

FAKULTNÍ
NEMOCNICE
U SV. ANNY
V BRNĚ



Thyroid gland, salivary glands

**ENT Clinic of Masaryk university, Brno
Faculty St. Ann Hospital**

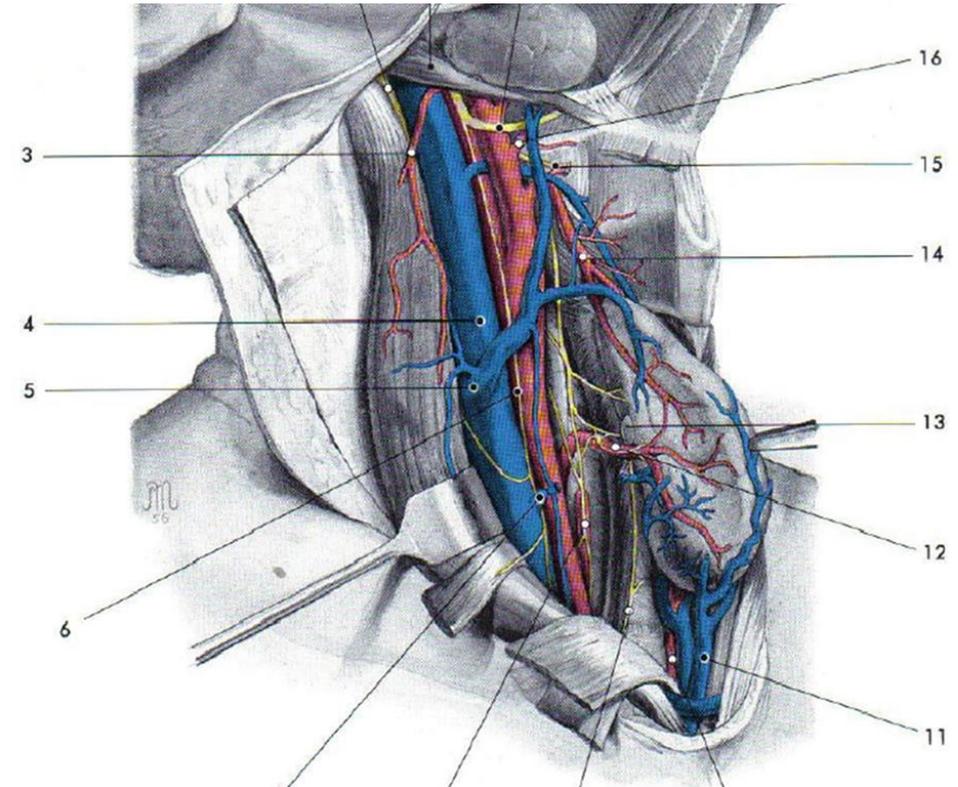
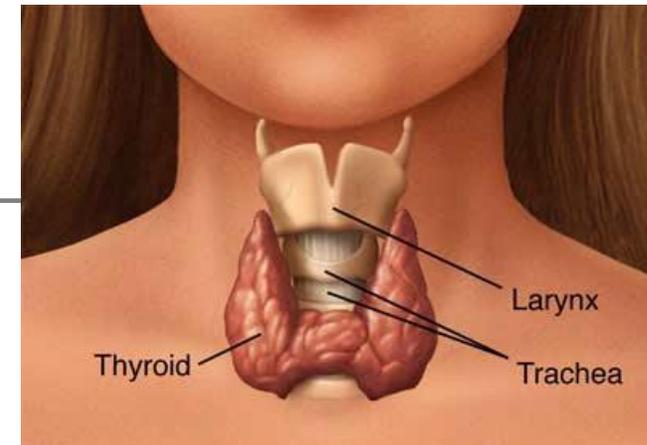
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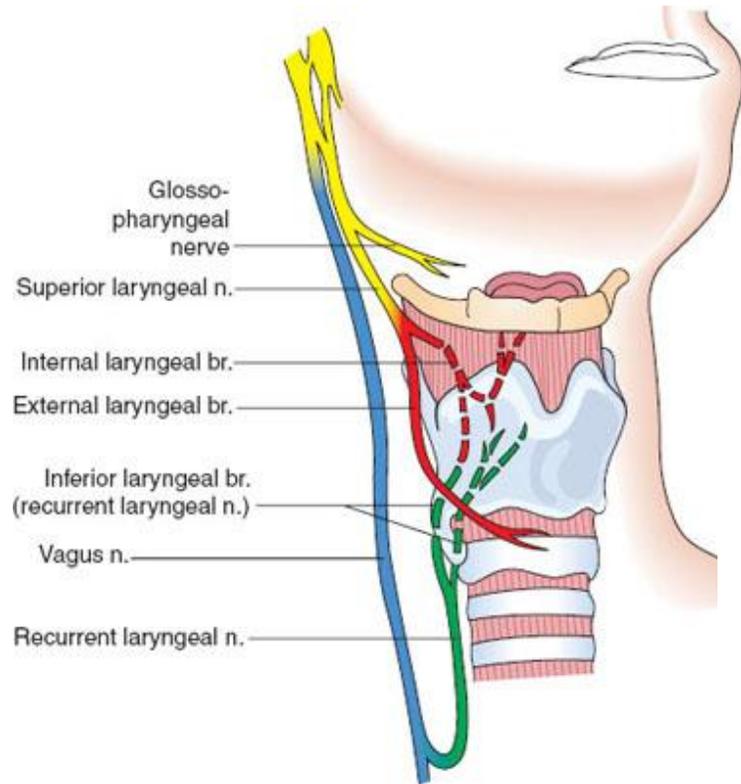


Anatomy

- 2.-4.trach. ring, C5-Th1; butterfly shape, lobus dexter, sinister, isthmus, lobus pyramidalis 50%
- Nervus laryngeus **recurrens** (innervation of laryngeal muscle) et **superior** (m. cricothyreoideus)
- **Blood suply:** ATS (ACE/ACC), ATI (TTC), a.thyreoida ima (aorta/ABC); VTS (VF), VTM (VJI), VTI (v. brachiocephalica)



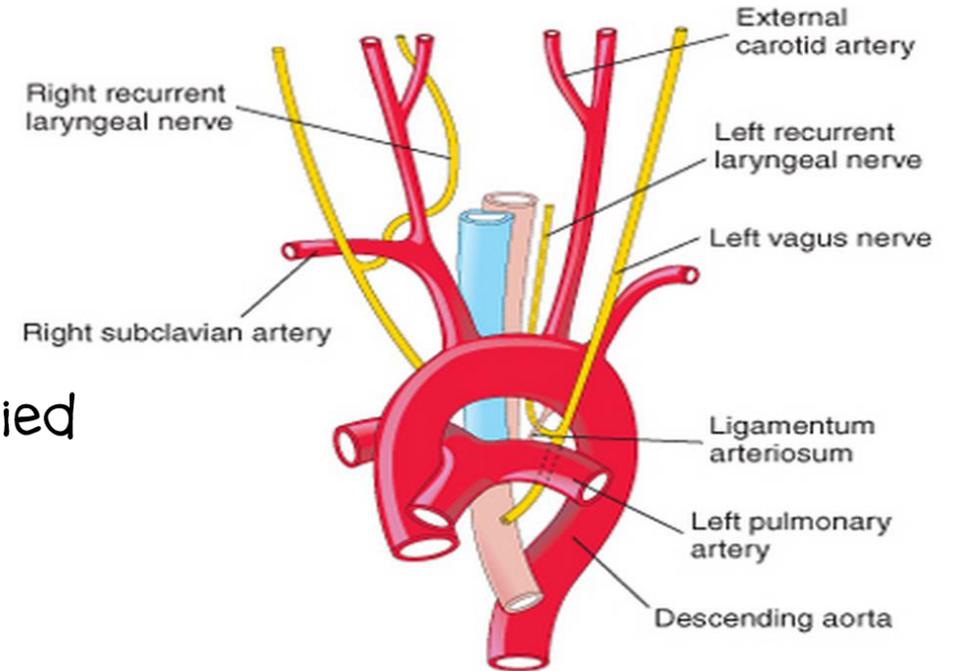
ANATOMY



Remember: Larynx is supplied by the Xth cranial nerve
Mnemonic: **SCAR**

S = Superior laryngeal nerve
C = Cricothyroid muscle

A = All other muscles
R = Recurrent laryngeal nerve



C



Physiology of thyroid gland

The largest purely endocrine gland producing thyroidal hormones – iodized amino acids.

- **Thyrocytes** – creates follicles. The thyroid secretes several hormones, collectively called thyroid hormones. The main hormone is **thyroxine**, also called T4. Thyroid hormones act throughout the body, influencing metabolism, growth and development, and body temperature. During infancy and childhood, adequate thyroid hormone is crucial for brain development.
- **Parafollicular cells:** hormone calcitonin – **calcium metabolism**

Diagnosis

- History of disease, clinical evaluation – aspection, palpation
- WHO goiter classification: *I palpable, invisible*
II palpable, visible
III visible from distance
- Functional endocrinologic evaluation – TSH, T3, T4, Tg, calcium, (calcitonin)





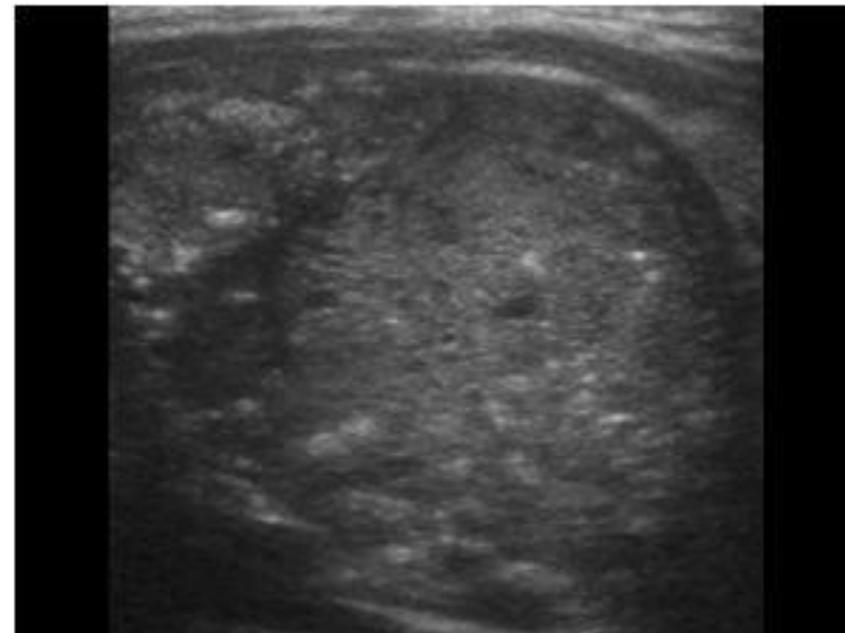
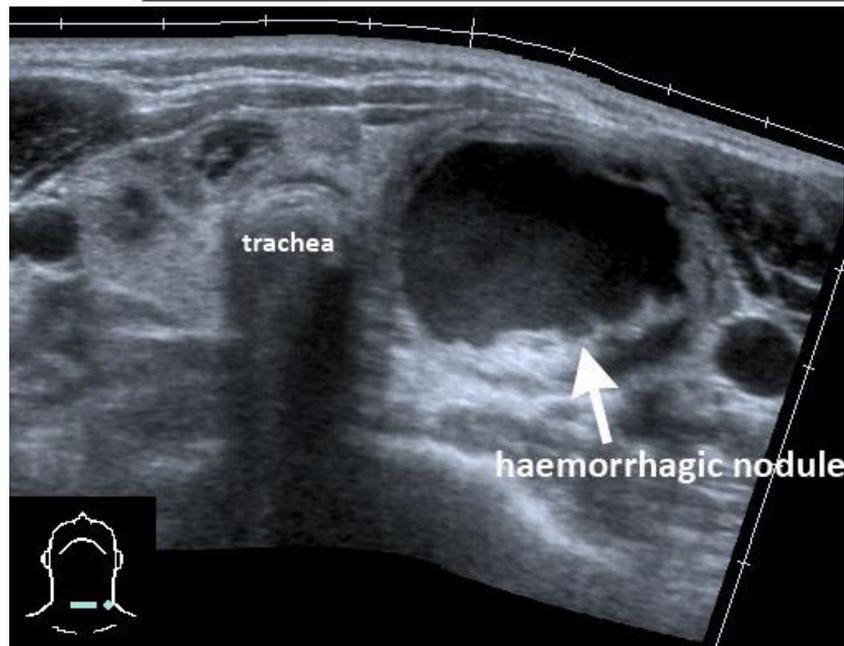
Diagnosis - ultrasound

- Ultrasound – gold standard both in early diagnosis and in follow up
- **reproducible, non invasive evaluation**
- goiter (man >22ml, women > 18ml)
- The smallest lesion for detection $\geq 2\text{mm}$

Ultrasound guided fine needle aspiratory cytology (FNAC), Bethesda classification

cytology from nodule > 1cm, Bethesda classification I-VI

Diagnostic category	Risk of malignancy (%)
I. Nondiagnostic or unsatisfactory	
II. Benign	0–3
III. Atypia of undetermined significance or follicular lesion of undetermined significance	5–15
IV. Follicular neoplasms or suspicious for a follicular neoplasm	15–30
V. Suspicious for malignancy	60–75
VI. Malignant	97–99





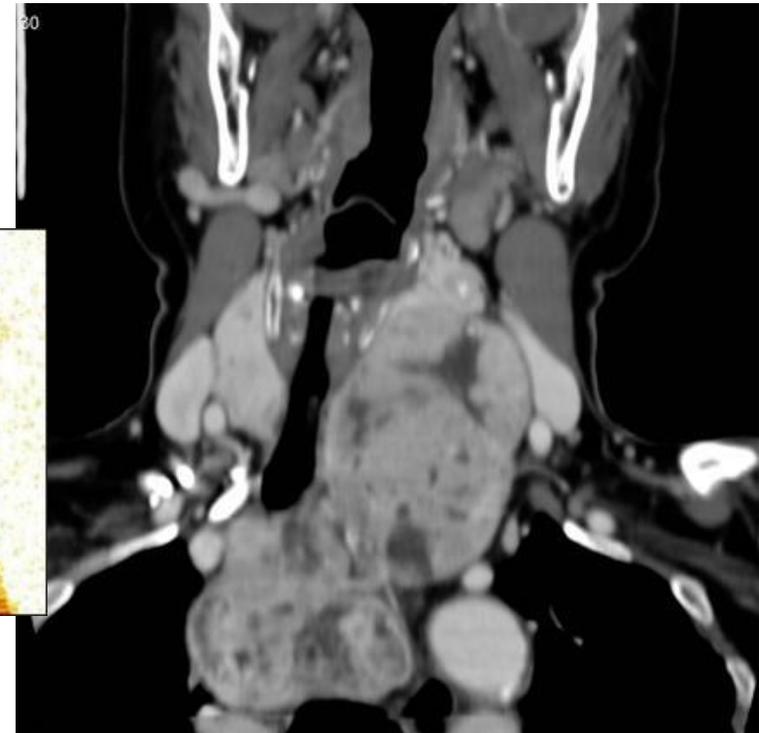
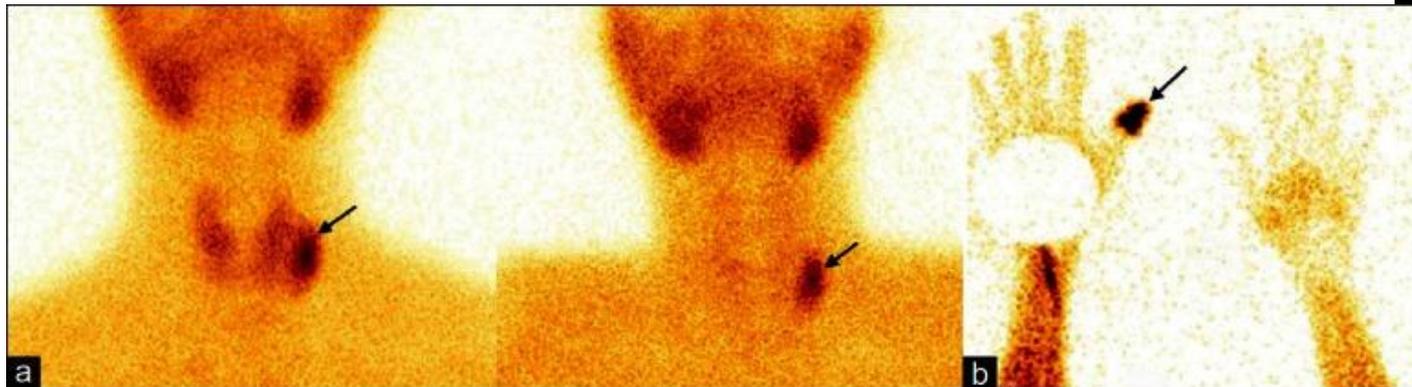
Ultrasound guided fine needle aspiratory cytology (FNAC)

- uncertain category III, IV, - FNAC is not helpful in decision about therapy
- FNAC – possible repeat in 3 months, follow up of nodules
- In future – detection of mutations *BRAF, NRAS, HRAS, KRAS, RET/PTC1, RET/PTC3* a *PAX8/PPAR γ*

Diagnostic category	Risk of malignancy (%)
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VI. Malignant	97–99

Diagnosis

- **CT (without contrast medium, possible delay of radio iodium in 3 months)**, magnetic resonance – in retrosternal spread, primary retrosternal goiter, lymphadenopathy)
- Scintigraphy – tumors accumulated ^{131}I , residual tissue, recurrence of disease, primary hyperparathyreosis
- *PET/CT*
- *Fibro endoscopy – laryngo-tracheoscopy*





Disease of thyroid gland

ENDOCRINOLOGY – diagnosis and conservative treatment

ENT, surgery – surgical treatment

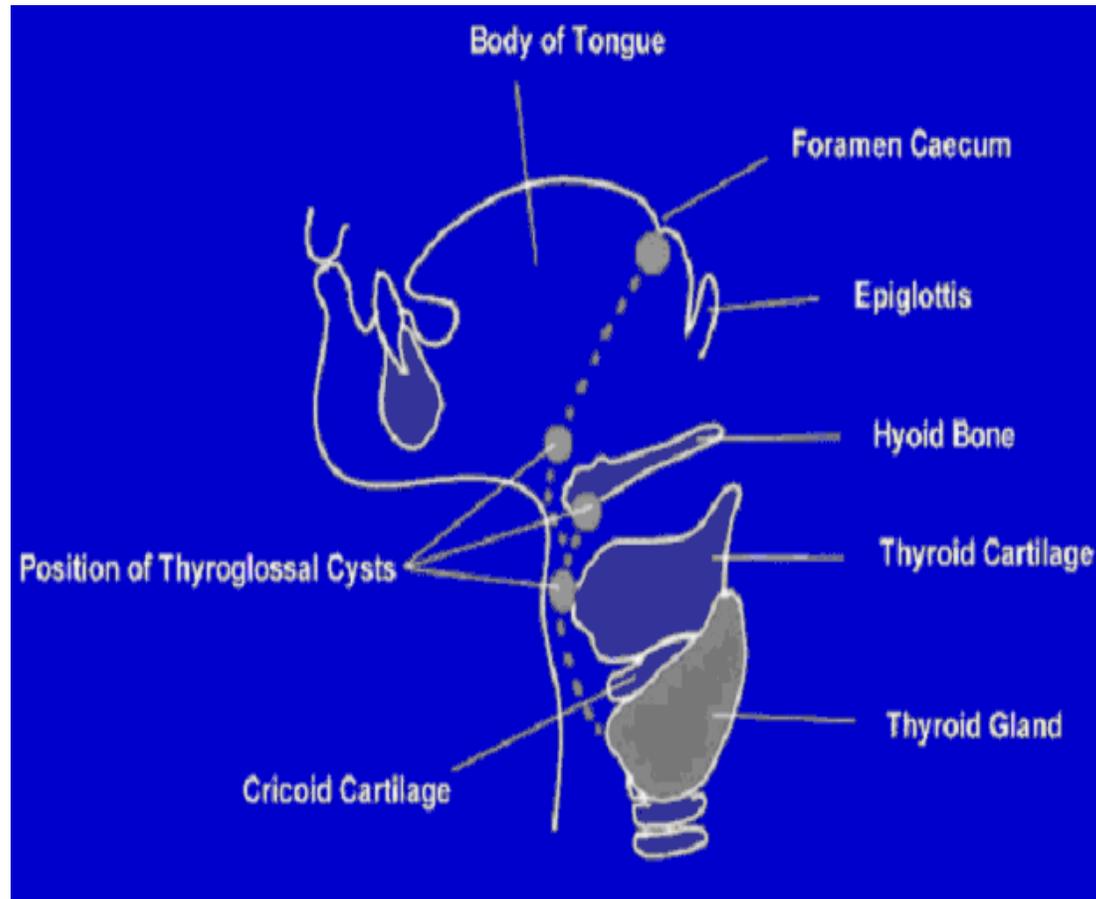
According to **function**:

- Hyperfunction(thyrotoxicosis)
- Hypofunction
- Diseases with eufunction

According to **morphology**:

- Congenital diseases
- inflammations, diffuse hyperplasia
- tumors:
 - benign
 - malignant

Congenital developmental diseases



- Agenesis
- Accessory / ectopic gland
 - Lingual, thoracic goiter
- Persist. dct. thyroglossal
- Medial cervical cyst and fistula
- Ectopic parathyroid glands



Inflammatory diseases

Type	Etiology	Clinical features	Therapy
Acute thyroiditis	<ul style="list-style-type: none"> • Bacterial • Viral • Specific (actinomycosis, tbc) 	Pain, fever, swelling, redness of overlying skin	Antibiotics, corticosteroids In Abscess: surgery
Subacute thyroiditis (de Quervain)	Paramyxovirus infection, genetic predisposition	Pain, fever, recurrences, sometimes hypofunction, In connection with viruses'	Antibiotics, non-steroidal anti-inflammatory drugs, corticosteroids in severe cases
Chronic lymphocytic autoimmune Hashimoto	Autoimmune disease	Hard, often asymmetrical thyroid swelling, infiltration of surrounding tissue	Medical treatment with thyroid hormone Total thyroidectomy to reduce compression syndrome
Chronic fibrous thyroiditis (Riedel)	Not known	compression syndrome hypofunction	Medical treatment with thyroid hormone Total thyroidectomy to reduce compression syndrome



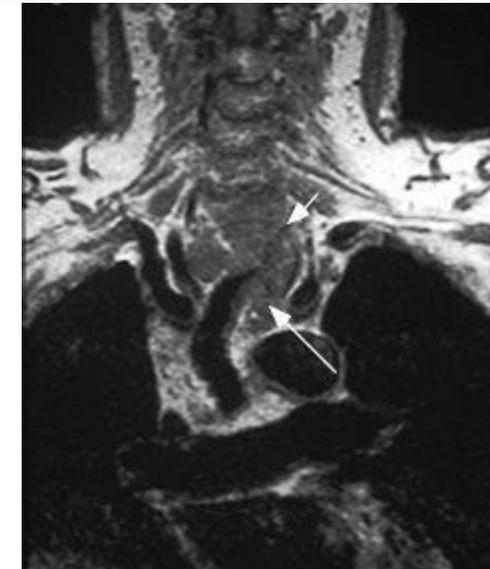
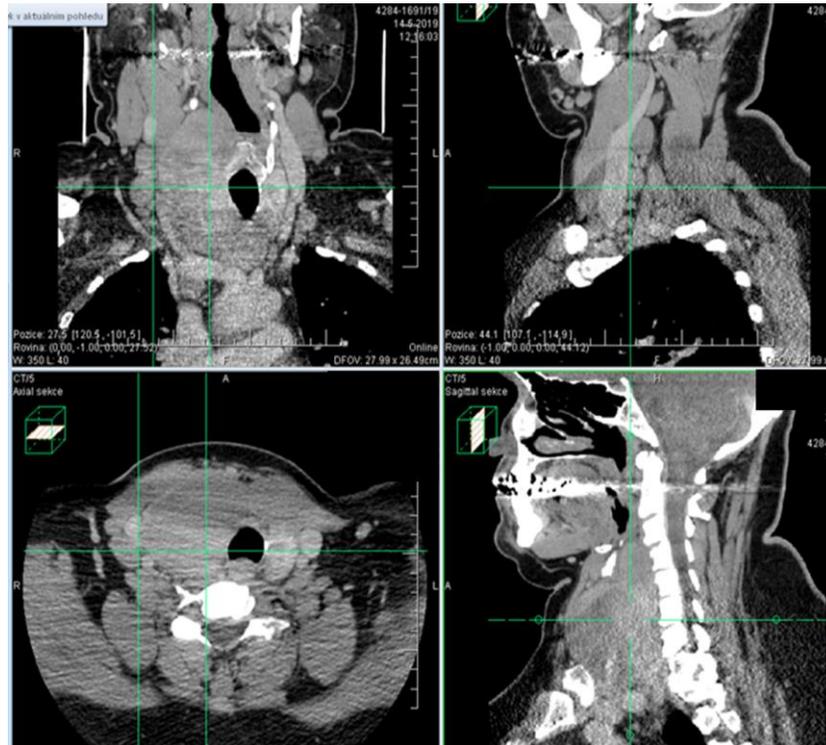
Thyrotoxicosis (Graves-Basedow disease – autoimmune disease)

Toxic adenoma (independent adenoma)

- Symptoms-hyperactivity, muscle adynamia, tachycardia, higher perspire, ev. exophthalmia (endocrine orbitopathy)
- Diagnosis – higher level of thyroidal hormones, high level of antibodies against TSH
- Therapy – medical, if no effective – total thyroidectomy or hemithyroidectomy

Benign tumors of thyroid gland

- eufunction, hypo-, hyperfunction
- diffuse/nodal
- benign/malignant
- primary/ secondary retrosternal goiter
- compression syndrome





Benign tumors of thyroid gland

Cysts, adenomas, diffuse, autoimmune disease

Nodules - solitary, multiple

- incidence growing with age >50 let, female : male 6:1
- diagnosis – laboratory tests, ultrasound, (CT), cytology
- Significant for diagnosis – increase of nodule 2-4mm/ year



Thyroid carcinoma (TC) thyroid malignancy

- Well differentiated TC (WDTC)
 - papillary (PTC) 70-80%
 - follicular (FTC) 10-20%
- Medullary (MTC) parafollicular cells 5%
- Anaplastic not differentiated 1%

increasing incidence of PTC, incidence of other stable



Risk factors of thyroidal malignancy

- Ionization radiation, radiotherapy (especially in childhood)
- smoking
- Low intake of iodine, high TSH
- thyroid antagonists in food
- Positive congenital history



Well differentiated TC (WDTC)

■ prognostic factors WDTC

- M distant metastasis
- A age
- C completeness of surgery
- I invasion to neighborhood
- S size of tumor

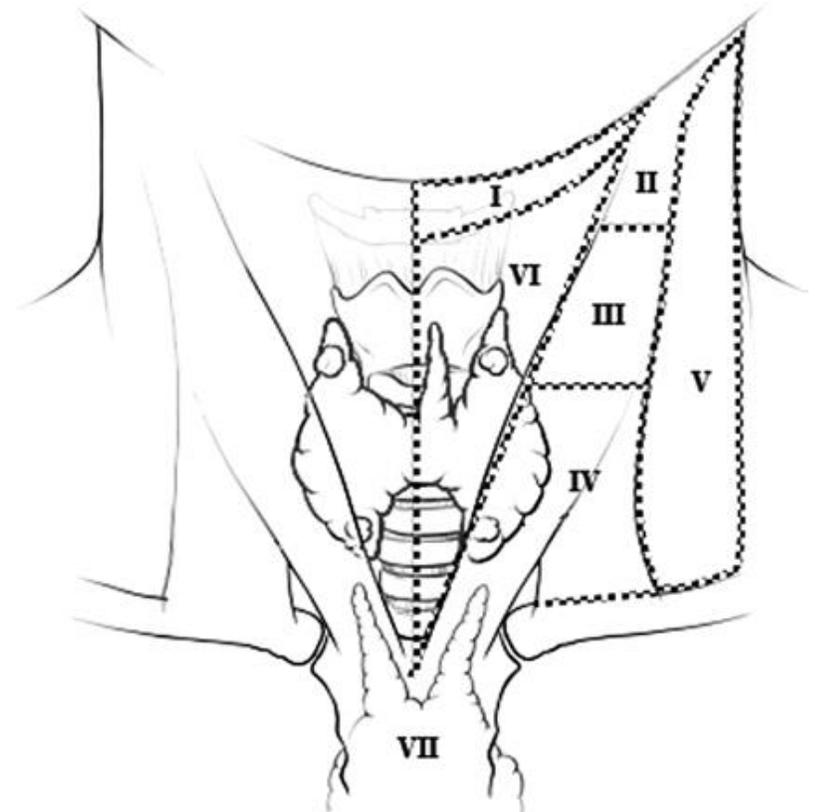
MACIS

- M0 <45 let, negative resection margins, intracapsular growth < 1cm

Papillary thyroid cancer	Follicular thyroid cancer
Neck metastasis without prognostic influence	Neck metastasis worsening prognosis
~35 year	Older patients
intrathyroid., lymphatic, hematogenous spread	lymphatic, hematogenous spread
utilize 131I	utilize 131I

WDTC – primary surgical treatment

- **Total thyroidectomy**, 1, 2 stages surgery
- cervical lymphadenectomy in cN+ (lymphatic nodule +)
- **adjuvant ¹³¹I** on case of risk factors
- Follow up (TSH, Tg, ultrasound, scintigraphy)
- hormonal substitution



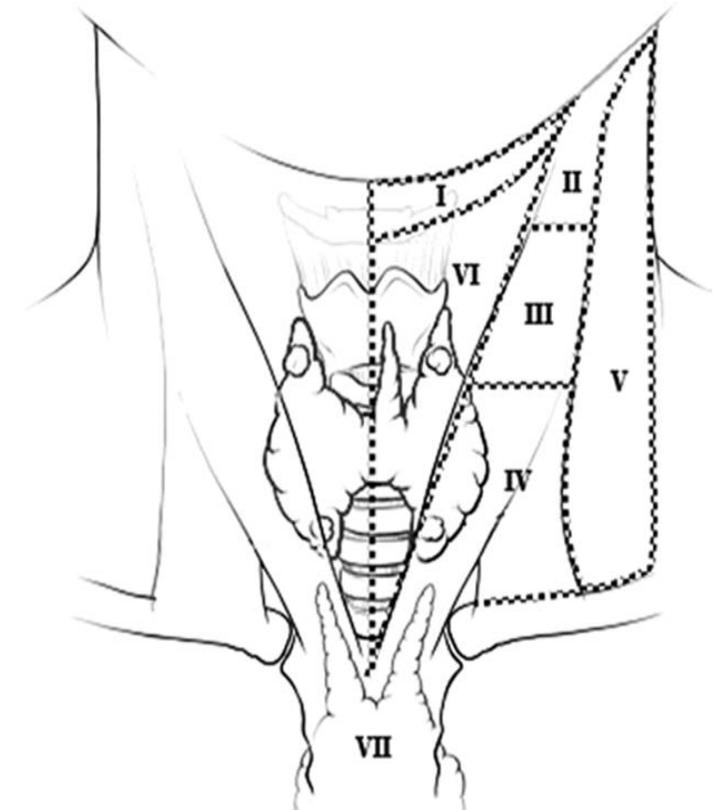


MTC medullary cancer

- **sporadic** 70-80%, **hereditary** (autosomal dominant) syndroms MEN2A, MEN2B (pheochromocytoma, neurofibroma, parathyroid adenomas); marker: calcitonin
- aggressive, early neck metastases, *ipsi-* (50%), *kontralaterální* (25%), distant metastases

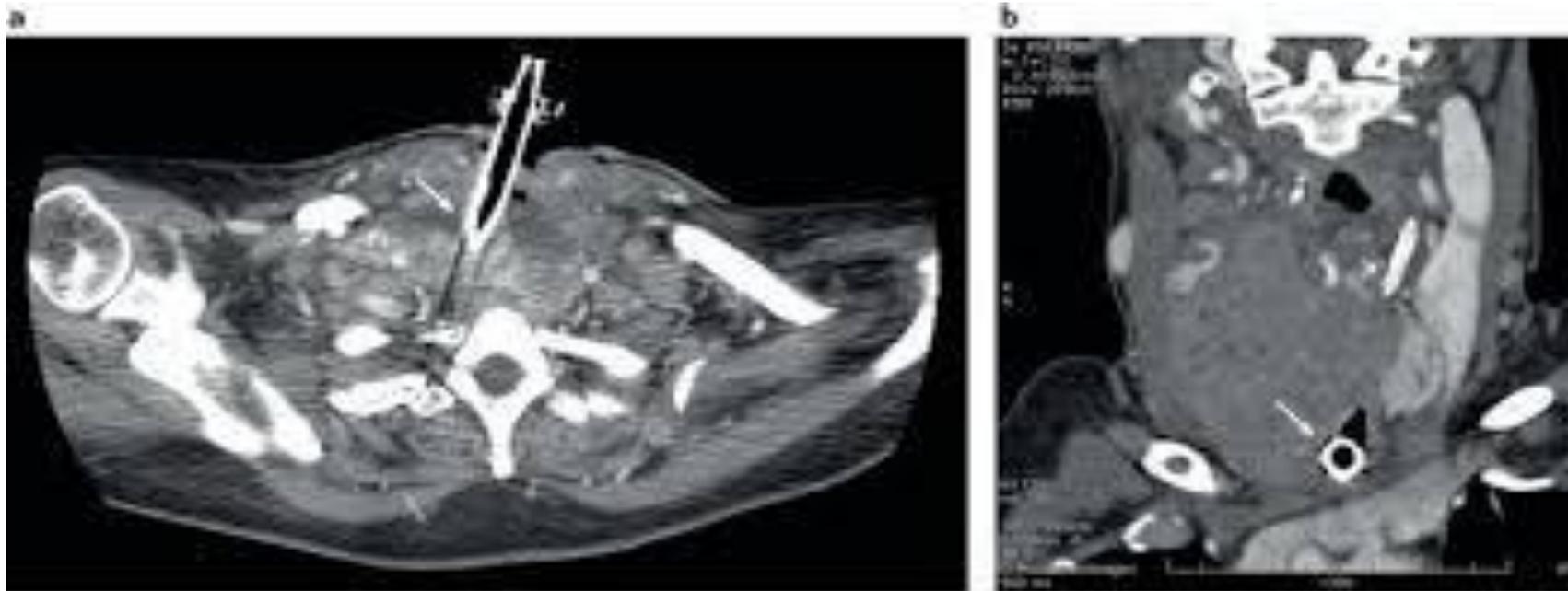
more radical treatment:

- total thyroidectomy
- **prophylactic** neck lymphadenectomy (central/lateral region)
- adjuvant actinotherapy (external irradiation) (not utilize 131I)
- prognosis – 75%
- Genetic evaluation of family members, ev. TTE



Anaplastic cancer

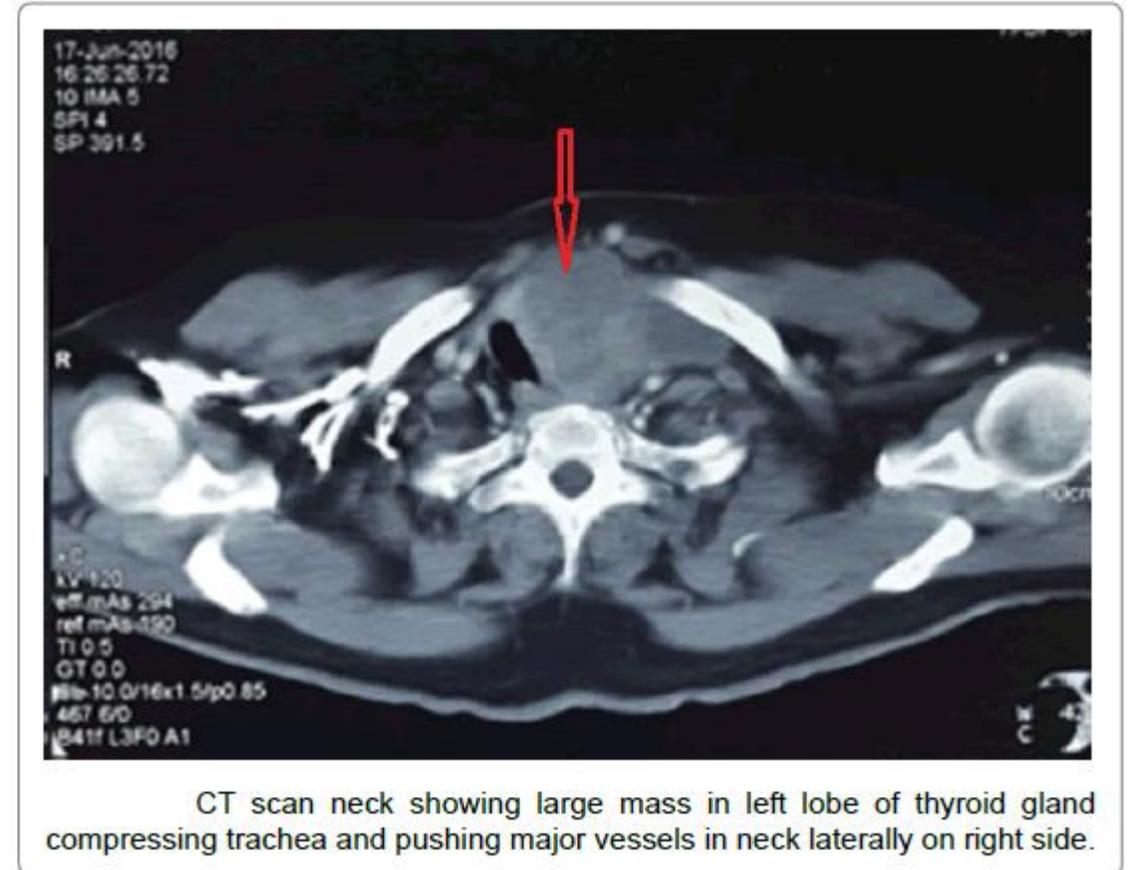
- Poor prognosis, survival < 1 year, patients > 60-70 year
- Quickly growing neck mass , dyspnea, recurrent nerve palsy, compression syndrome
- **Therapy** - palliative actinotherapy, symptomatic treatment, tracheostomy



Other thyroid malignancy

Very rare tumor: lymphoma (very frequently in terrain of Hashimoto thyroiditis), sarcoma.

Secondary tumor: lung, breast, uterus, renal cancer





Thyroid malignancy

Histologic type	Histology	Clinical features	Therapy
Well differentiated cancer (papillary and follicular adenocarcinoma)	Thyocytes Papillary Follicular Proof of thyroglobulin	Solid tumor with fibrotic capsule Metastasis on the neck, to the lung and bones	Total thyroidectomy+- neck dissection, radio-iodine or external RT, hormonal suppression and substitution
Medullar thyroid carcinoma (C-cell carcinoma)	C-cells (parafollicular) Amyloid Proof of calcitonin	Early hematogenic and lymphogenic metastases Tendency to rapid growth, Higher level of calcitonin , metastasis to the lung, bones and liver	Total thyroidectomy+ neck dissection, external RT, hormonal suppression and substitution
Anaplastic thyroid carcinoma	Atypical cells similar sometimes to sarcomas	rapid growth, hard solid tumor, infiltration of surrounding tissue, distant metastasis	Palliative external RT, surgery, chemotherapy - or symptomatic treatment
Malignant lymphoma	Non-Hodgkin from B-lymphocytes	rapid growth, neck lump, enlarged lymph-nodes	external RT, chemotherapy



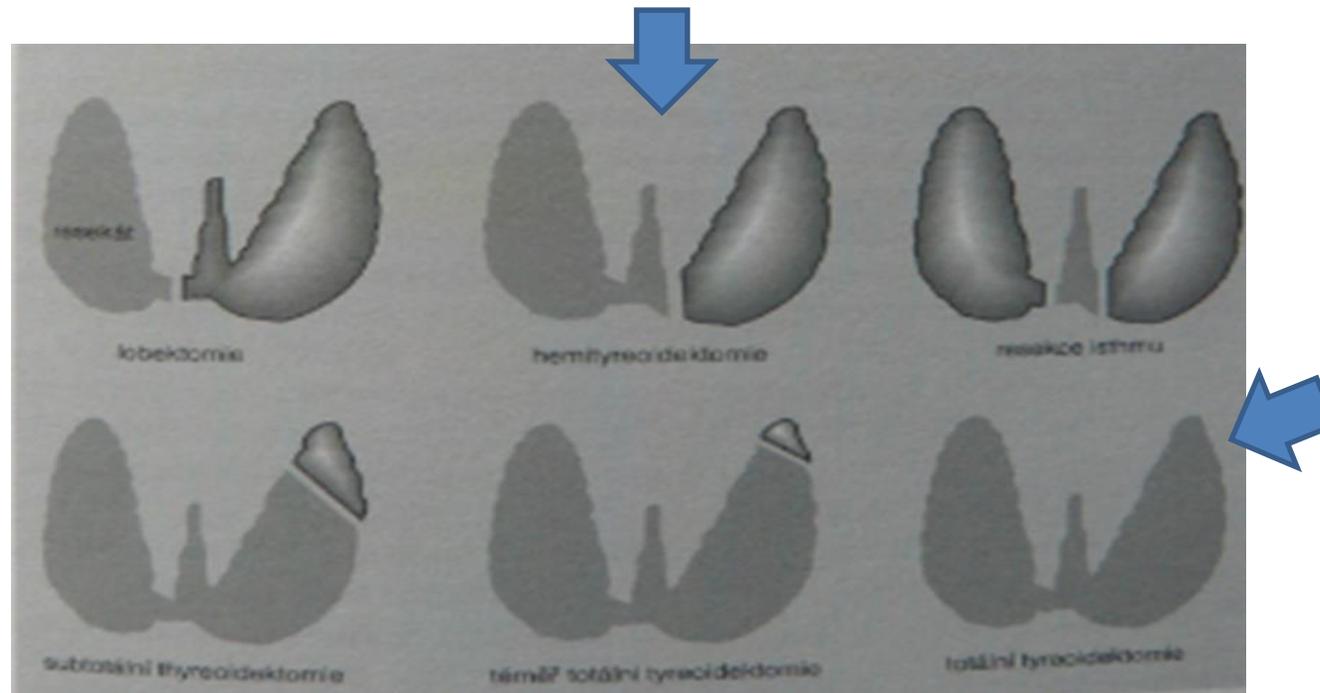
Indication to surgery

- Suspicion of malignancy, confirmed malignancy – ultrasound, FNAC
- compression syndrome (discomfort, pressure in the neck, dysphagia, disorder of swallowing, hoarseness, dyspnea)
- Thyrotoxicosis resistant to medical treatment

Diagnostic category	Risk of malignancy (%)	Usual management
I. Nondiagnostic or unsatisfactory		Repeat FNA with ultrasound guidance
II. Benign	0–3	Clinical follow-up
III. Atypia of undetermined significance or follicular lesion of undetermined significance	5–15	Repeat FNA
IV. Follicular neoplasms or suspicious for a follicular neoplasm	15–30	Surgical lobectomy
V. Suspicious for malignancy	60–75	Near-total thyroidectomy or surgical lobectomy
VI. Malignant	97–99	Near-total thyroidectomy

Extent of surgery

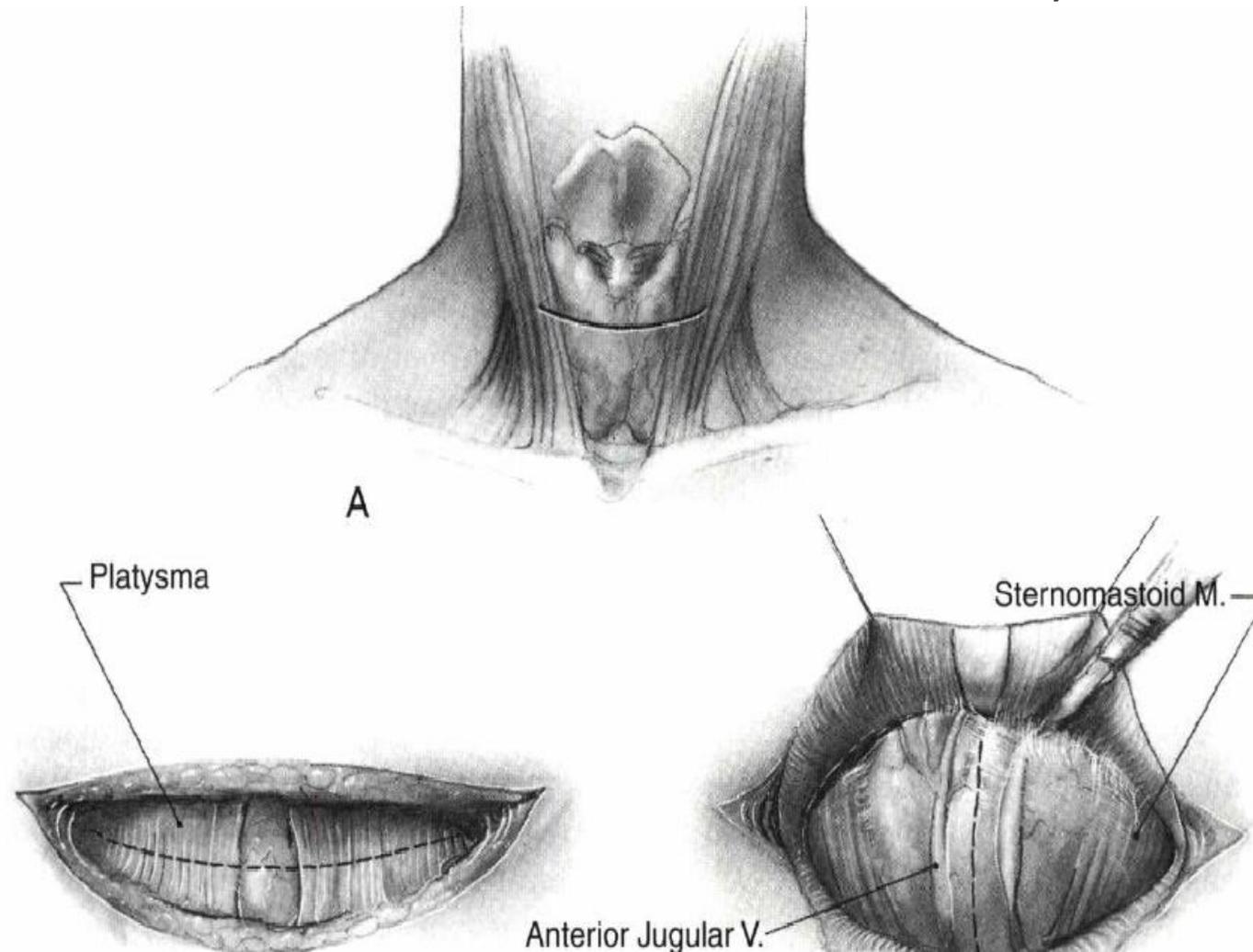
- hemithyroidectomy (second lobe without suspicious nodules , benign cytology)
- total thyroidectomy (malignancy, Bethesda (IV) V, VI), compression syndrome
- therapeutic neck dissection – Well differentiated TC
- prophylactic neck dissection – medullar carcinoma



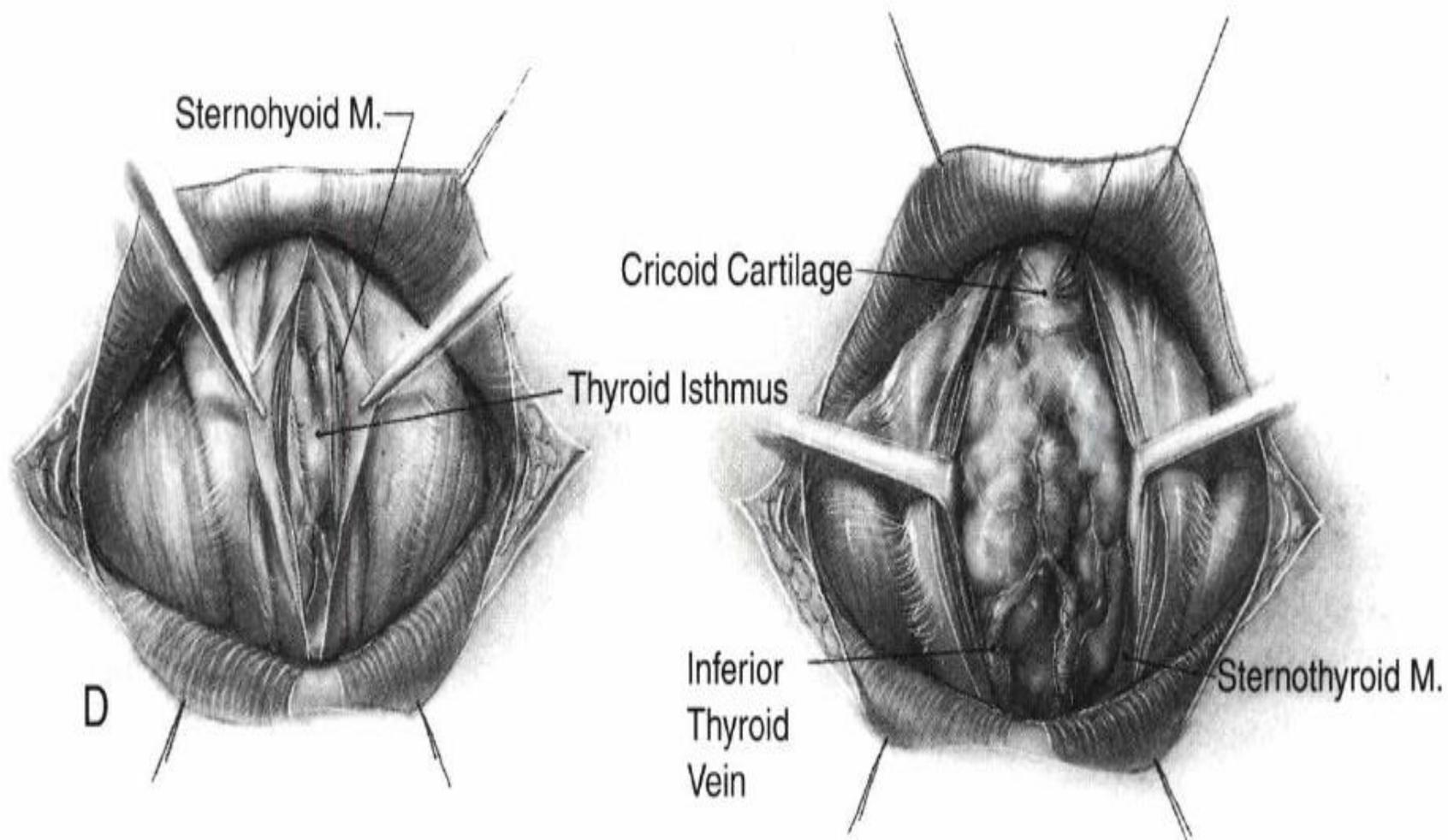
- **MIVAT miniinvasive video-assisted thyroidectomy**

Total thyroidectomy

- cca 2 hours, stay in hospital until 5.-7. day, 3 weeks reconvalescence, hormonal substitution – months; lázeňská léčba; lymfodrenáže



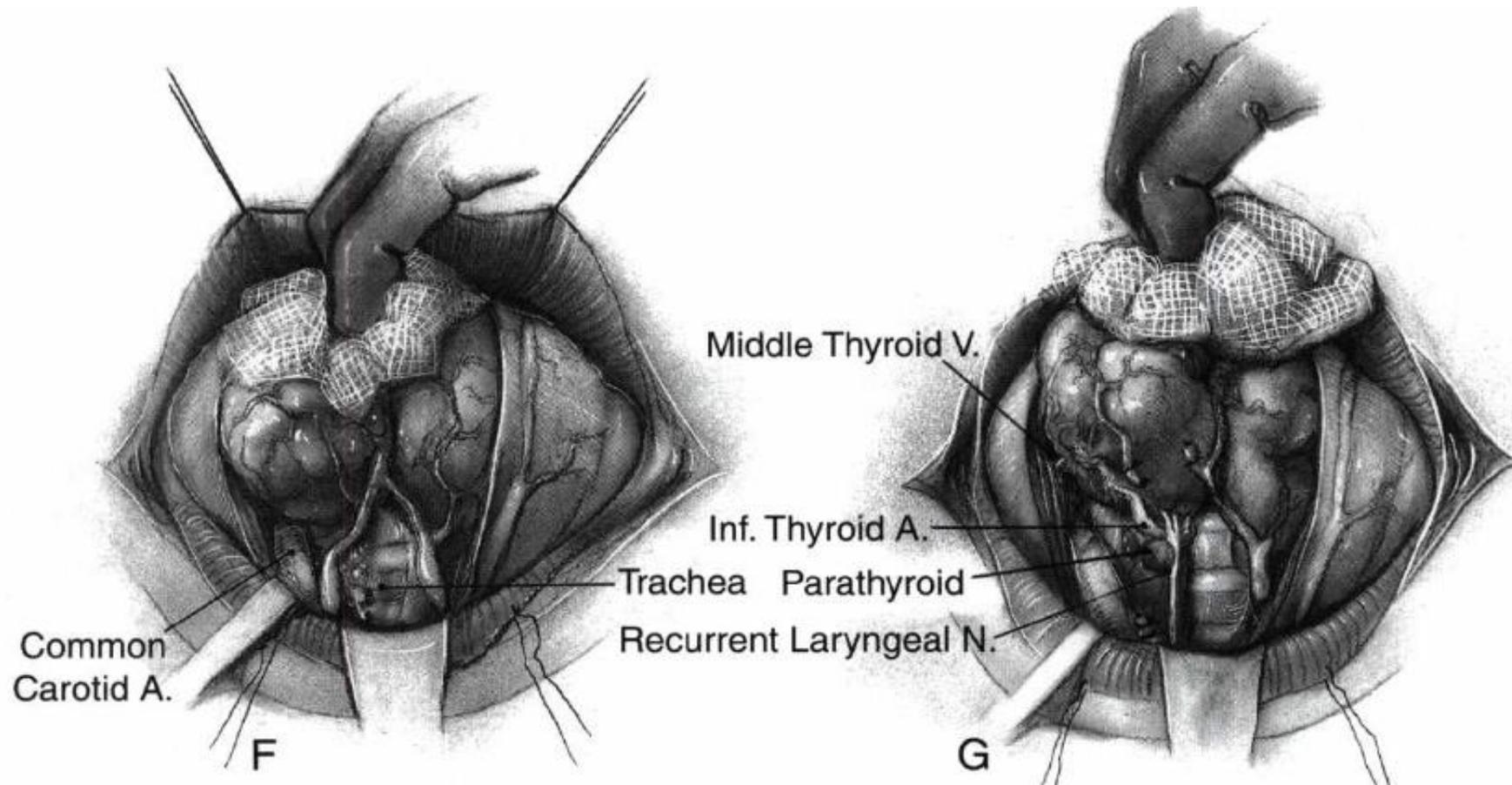
total thyroidectomy



total thyroidectomy

Lateral approach – widely used as the most safe

Identification of NLR in tracheoesophageal groove, / in the place of crossing with ATI / below inferior Para thyroidal body / Wang method



Neuromonitoring

- Non invasive method
- bipolar probe, electric impulse, recording electrode
- Outcome of stimulation: biphasic amplitude, with characteristic latency

Thyroid VNS

Verze 1.00 / 2013-12-13



JEDNORÁZOVÉ STIMULAČNÍ SONDY

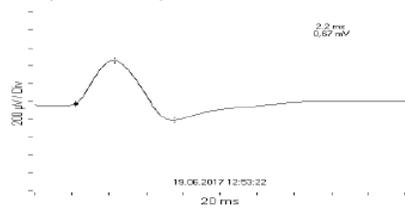
Stimulace nervů se provádí pomocí jednorázových stimulačních sond, které se dodávají ve sterilním stavu.

- Připojte jednorázovou stimulační sondu k adaptéru podle barevného značení
- Adaptér zapojte do zelené zásuvky na headboxu

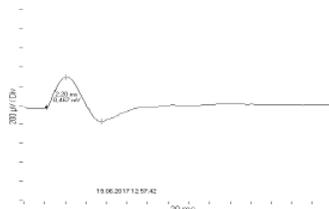
V případě monopolární stimulace umístěte bílou jehlovou elektrodu (položka č. 42-0057) jako referenční do okolní tkáně!



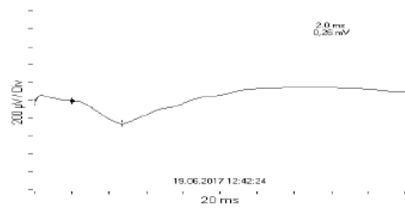
Recurrans prior to left ectomy 19.06.2017 12:53:22



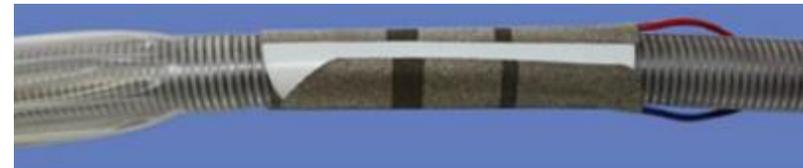
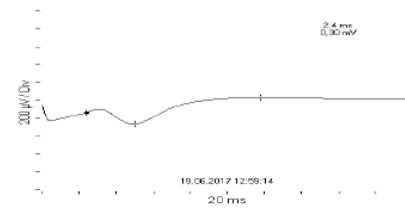
Recurrans after left ectomy 19.06.2017 12:57:42



Recurrans prior to right ectomy 19.06.2017 12:42:24

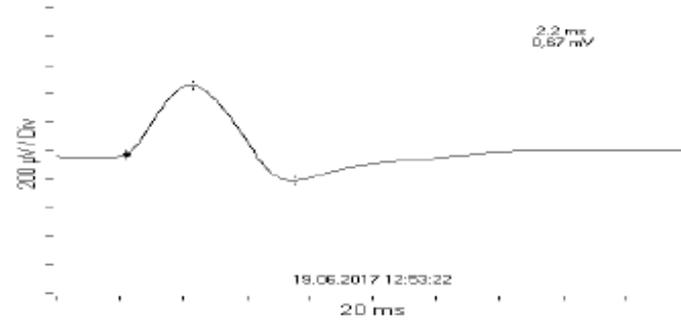


Recurrans after right ectomy 18.06.2017 12:58:14

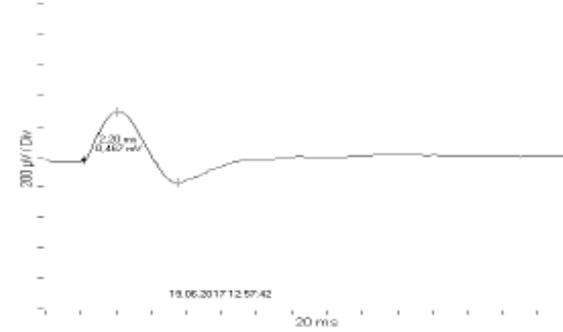


Neuromonitoring

Recurrens prior to left ectomy 18.06.2017 12:53:22



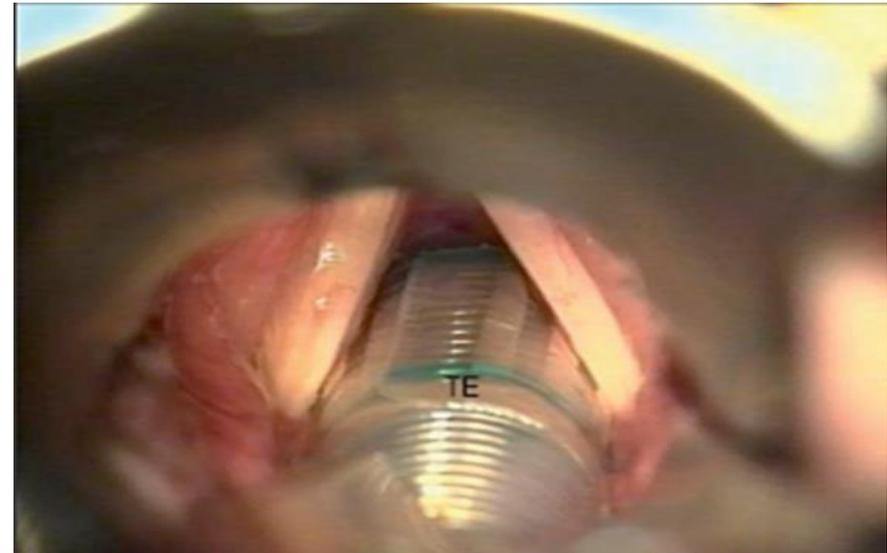
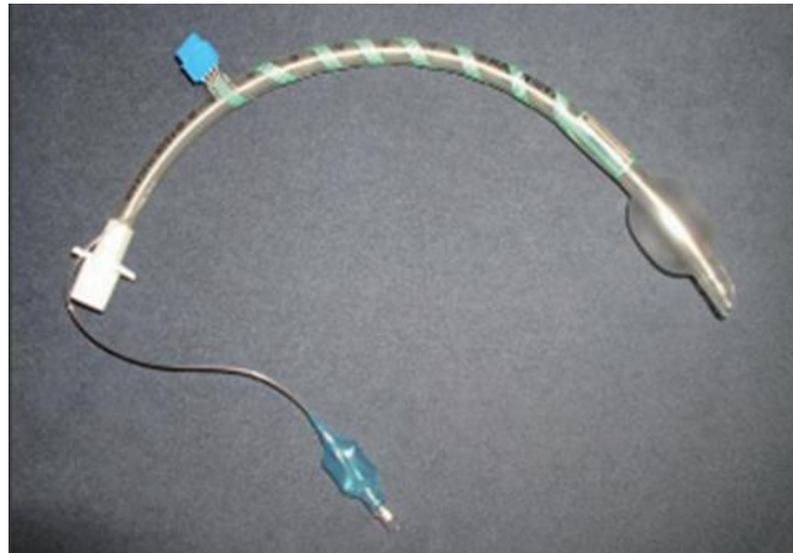
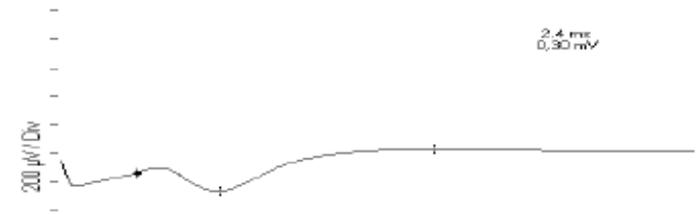
Recurrens after left ectomy 19.06.2017 12:57:42



Recurrens prior to right ectomy 18.06.2017 12:42:24



Recurrens after right ectomy 18.06.2017 12:58:14





Risk of thyroidectomy

N. recurrens paresis

- nerve contused / interrupted (neuropraxia, axonotmesis, neurotmesis); micro suture in case of interruption, end to end, ansa n. XII – higher tonus of vocal cord
- unilateral (**hoarse voice**)/ bilateral (**acute dyspnea, cave tracheostomy!**)
- temporary / permanent > 1 year
- voice rehabilitation – days to months

Unilateral n. recurrens paresis

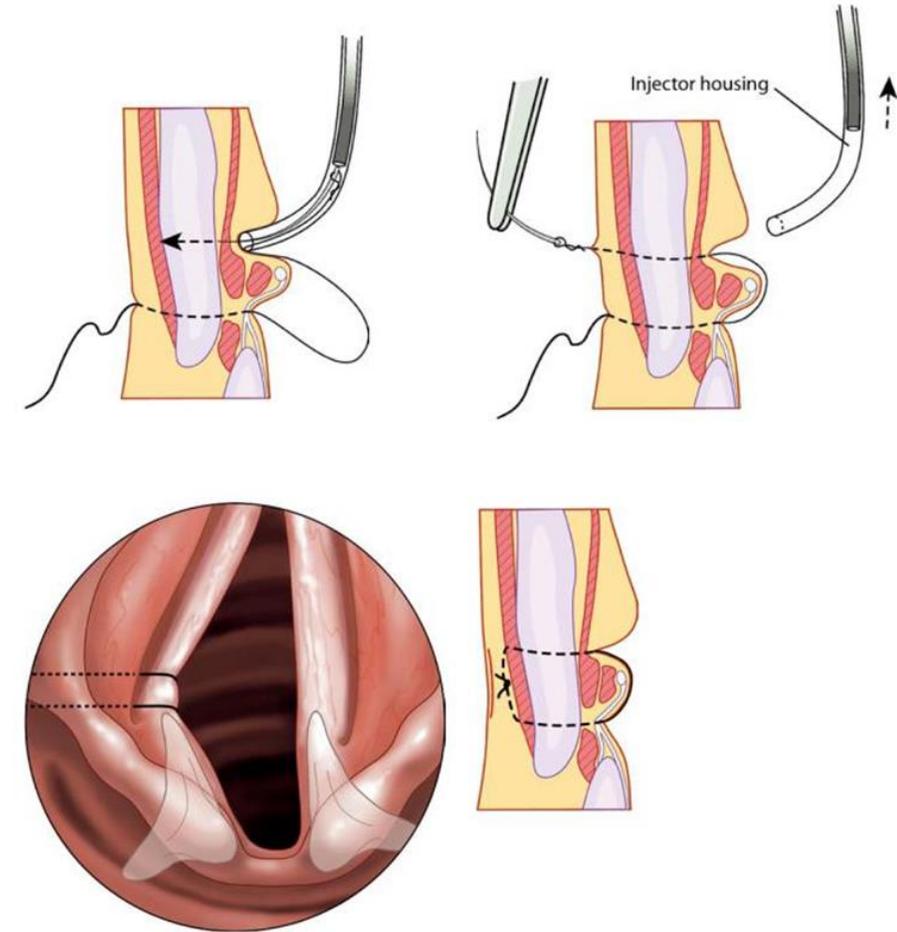
- hoarseness, faint, dyspneic voice
- corticotherapy, B12, speech(-language) therapy
- Surgery treatment of permanent unilateral paresis - medialization of vocal cord (fat injection)



Vocal cord injection with fat

Bilateral n. recurrens paresis

- Inspiratory dyspnea and stridor
- laryngoscopy , tracheostomy, corticoids, B12, speech(-language) therapy
- Surgery after 1 year – lateralization



Bilateral n. recurrens paresis- arytenoidectomy





Paresis N.Laryngeus superior

- **sensitive innervation** of aditus laryngis
- **motoric innervation** m.cricothyreoideus (tensor of vocal cord)
- symptoms: lower voice efficiency, inability raise one's voice, aspiration (in both sided injury)
- prevention – ligation branches of ATS closely to thyroid gland capsule
- Frequent spontaneous recovery
- speech(-language) therapy,



Hypocalcemia after surgery

- Ca < 2,00 mmol/l without clinical symptoms, Ca < 2,10 mmol/l with clinical symptoms, in two following sampling
- hypo- parathyrosis, frequently perceived negatively
 - temporary / permanent > 6 months
 - damage of blood supply of parathyroid body/ his removal
 - auto transplantation of parathyroid body



Hypocalcemia – symptoms, diagnosis

- paresthesia sup. and inf. extremities, around mouth, convulsions
- The Chvostek sign - the twitching of muscles innervated by the facial nerve (CNVII), Trousseau's Sign - is characterized spasming of wrist and hand muscles due to neuromuscular irritation following brachial artery occlusion
- anxiety, lability, depression in chronic cases
- development some hours after surgery, the lowest level 3.-5.den
- Calcium sampling 1st, (2nd), 4th day



Hypocalcemia – therapy

- asymptomatic hypocalcemia above 2 mmol/l without substitution
 - **2-2,1 mmol/l**: 1-2g calcium/d p.o.
 - **1,86-2 mmol/l**: 1-2g calcium/d , 0,25 mcg/d AlphaD3
 - **< 1,86 mmol/l**: 3g calcium/d , 1mcg AlphaD3, Mg 250mg/d
 - in spasms calcium and magnesium **parenterally**
- dismissal in $> 1,9$ mmol/l and growing tendency



Complication after surgery

- **bleeding** - life threatening, open suture, evacuation of hematoma, revision under general anesthesia
- laryngeal edema
- cosmetic defect – keloid, atrophy, fixation of scar to trachea



Salivary glands

- Serous: gl. **Parotis** (dct. Stenoni), Ebner's lingual glands
- Mixed: gl. **Submandibularis** (dct. Whartoni), gl. Sublingualis
- small salivary glands – on oral cavity mucosa membrane

Function:

Moistening of mucosa membrane, mouthful wrapping, ferment ptyalin

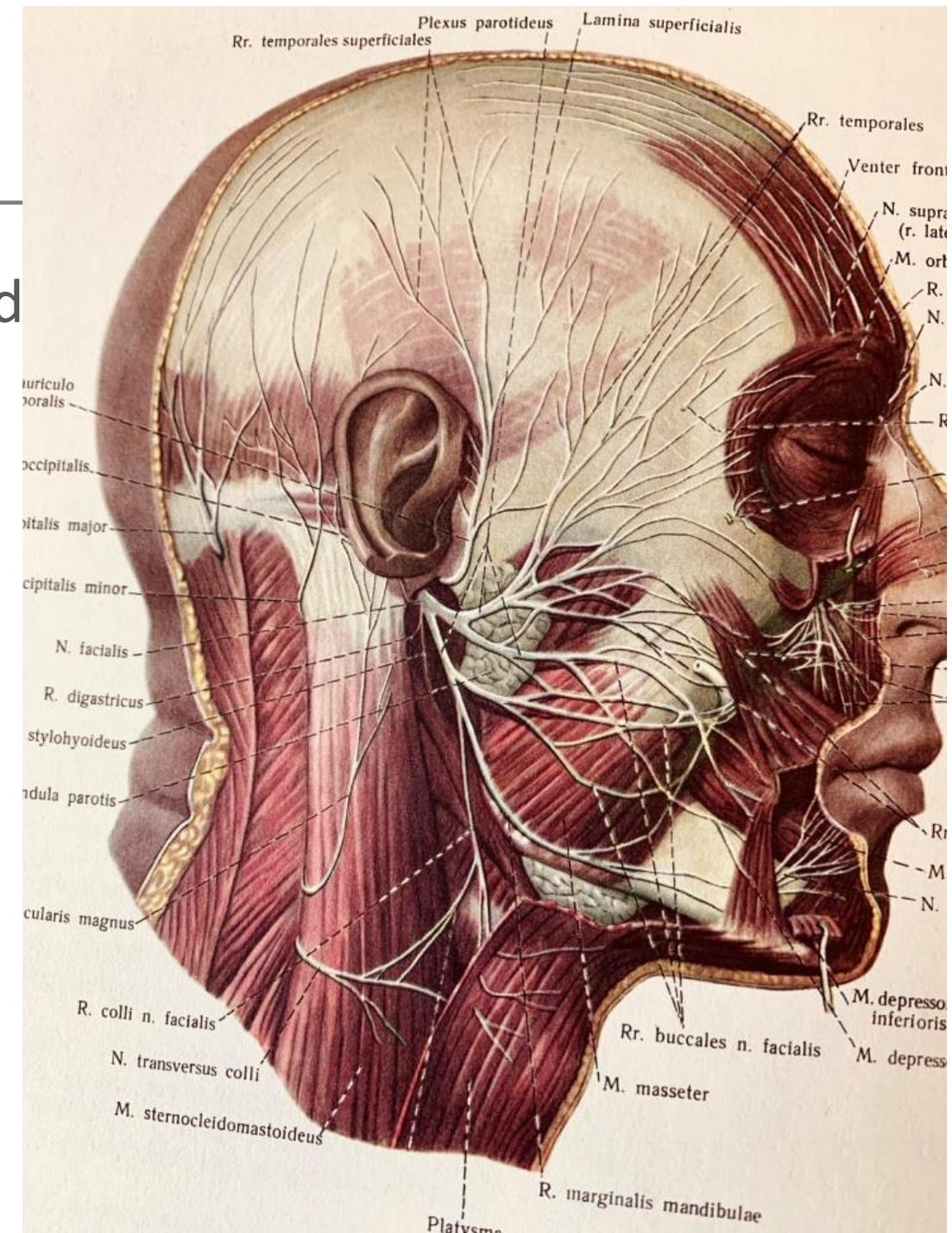
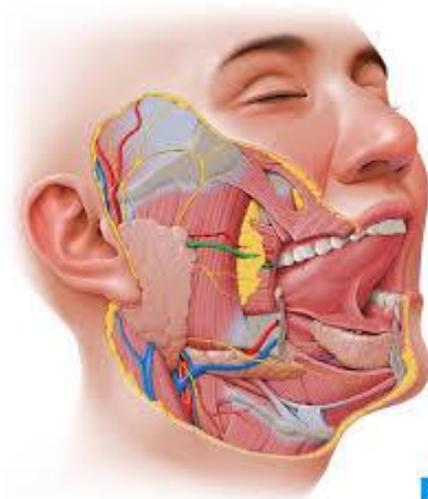
Parotid gland

- Strictly serous tubo-alveolar salivary gland
- Ramification of facial nerve (CN VII):

Pes anserinus nervi facialis:

- rr. temporales
- rr. zygomatici
- rr. buccales
- r. marginalis mandibulae
- r. colli

- Duct - dct. Stenoni





Salivary glands inflammations

Acute

- **acute bacterial sialadenitis** parotid gland/submandibular gland. Ascendent infection, bad hygiene of oral cavity, diabetes mellitus, dehydration.
 - Painful swelling, include skin, pus discharge from duct
 - Antibiotic treatment; in abscess – incision
- **acute viral (mumps)** – paramixoviridae family (parotitis), affection of testes, CNS, CN VIII - deafness – analgesics, antiphlogistic,

Chronic

chronic recurrent parotitis – congenital duct ectasia, with „milk“ saliva. In acute exacerbation AB, massage, hygiene of oral cavity

Chronic sclerosing sialadenitis of the submandibular Gland („Küttner tumor“) fibrous changes, enlargement of the gland, diff dg: cave tumor. Therapy: surgery, the gland is removed.



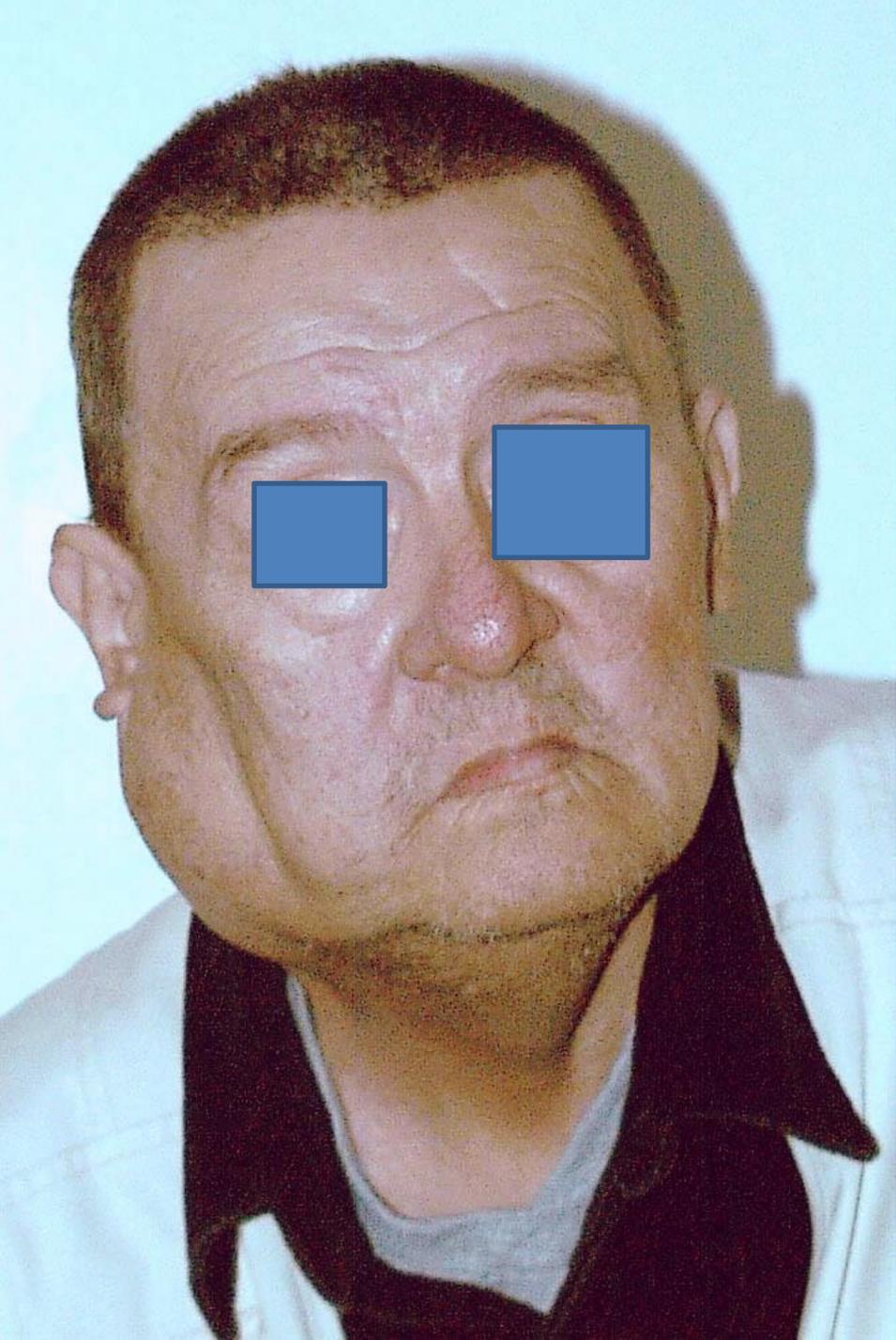
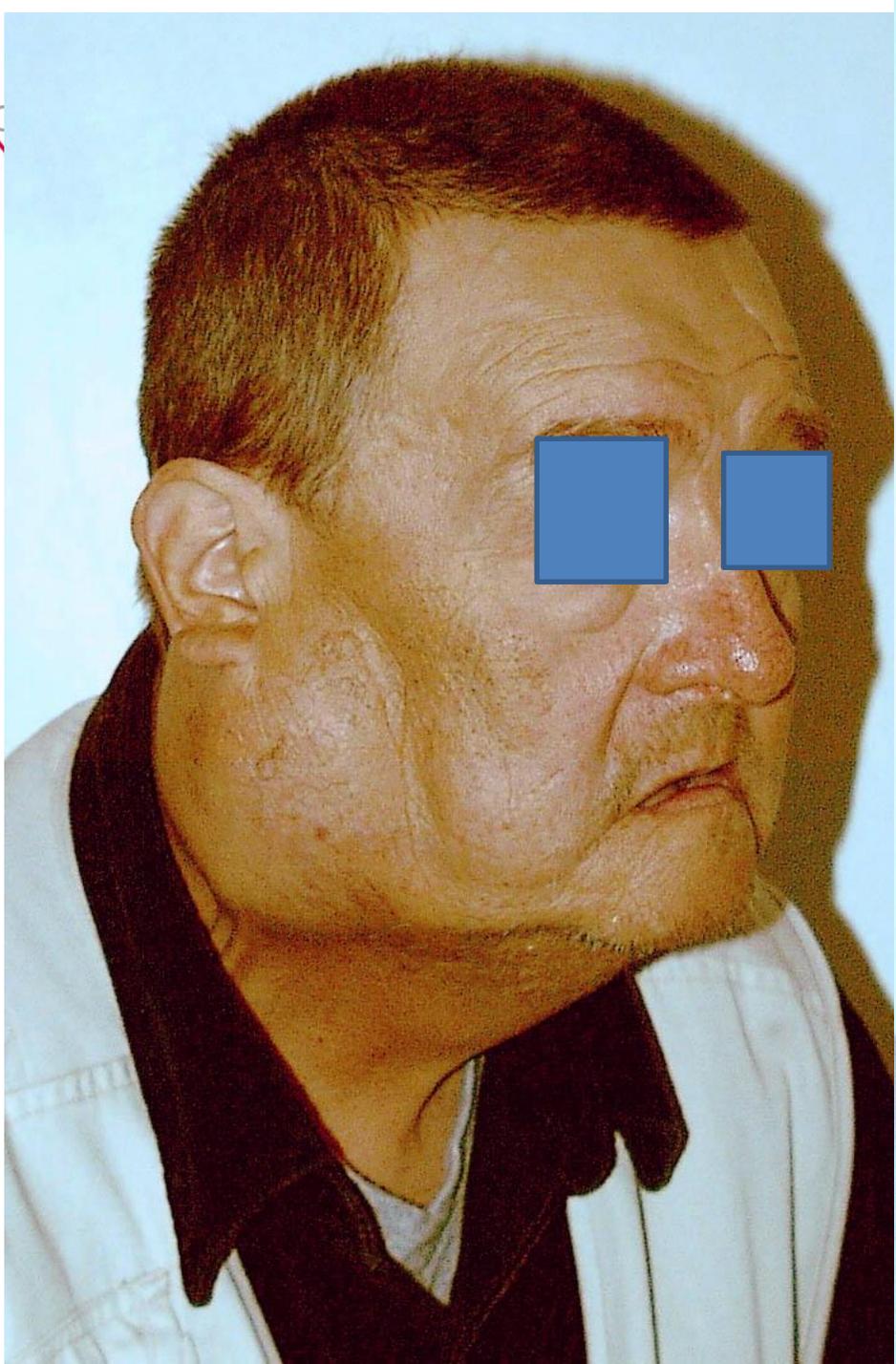
Myoepithelial sialadenitis (Sjögren Syndrome), Benign lymphoepithelial lesion

- autoimmune disease
- Lesion of other exocrine glands, rheumatic disease
- Bilateral enlargement of parotid gland, sometimes submandibular gland, xerostomia, „sicca syndrome“ (affecting upper respiratory mucosa), xerophthalmia
- Treatment: corticosteroids, immunosuppressive drugs
- In terrain diseased parenchyma - malignant lymphoma 40x frequently – removal and histological evaluation!



Sialoadenosis

- Non inflammatory gland parenchyma hyperplasia and hypertrophia, various etiology, for inst.: antihypertensive drugs, beta sympathomimetics
- endocrine sialoadenosis – in diabetes (**Charvat sign**), pregnancy
- Non painful enlargement of glands without greater clinical trouble



Mixtumor parotis





**Advanced cancer of
submandibular
salivary gland**



Tumors of salivary glands

- All ages
- children – 95% vasoformative lesions
- Maximum of incidence 4. - 6. decennium
- Highly malignant 6. - 8. decennium





Tumors of salivary glands epidemiology

- 1% of human tumors, 3-4% HNSCC
 - Incidence 1 on 100 000 inhabitants
-
- parotis 80%
 - submandibular 10%
 - small glands 8-9%
 - sublingual 1%

Parotid pleomorph adenoma side left



Mixtumor parotis



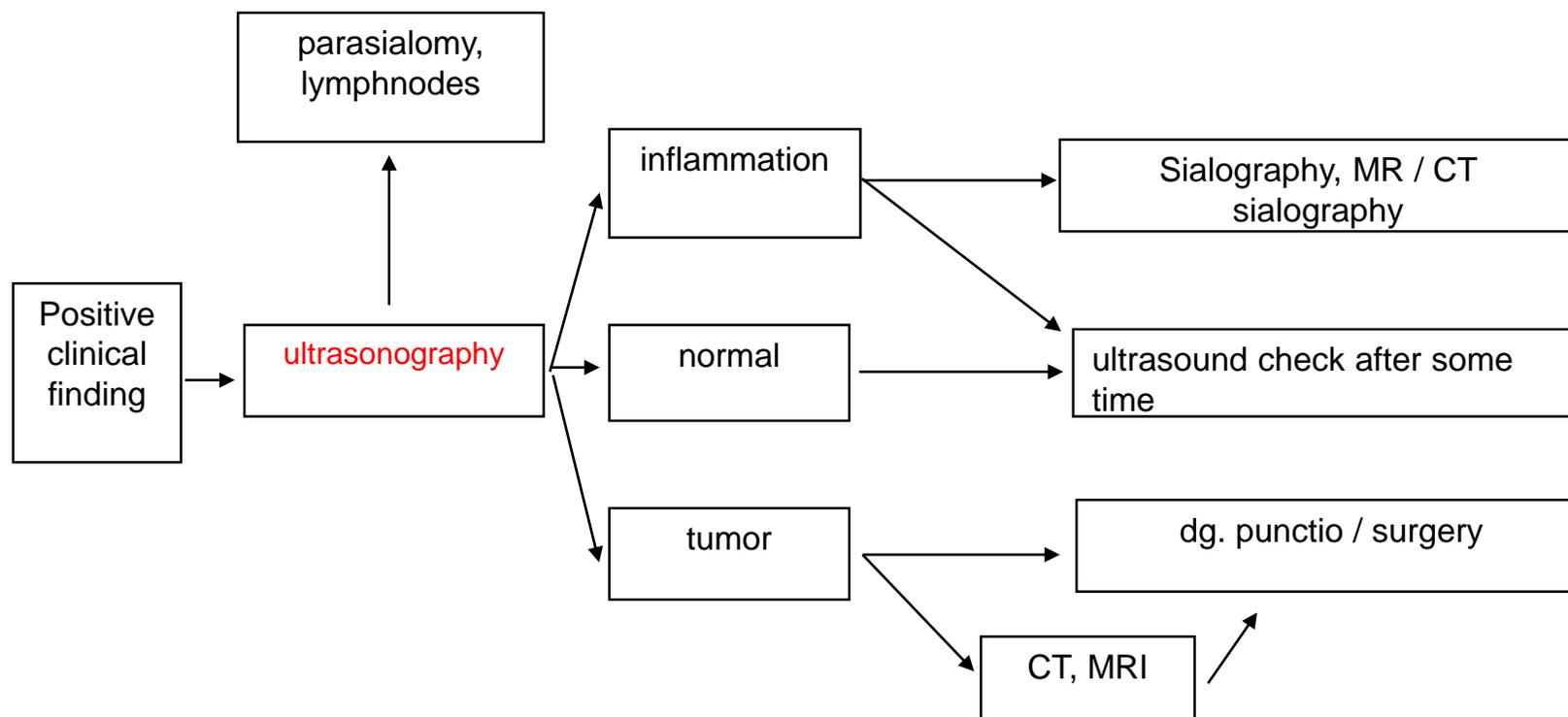


Diagnosis

- History of disease - time, change in growth speed, hydration, infectious contact?, pain, comorbidities, surgery
- Palpation - consistence, fixation, pain
- Ultrasonography, duplex ultrasonography
- FNAB (fine needle aspiration biopsy)
- CT, MRI, CT sialography
- Facial nerve function
- Sialography
- Scintigraphy
- Cryotome intraoperative evaluation
- Definitive histologic evaluation



Diagnosis



FNAB (fine needle aspiration biopsy)



Histologic classification of salivary gland tumors and their incidence

Benign tumors

Epithelial (adenomas)	Pleomorphic adenoma	50 %
	Cystic adenolymphoma	30 %
	Other adenomas	10 %
Mesenchymal		5 %
Other		5 %

Malignant tumors

Epithelial (carcinomas)	Adenoid cystic carcinoma	20 %
	Acinic cell adenocarcinoma	15 %
	Mucoepidermoid carcinoma	15 %
	Malignancy in Pleomorphic adenoma	15 %
	Other carcinomas	15 %
Malignant lymphomas		15 %
Other		5 %



Therapy

- **Surgery**

- Surgery of parotid gland
- Extirpation of submandibular gland, small salivary glands
- **Possible complication** – facial paresis, syndrome Frey (auriculotemporal **syndrome**) caused by aberrant growth of parasympathetic fibers nerve auriculotemporalis into skin sweat gland. redness, sweat (perspiration), burning sensation in the skin parotid region.

- **Radiotherapy**



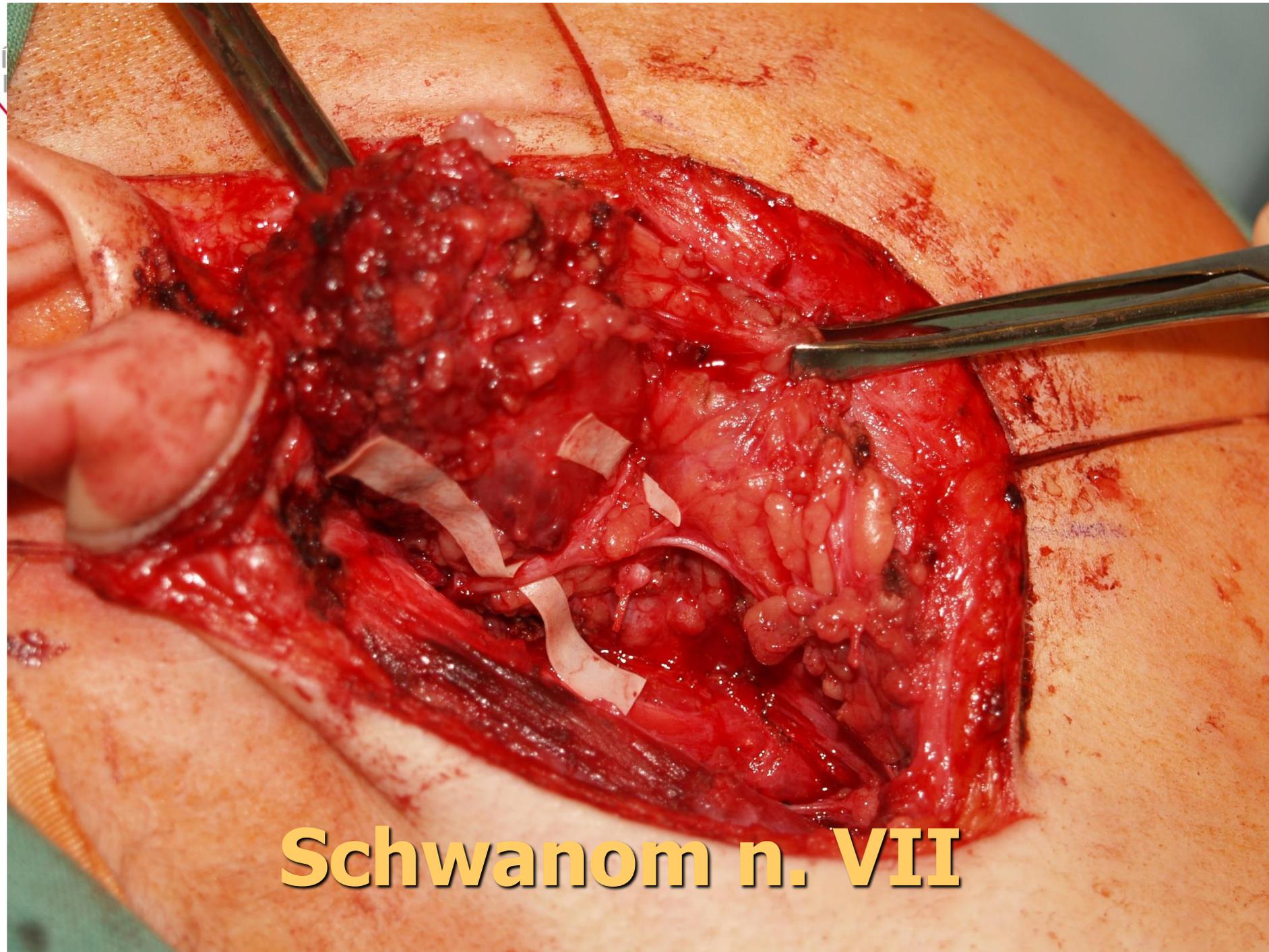
Surgery of parotid gland

- **Extracapsular extirpation** – removal of limited tumor with surrounding tissue
- **Conservative superficial parotidectomy** – removal of the whole superficial lobe in the level of ramification CN VII
- **Conservative total parotidectomy** – removal of the tumor mass in both lobes, preservation of ramification CN VII
- **Semi radical parotidectomy** – superficial, subtotal or total parotidectomy, sacrificed ramification CN VII infiltrated by tumor
- **Total radical parotidectomy** – removal of the whole gland include CN VII ramification

Conservative total parotidectomy



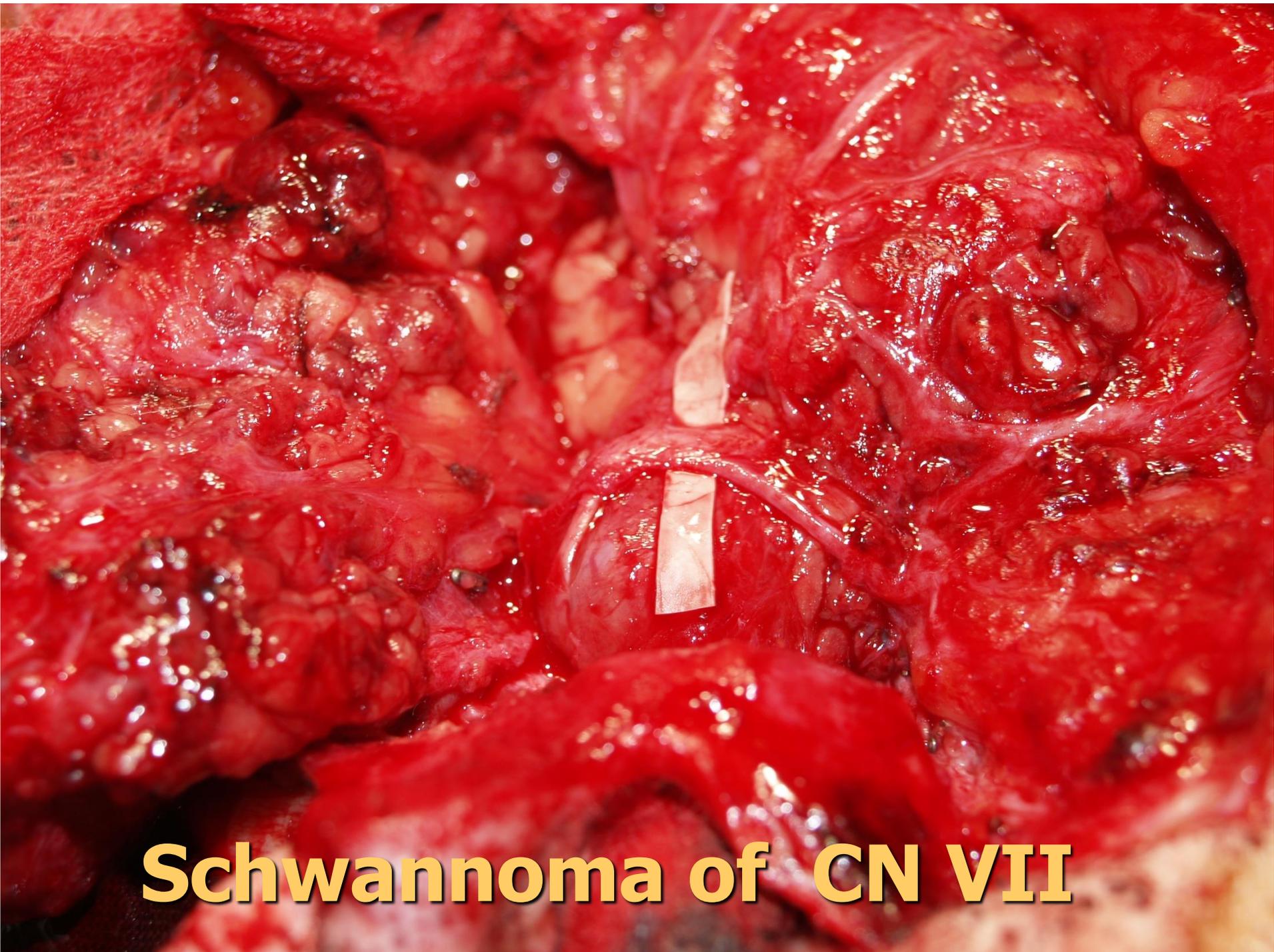




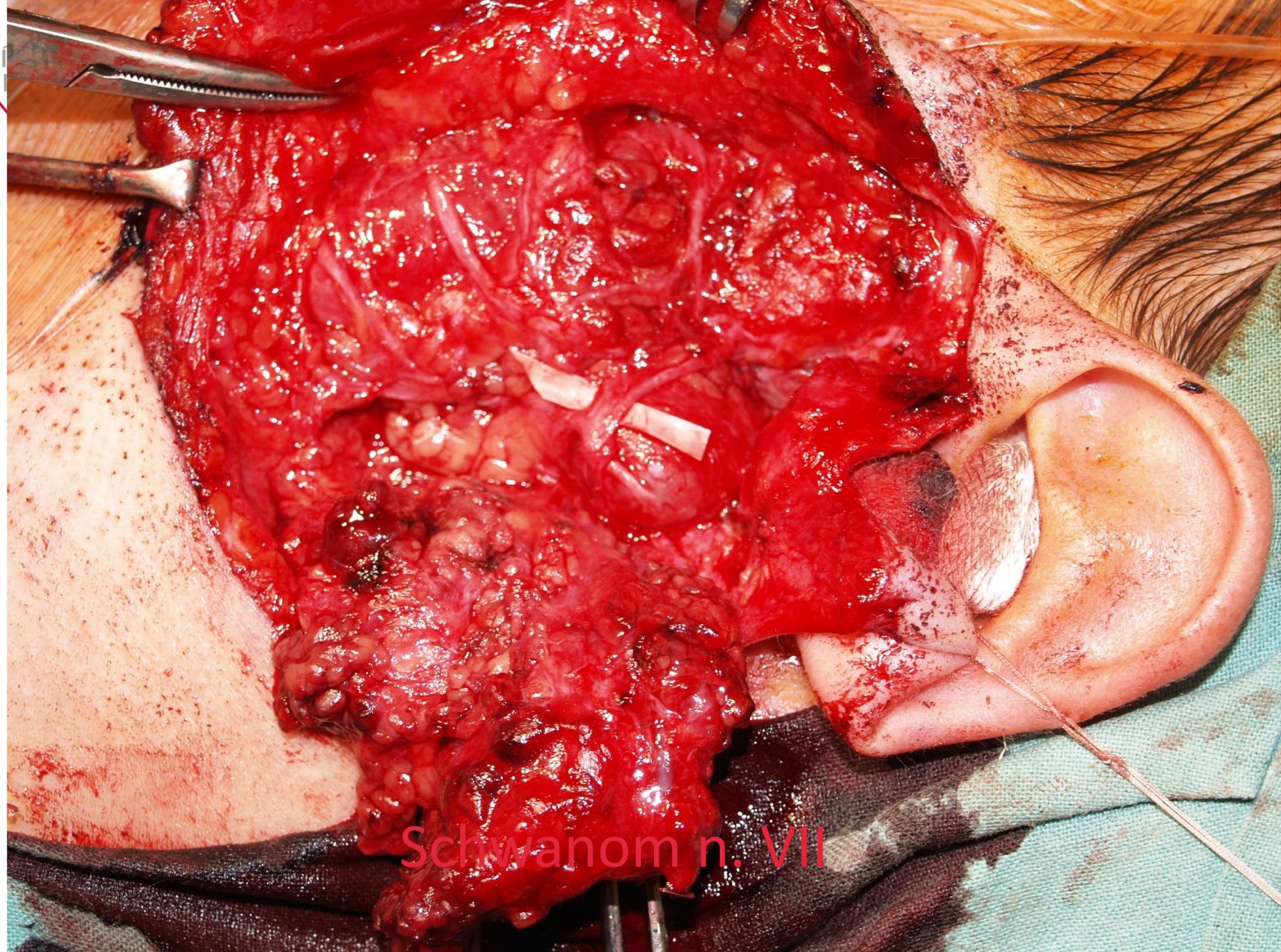
Schwanom n. VII



Schwanom n. VII



Schwannoma of CN VII



Schwannom n. VII