetic syndrome**.
     - They are **locally invasive**, **slow**-growing tumors that can remain **asymptomatic** for many years.
     - Carotid body tumors typically present as **painless**, gradually enlarging masses located in the upper part of the neck below the angle of the jaw. In later stages, pain, dysphagia, deficits of cranial nerves VII, IX, X, XI and XII, and hoarseness or a Horner's syndrome may result from pressure on the vagus or sympathetic nerves.
     - Physical examination discloses a rubbery non-tender mass in the lateral neck that is more freely movable in the horizontal plane than vertically, referred to as a positive ***Fontaine's** sign*. Carotid body tumors are often pulsatile (it can transmit the carotid pulse, or it can have a pulse on its own), and a bruit can be heard on auscultation; however, the absence of a bruit does not rule out a carotid body tumor.
     - Diagnosis is usually made based on characteristic features demonstrated on **MRI/MRA** imaging. Duplex sonography typically indicates the mass to be hypervascular, although the absence of hypervascularity does not exclude the diagnosis
     - Treated with surgical excision and preoperative embolization

DDx

- Midline neck mass: thyroglossal duct cyst, dermoid cyst, pyramidal lobe of thyroid.
- Lateral: LN, branchial cleft cyst. PP
- Supraclavicular: lymph node, hygroma.
- Submandibular: LN, parotid and submandibular glands.

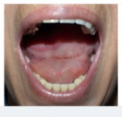
40. The term plunging ranula refers to which clinical entity:

a) A serous cyst originating from the parotid gland that is potentially malignant
b) A mucous retention cyst originating from the submandibular & sublingual glands that reaches the neck
c) A benign salivary mass involving the parotid & submandibular glands
d) A malignant congenital salivary mass arising from the submandibular gland
e) A midline neck mass which moves on tongue protrusion

Ranula:

- A ranula is mucocele of the sublingual gland that presents as an oral mass at the floor of the mouth and laterally. It can be deep and present as an upper lateral neck mass (diving, plunging ranula).

e. **Pharyngeal ranula:**
   - A ranula is a cystic mucosal extravasation from the sublingual salivary gland.
   - Plunging ranula: a ranula that extends through the **mylohyoid muscle**.
   - Treatment: **excision**.



Answer: B