

Parapharyngeal Space

Khalid Hussain AL-Qahtani
MD,MSc,FRCS(c)

Assistant Professor

Consultant of Otolaryngology

Advance Head & Neck Oncology ,
Thyroid & Parathyroid, Microvascular
Reconstruction, and Skull Base Surgery

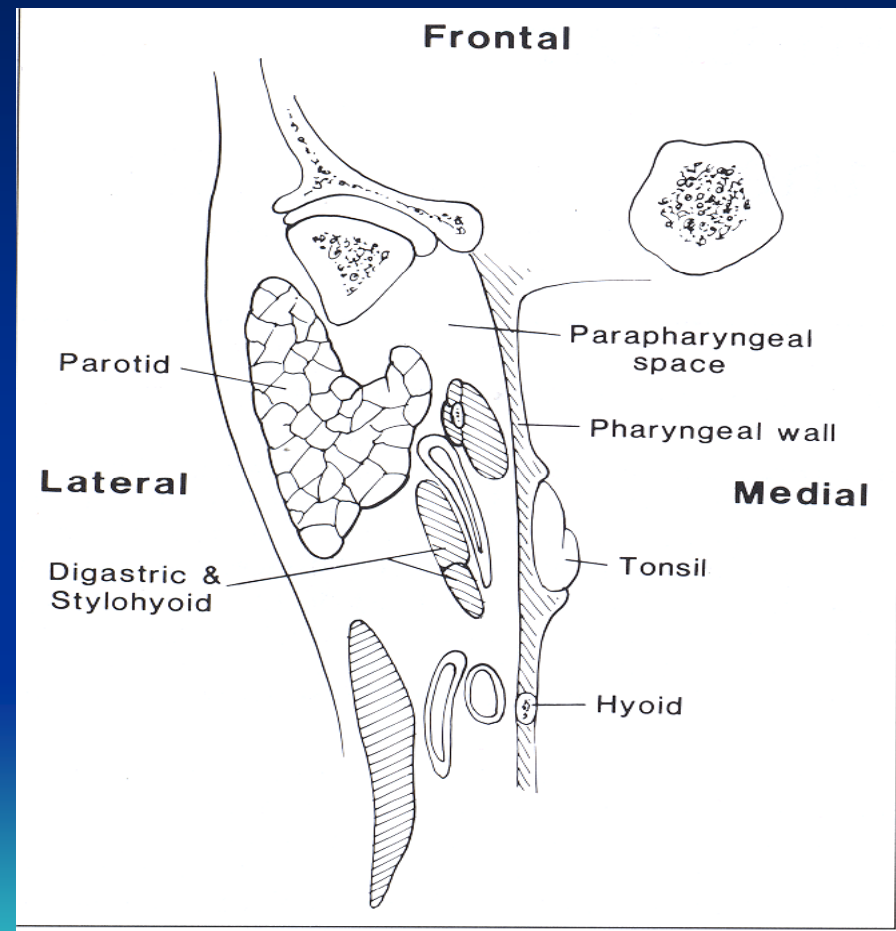
Objectives

- Anatomy
- Clinical evaluation
- Pathology
- Imaging
- Surgical treatment
- Nonsurgical options



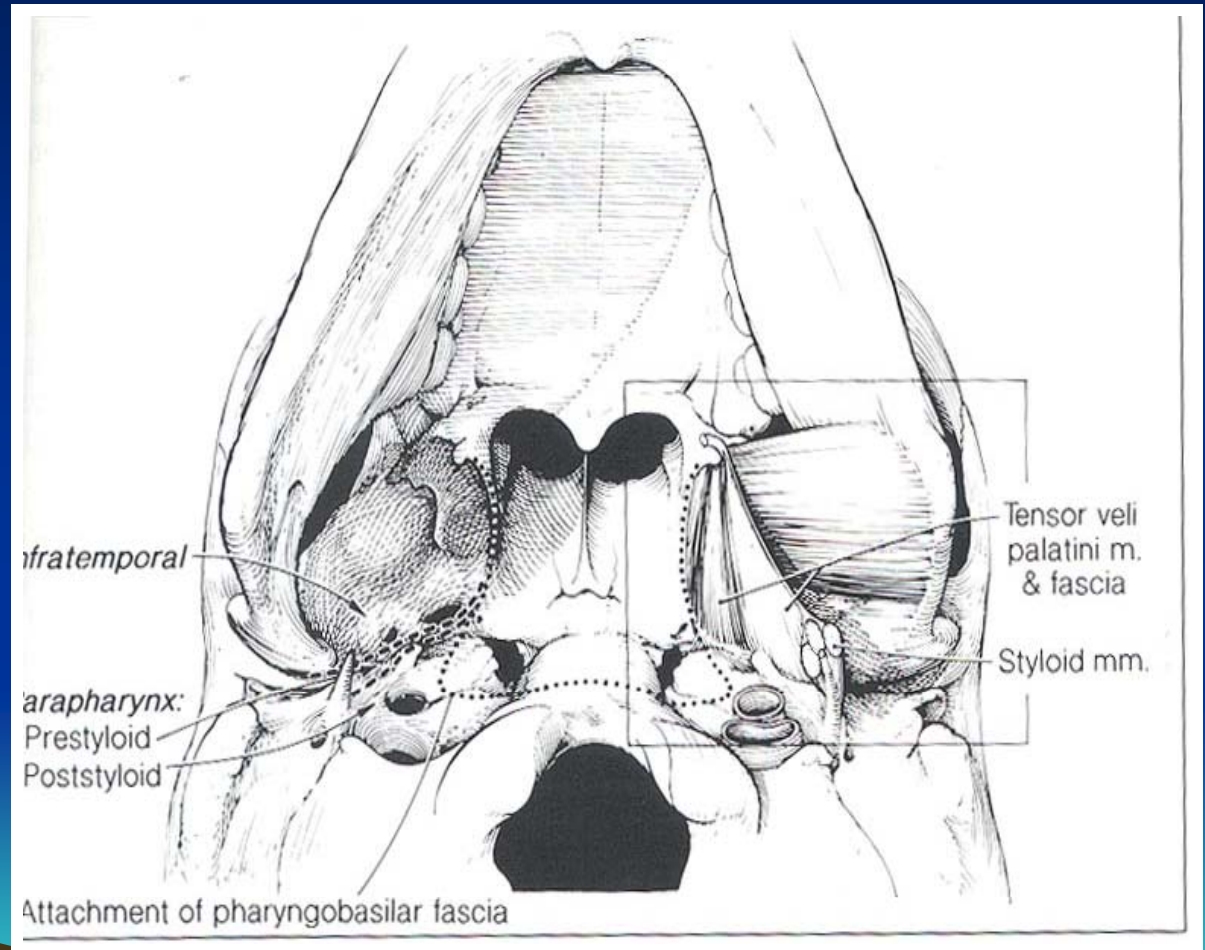
Anatomy

- Potential deep neck space
- Shaped as an inverted pyramid
 - Base of the pyramid: skull base
 - Apex of the pyramid: greater cornu of the hyoid bone



Anatomy

- Superior:
small portion of
temporal bone
and sphenoid
bones
- Inferior:
junction of the
posterior belly of
the digastric and
the hyoid bone



Anatomy

- Medial: pharyngobasilar fascia and pharyngeal wall
- Lateral:
 - medial pterygoid muscle fascia
 - Mandibular ramus
 - Retromandibular portion of the deep lobe of the parotid gland
 - Posterior belly of digastric muscle



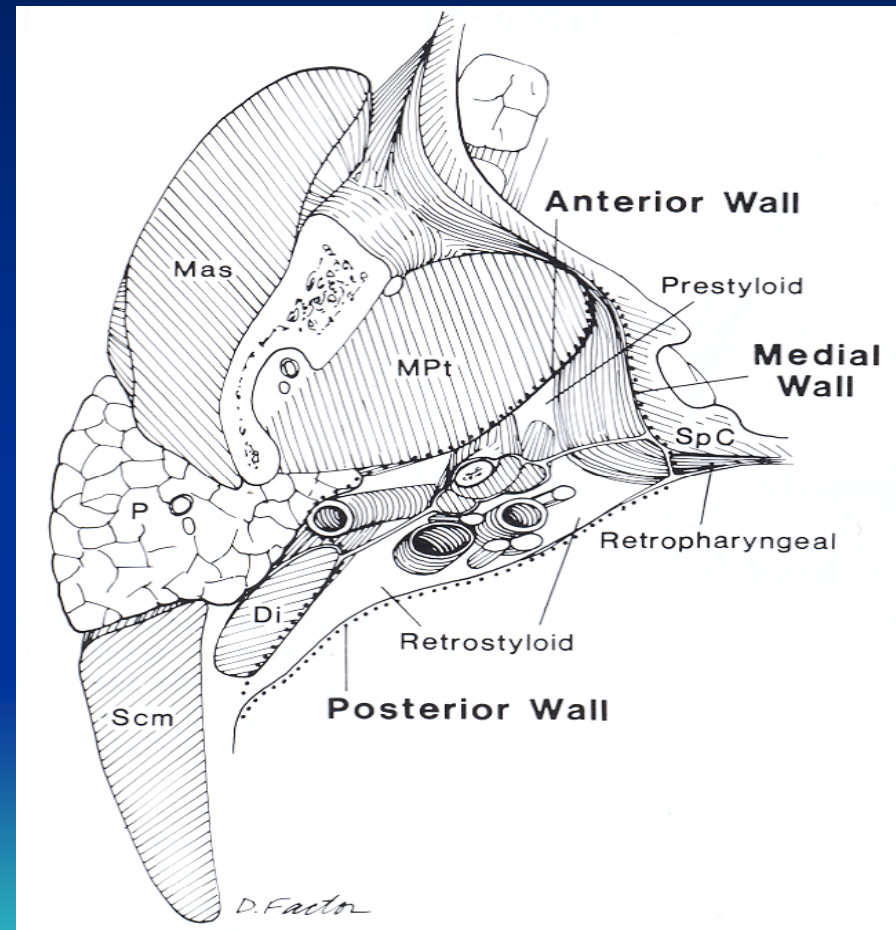
Anatomy

- Lateral: two ligaments
 - Sphenomandibular ligament
 - Stylomandibular ligament
- Posterior: vertebral fascia and paravertebral muscle
- Anterior: pterygomandibular raphe and medial pterygoid muscle fascia

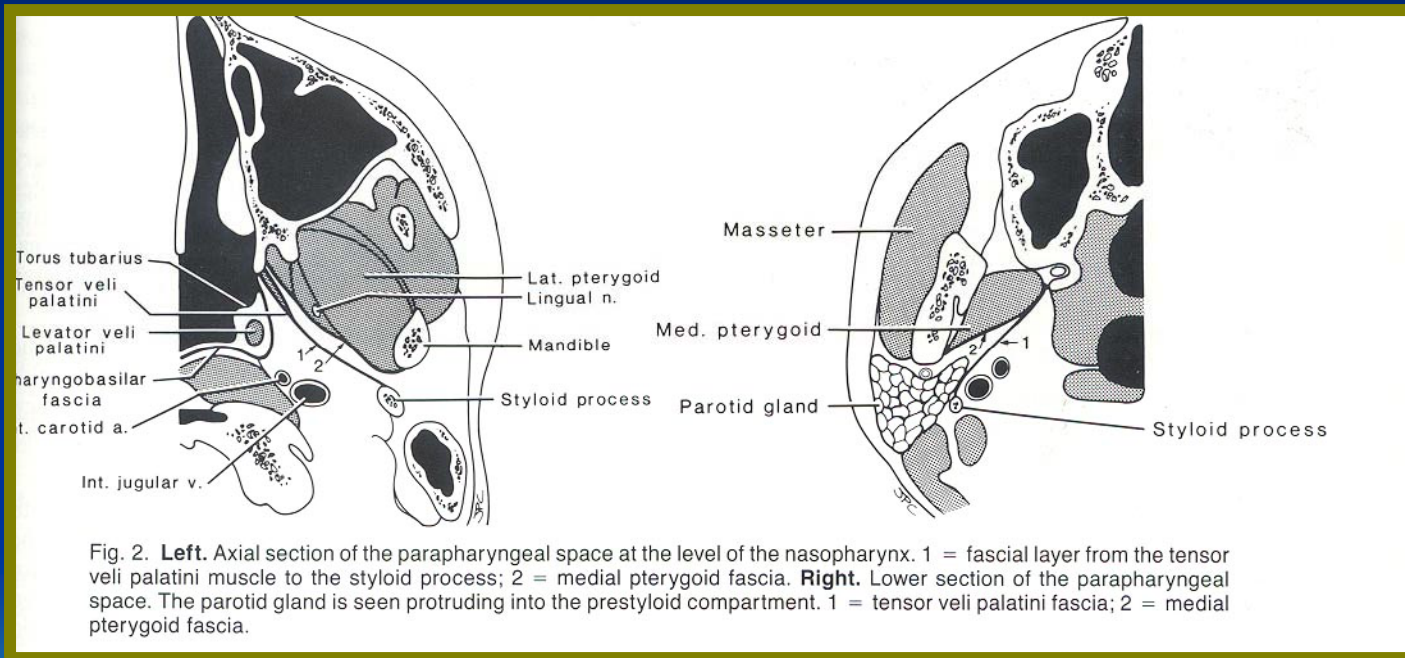


Anatomy

- Tensor-vascular-styloid fascia separates parapharyngeal spaces to two compartments:
 - Prestyloid
 - Poststyloid



Anatomy



Anatomy

- Prestyloid compartment contents:
 - Retromandibular portion of the deep lobe of the parotid gland
 - Minor or ectopic salivary gland
 - CN V branch to tensor veli palatini muscle
 - Ascending pharyngeal artery and venous plexus
 - Most fat



Anatomy

- Poststyloid compartment contents
 - Carotid artery
 - Internal jugular vein
 - CN IX to XII
 - Cervical sympathetic chain



Stylomandibular Tunnel

- Posterior ramus of the mandible
- Stylomandibular ligament
- Skull base
- Path for deep parotid tumors



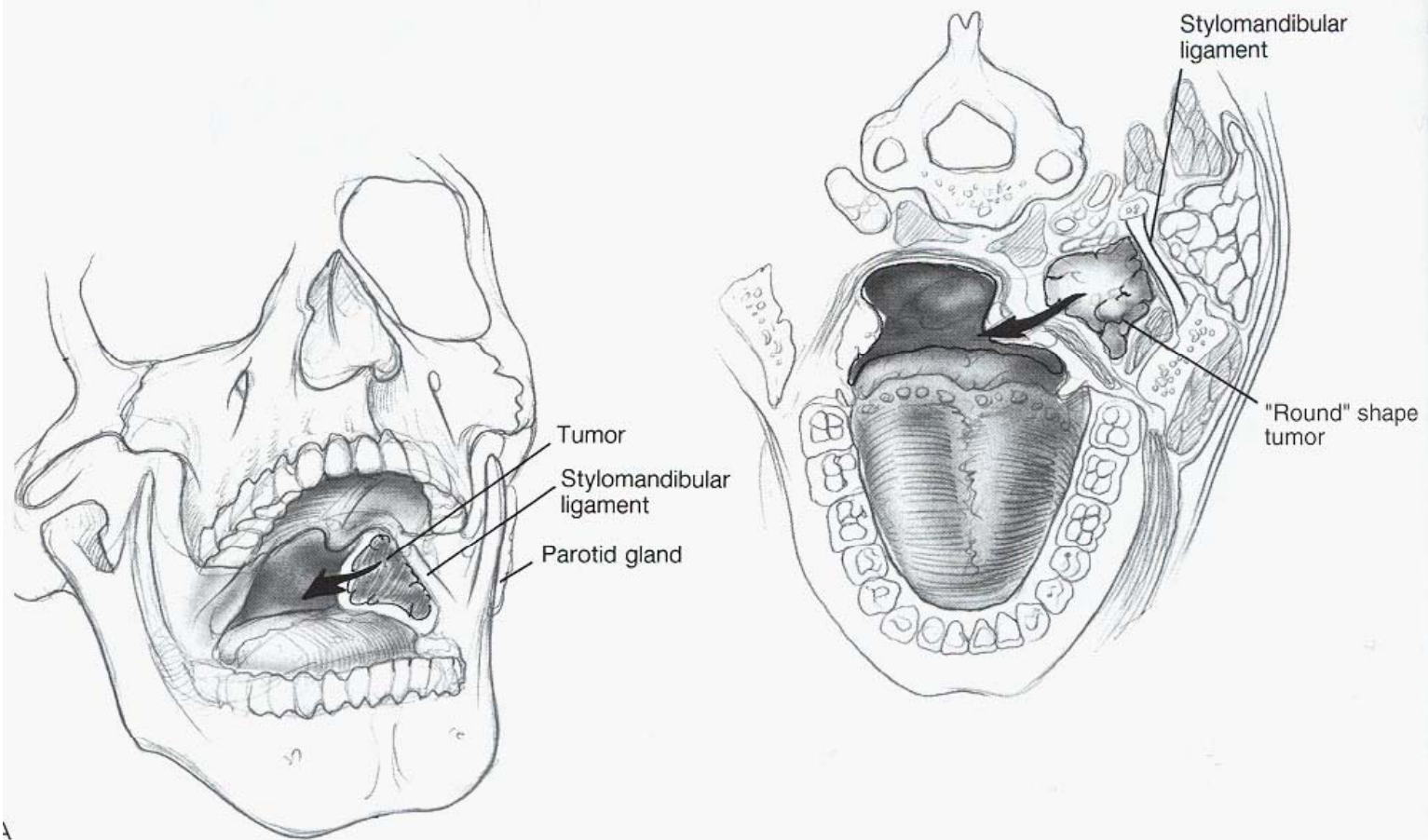


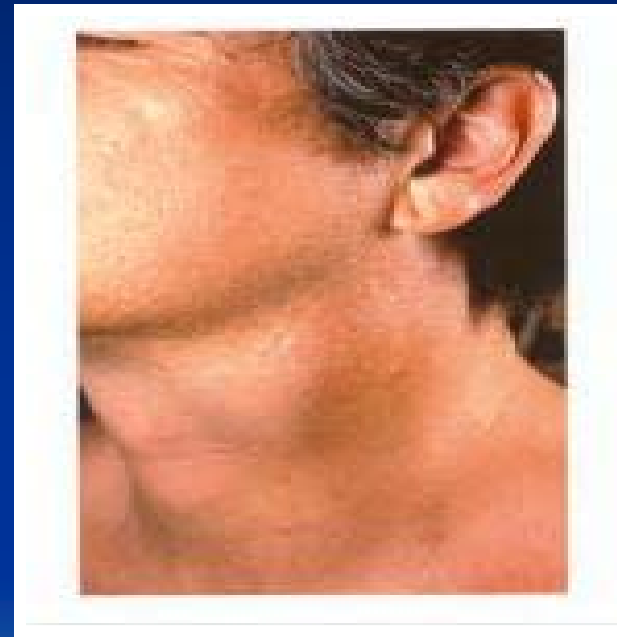
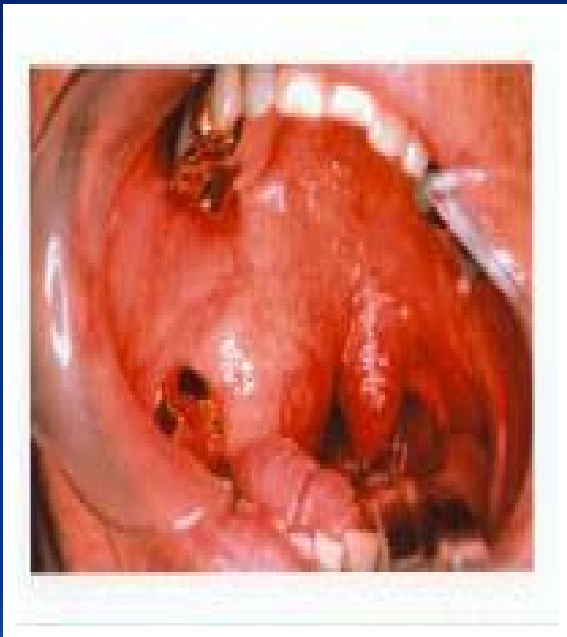
FIGURE 107.14. Round tumor involving the parapharyngeal space. Three fourths (A) and axial (B) anteroposterior view.

Clinical Presentation

- Clinical detection is difficult
- Tumor size 2.5 to 3.0 cm to be detected clinically
- Asymptomatic mass
 - Mild bulging of soft palate or tonsillar region 51%
 - Palpable mass at angle of mandible 53%



Clinical Presentation



Clinical Symptoms

- Prestyloid:
 - Serous otitis media
 - Voice change
 - Nasal obstruction
 - Dyspnea
- Poststyloid:
 - Compress CN 9th, 10th, 11th, 12th or sympathetic chain
 - Hoarseness, dysphagia, dysarthria, Horner's syndrome
- Cranial nerve paralysis, pain, trismus suggest malignancy



Pathology

- Benign 80%
- Malignant 20%
- Direct extension, metastasis, primary tumors



Direct Extension

- Mandible
- Maxilla
- Nasopharynx
- Neck
- Oral cavity
- Oropharynx
- Temporal bone



Metastasis

- Follicular thyroid cancer
- Papillary thyroid cancer
- Medullary thyroid cancer
- Osteogenic sarcoma
- Squamous cell carcinoma



Primary Tumors

- Three categories:
- Salivary gland tumors
- Neurogenic tumors
- Miscellaneous tumors



Differential diagnosis

- Location of the tumor:
 - Prestyloid:
 - Salivary gland neoplasm
 - Lipoma
 - Rare neurogenic tumors
 - Poststyloid:
 - Schwannoma
 - Paraganglioma
 - Neurofibroma



Salivary Gland Tumors

- Most common PPS neoplasms: 40-50%
- Prestyloid masses
- Pleomorphic adenoma 80-90%
- Mucoepidermoid most common malignant
- Less than 5% parotid tumors involve the PPS



Salivary Gland Tumors

- Located in prestyloid space
- From deep lobe of parotid or minor salivary glands
- On CT or MRI a fat plane between the parotid and a prestyloid mass indicates minor salivary gland origin
- Displace the internal carotid posteriorly



Neurogenic Tumors: 17-25%

- Schwannoma
- Paraganglioma
- Neurofibroma



Schwannoma

- Most common neurogenic neoplasm
- Vagus, sympathetic chain most common
- Benign and slow growing
- Generally don't affect nerve of origin
- Less than 1% malignant
- Displace internal carotid anteriorly



Paraganglioma

- Second most common
- Arise from nodose ganglion of vagus, extend superiorly from carotid body, extend inferiorly from jugular bulb
- Bilateral 10%, familial 30%
- Part of MEN IIA or IIB (medullary thyroid carcinoma, pheochromocytoma, parathyroid hyperplasia- with or without mucosal neuromas)



Paraganglioma

- Secrete catecholamines 1-3%
- Malignant 10%
- Classically, paragangliomas mobile anterior-posterior but not up and down
- Glomus vagale displace carotid anteriorly
- Carotid body tumors splay internal and external carotid – “lyre” sign



Neurofibromas

- 3rd most common neurogenic tumor
- From Schwann cells and fibroblasts
- Unencapsulated (involve nerve)
- Multiple
- Part of Neurofibromatosis type I



Miscellaneous Tumors

- Wide variety of tumors
- 20% of total PPS tumors
- Lymphoma, hemangioma, teratoma, lipoma, branchial cleft cyst, arteriovenous malformation, internal carotid artery aneurysm

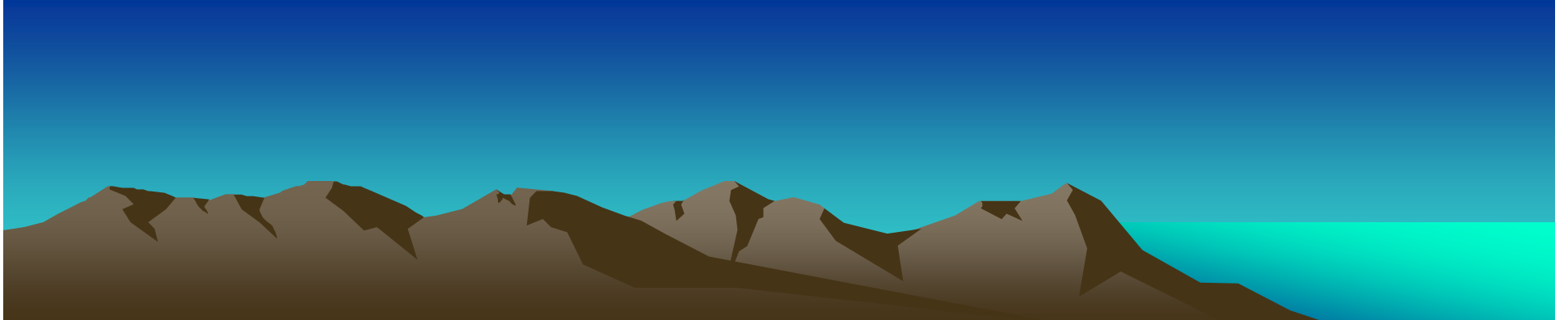


Work up

- Complete HN Hx & exam
- Imaging
- FNA after imaging
- If paraganglioma is suspected need to check 24 hour urine for catecholamines: VMA, metanephrines, etc

Imaging

- CT
- MRI/MRA
- angiography



CT

- Locates tumor to prestyloid vs retrostyloid
- Fat plane between mass and parotid
- Displacement of carotid
- Enhancement of lesion
- Bone erosion due to malignancy
- Limited soft tissue detail





MRI

- Most useful study
- Relationship of mass and carotid more easily seen than with CT
- Characteristic appearances of tumor types on MRI allows preoperative Dx in 90-95% of patients



Pleomorphic Adenoma

- Low signal intensity on T1
- High signal intensity on T2
- Displace carotid posteriorly



Figure 3. Axial proton density (2500/20) MR scan shows a right parapharyngeal space mass with an intermediate signal intensity. The lesion has a slightly lobulated contour and fat is present between the posterolateral margin of the mass and the parotid gland (*arrow*). This extraparotid benign mixed tumor is also anterior to the internal carotid artery.

Schwannoma

- High signal intensity on T2
- Displace carotid anteriorly



Figure 4. Axial proton density (2400/22) MR scan shows a right parapharyngeal space mass that has displaced the internal carotid artery anteriorly (arrow). This vagal schwannoma had a fat plane between it and the parotid gland.

Paraganglioma

- Numerous flow voids
- “Salt and pepper” appearance
- Displace carotid anteriorly



Figure 6. Axial T1-weighted (700/20) MR scan shows a right extraparotid parapharyngeal space mass that has displaced the internal carotid artery anteriorly. This glomus vagale tumor has numerous flow voids within it.

Angiography

- Used to be all enhancing lesions
- Gold standard for relationship to great vessels
- Differentiate neurogenic and vascular
- Remember “lyre” sign
- Balloon occlusion test if possible sacrifice



“Lyre” sign



Angiography

- Tumor embolization can be performed on paragangliomas 24 hours prior to procedure
- May cause fibrosis making dissection difficult



Surgical approaches

- Transoral
- Transcervical
- Transcervical-Parotid
- Transparotid
- Cervical-transpharyngeal “swing”
- Infratemporal fossa
- Transcervical-transmastoid



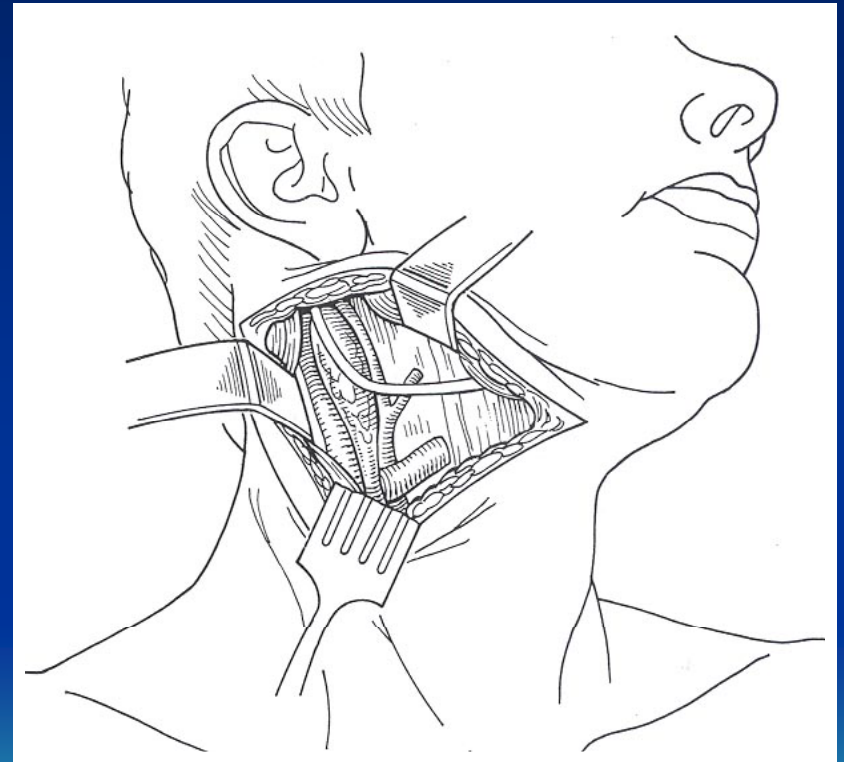
Transoral

- Has been used for small, benign tumors
- Very limited exposure
- Increased risk of tumor spillage, neurovascular injury



Transcervical

- Transverse incision at level of hyoid
- Submandibular gland displace or removed
- Increase exposure by releasing digastric, stylohyoid, styloglossus from hyoid, cut stylomandibular ligament, mandibulotomy

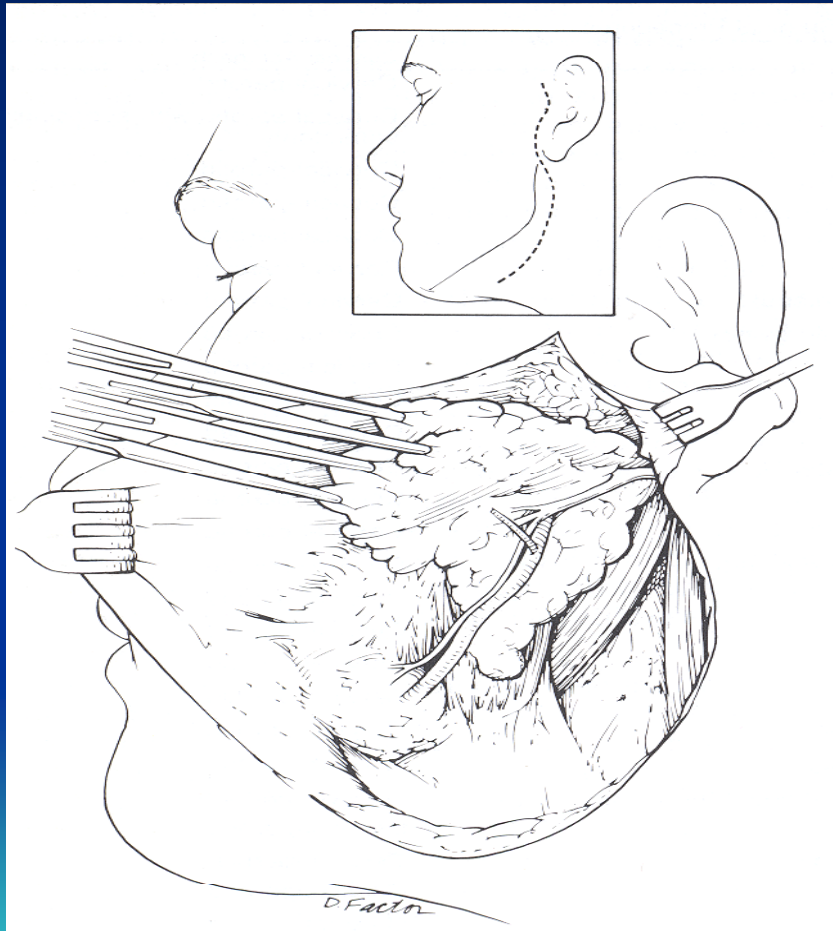


Transcervical-parotid

- Extend cervical incision up in front of ear
- Allows identification facial nerve
- Divide posterior belly digastric
- Divide stylomandibular ligament, styloglossus, stylohyoid close to styloid process



Transcervical-parotid approach

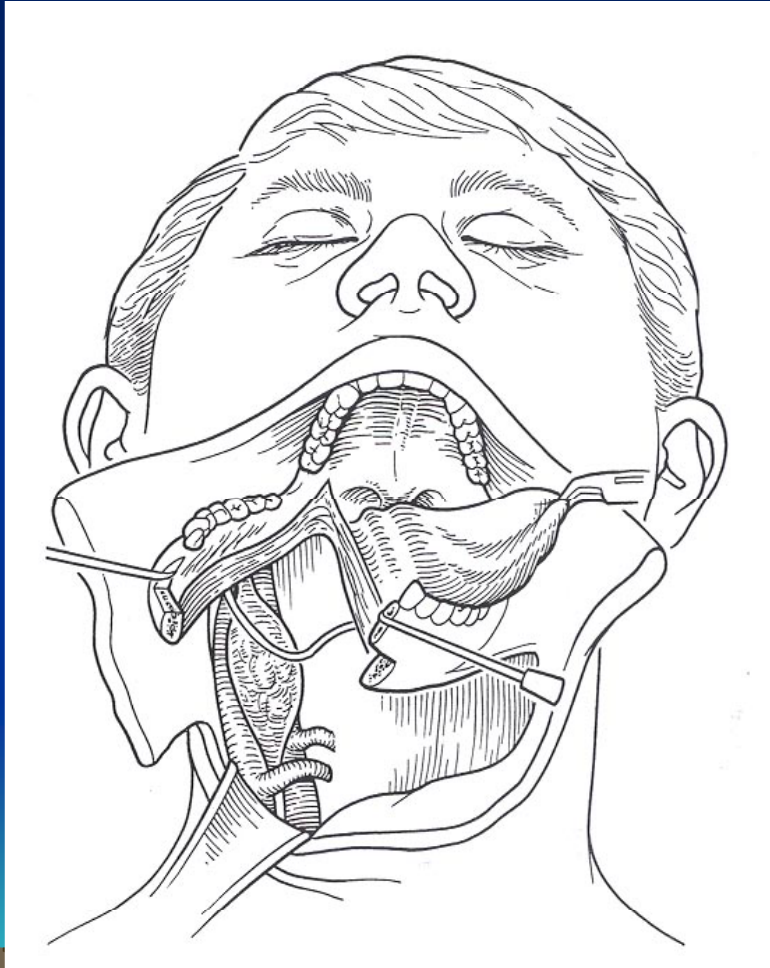


Transparotid

- For deep lobe parotid tumors
- Superficial parotidectomy
- Facial nerve retracted
- Dissect around mandible
- May use mandibulotomy



Cervical-transpharyngeal



- “mandibular swing”
- Large or highly vascular tumors
- Mandibulotomy anteriorly, incise along floor of mouth to anterior tonsillar pillar
- Need a tracheotomy

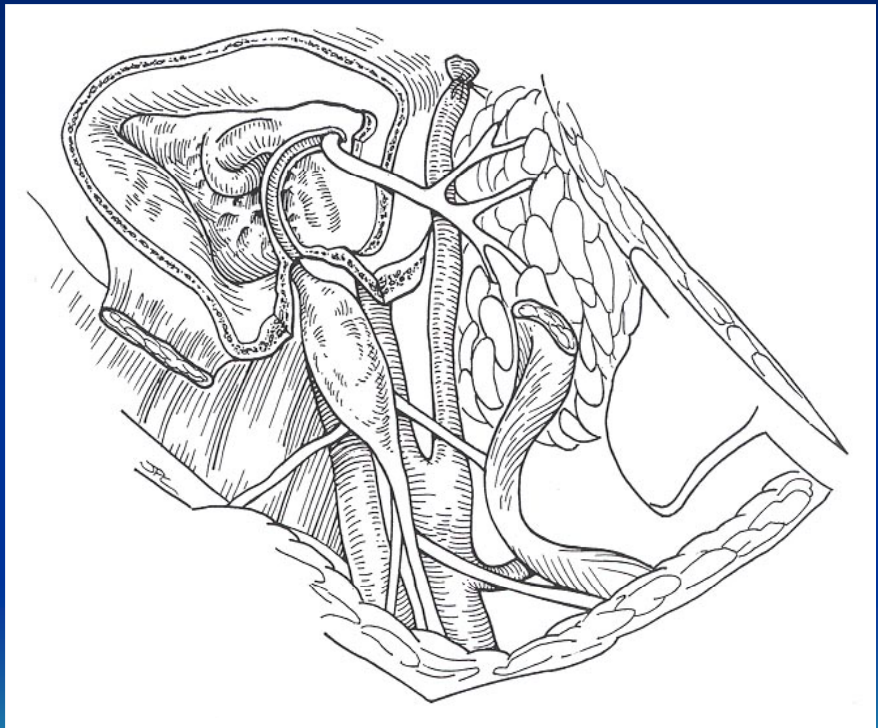
Infratemporal fossa

- Preauricular lateral infratemporal fossa approach
- Skull base or infratemporal fossa involvement



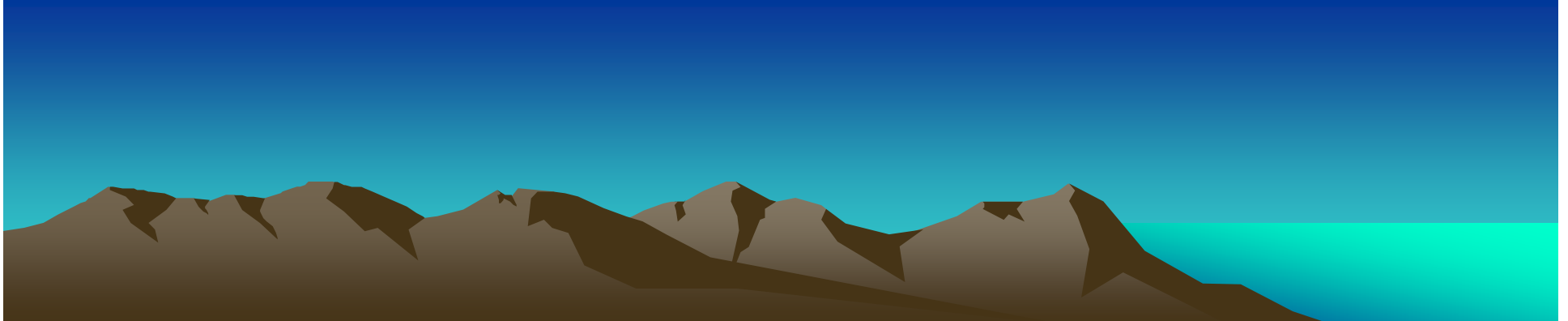
Transcervical-transmastoid

- Cervical incision carried postauricularly
- Mastoidectomy
- Remove mastoid tip exposing jugular fossa
- Facial nerve may need to be dissected from Fallopian canal



Nonsurgical Management

- Poor surgical candidates, failed balloon occlusion, elderly, unresectable lesions, would require sacrifice of multiple cranial nerves
- Observation
- Radiation



Observation

- Paragangliomas grow 1.0-1.5 mm per year
- Benign
- Mortality less than 10% per year for untreated



Radiation

- Not curable
- Used for local control
- Some shrink, mostly stops growth
- Local control 90-100% reported



Key things to remember:

- Prestyloid vs. Poststyloid
- Most are benign
- Pleomorphic most common prestyloid
- Neurogenic tumors are poststyloid
- “Surgery is mainstay of therapy



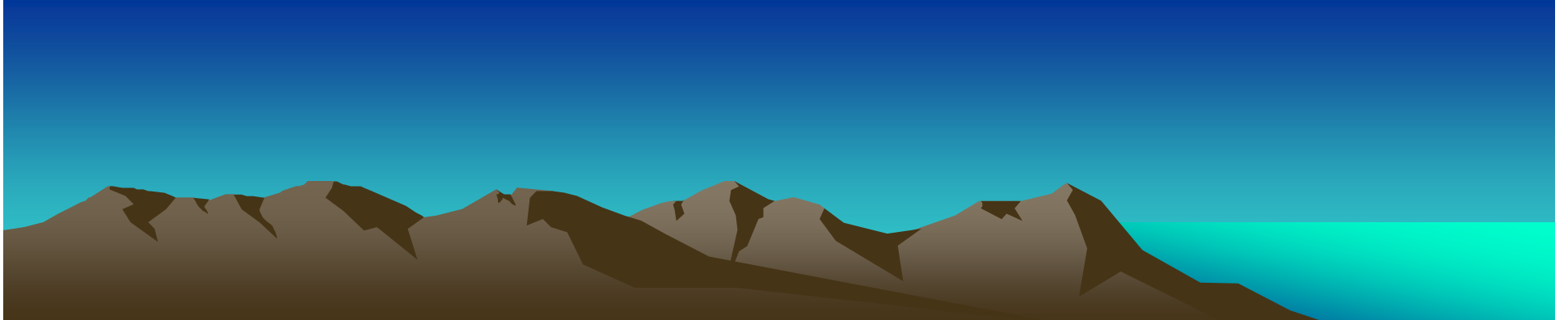
History

- 50 y old F.
- CC :
 - Large cervical goiter.
- PMHx:
 - Asymptomatic goiter.



P/E

- Neck:
 - Large goiter.
- HN exam:
 - Normal

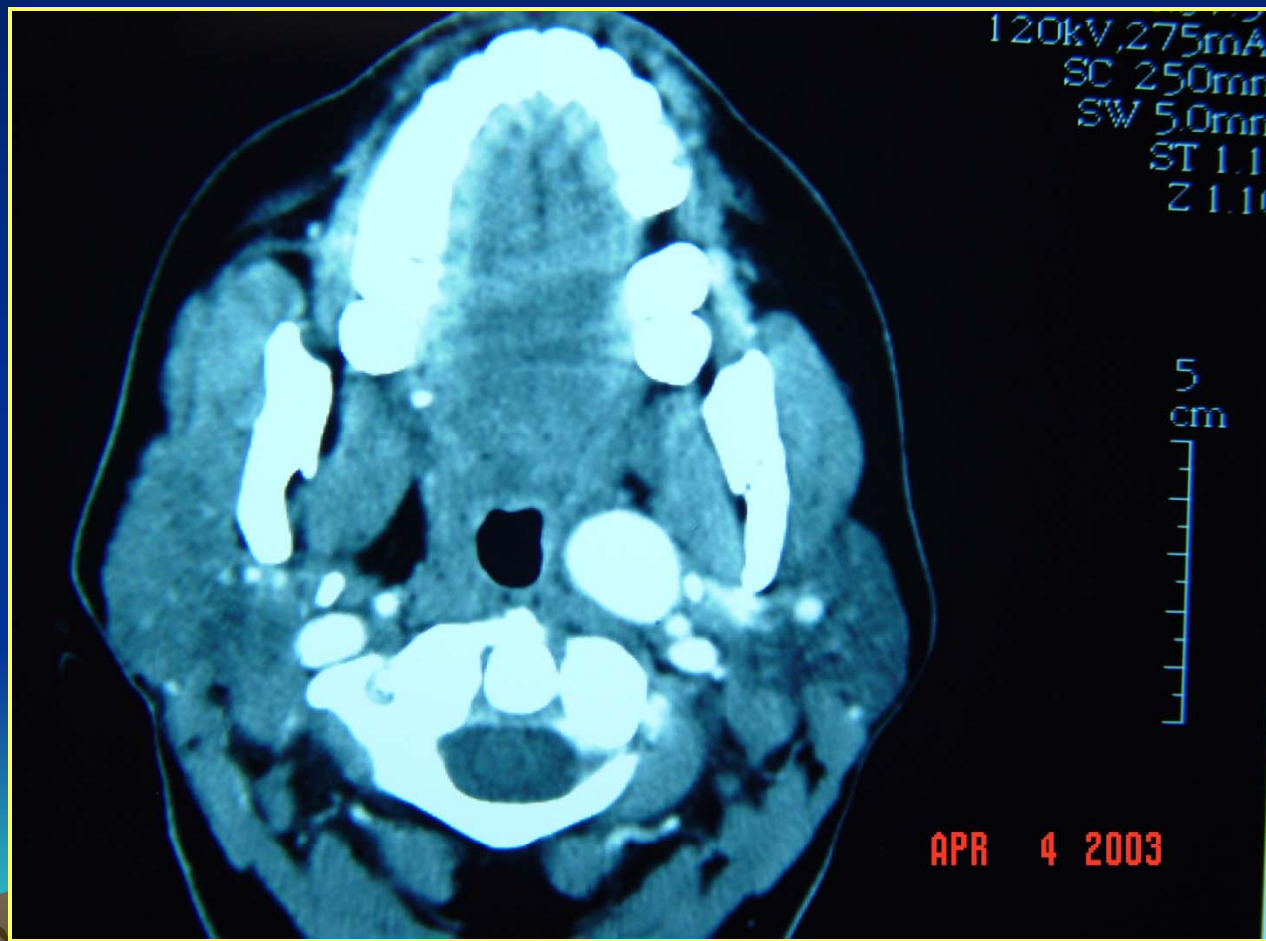


U/S Neck

- Large multinodular goiter, more in left side.
- On Left side ,no distinct nodules were measureable.
- On right side, largest nodule 1.5 cm.
- No adenopathy.



CT Neck

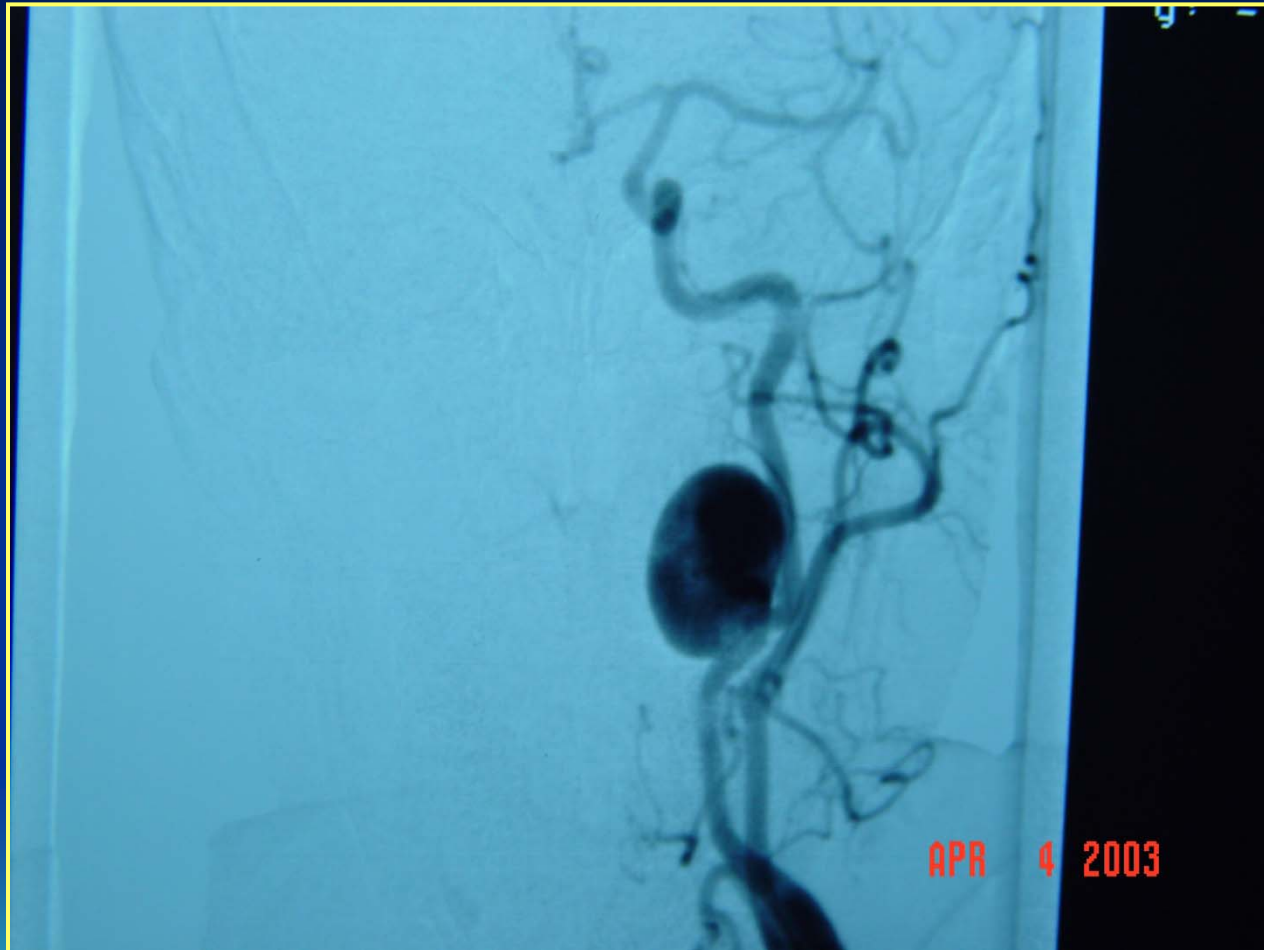


CT Neck

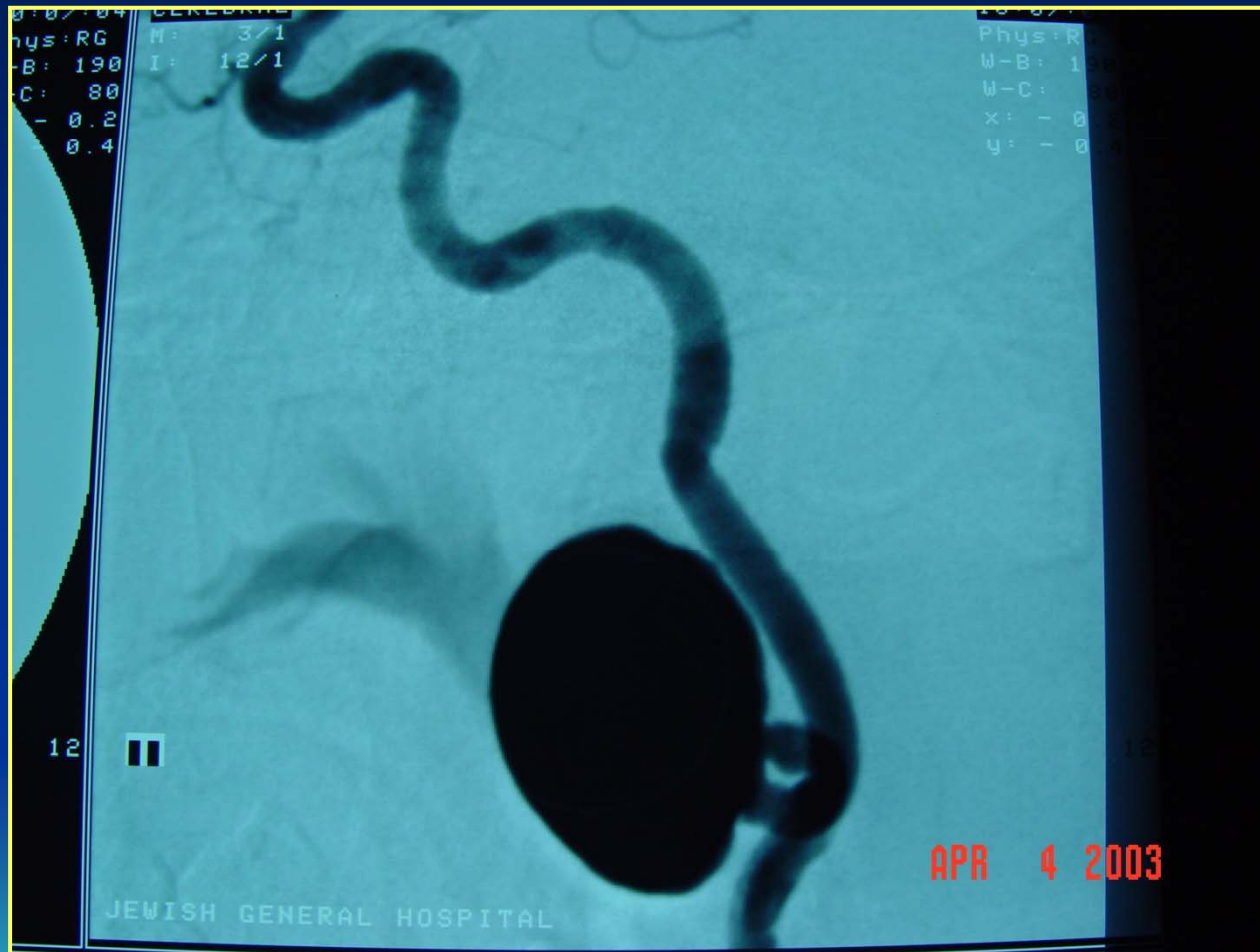
- Goitrous thyroid with dominant nodule arising from left inf lobe.
- No lymphadenopathy.
- Incidental 3cm lesion in left parapharyngeal space region, suspicious for pseudoaneurysm.



Angiogram



Angiogram



Angiogram

- Large left internal carotid artery aneurysm 2.25 cm by 3.29 cm, at skull base.



Treatment

- Tracheostomy, Mandibular Osteotomy and Swing Transoral Approach to left parapharyngeal space and left Cervical Neck Dissection.

AND

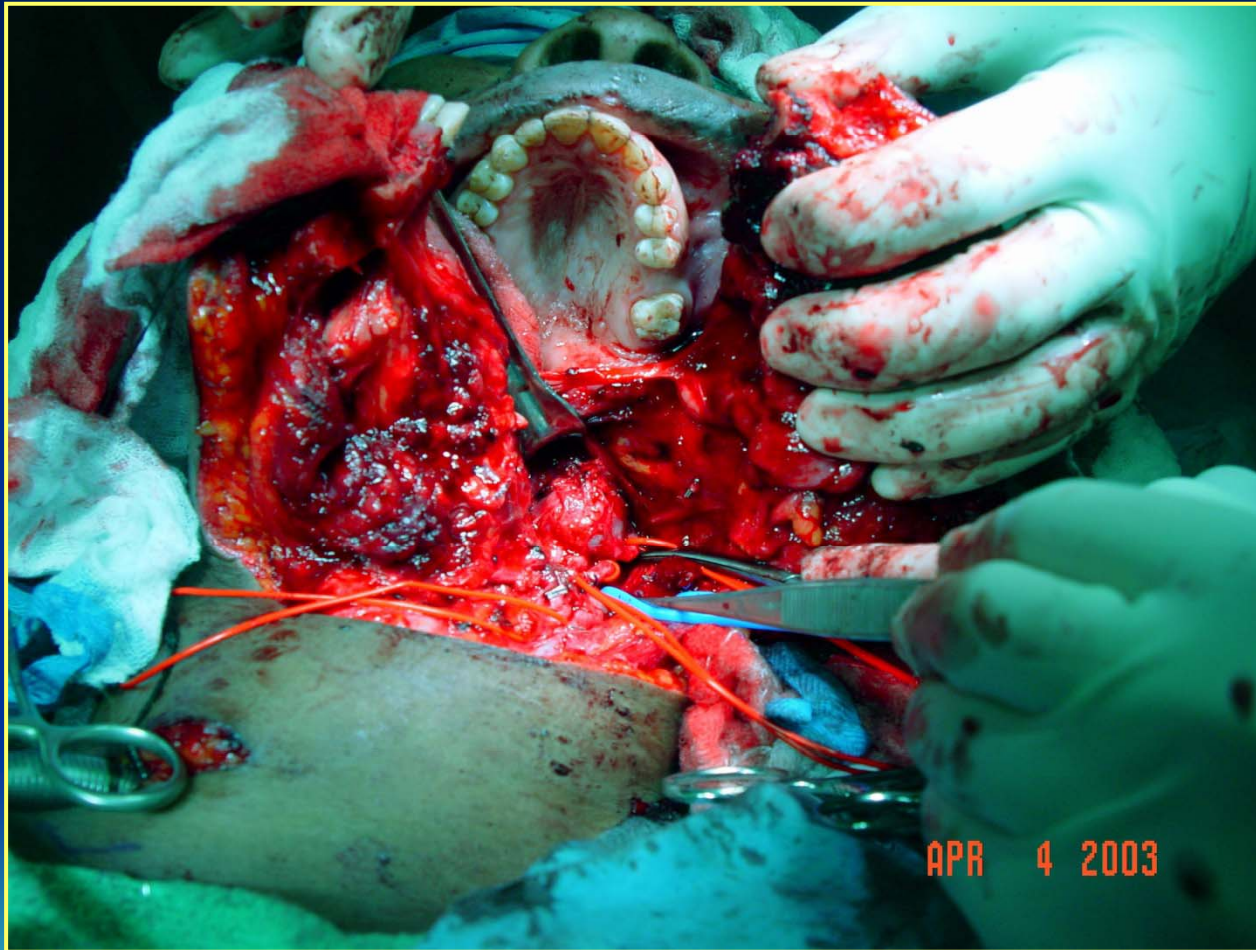
- Resection and Repair of internal carotid artery aneurysm.



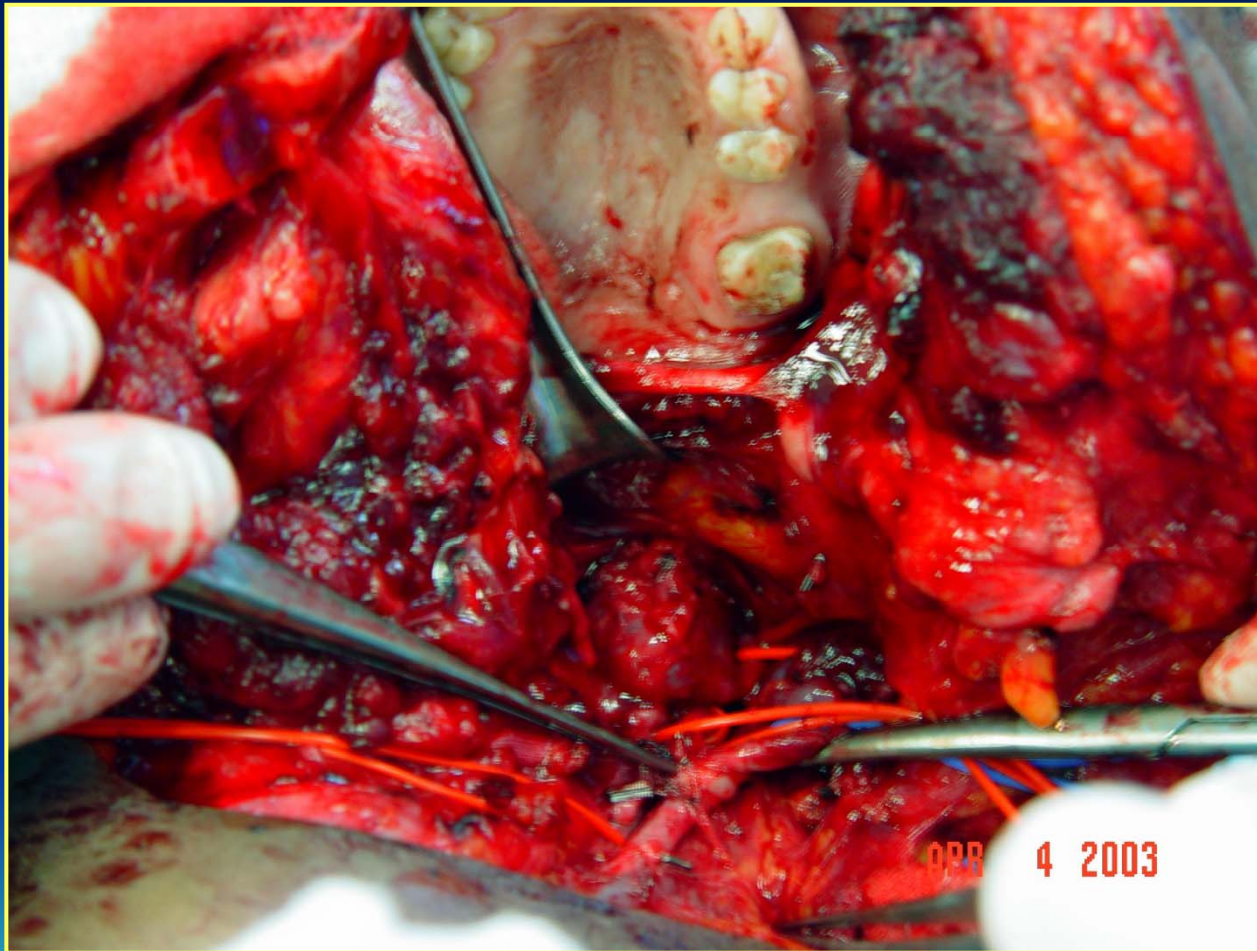
Surgery



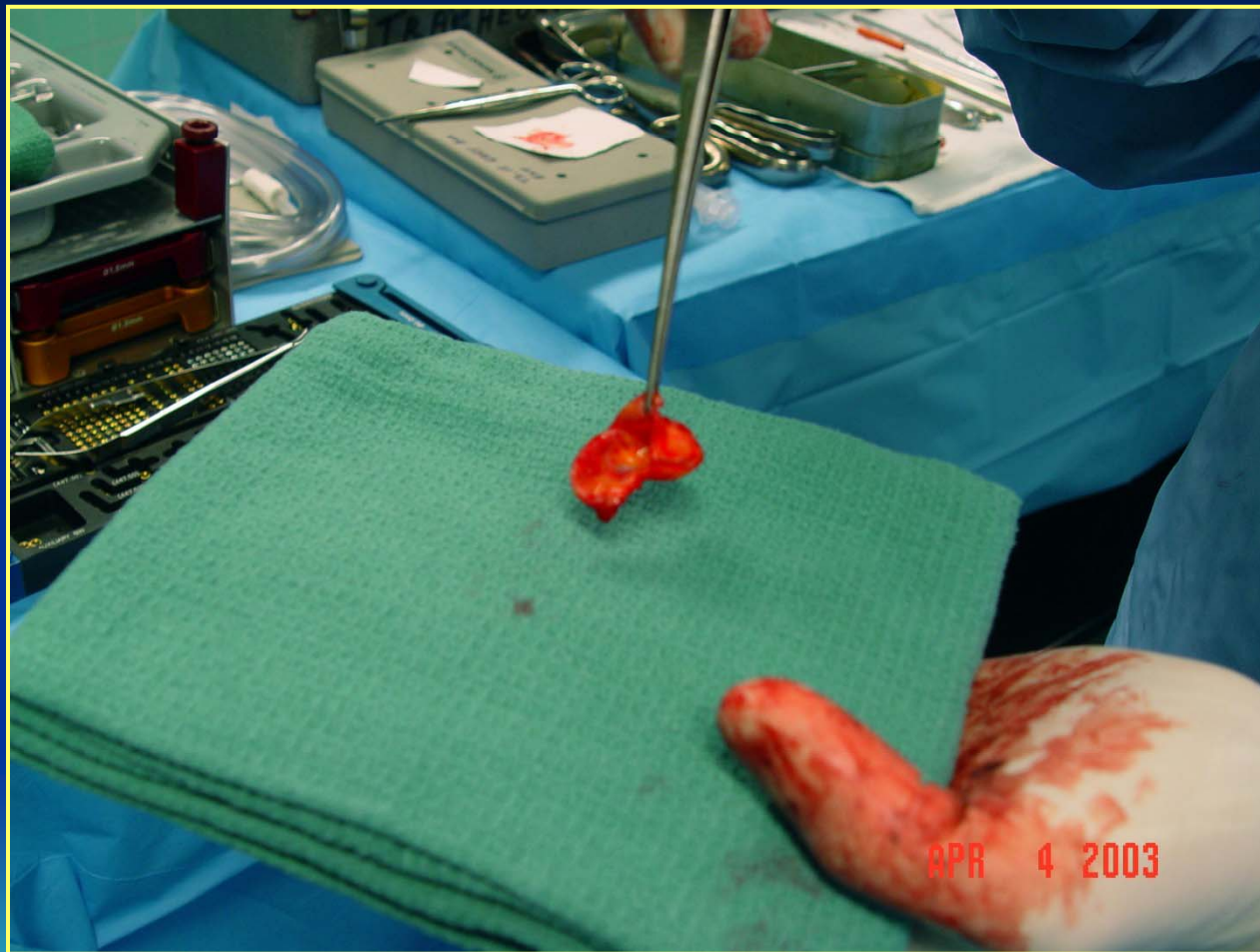
Surgery



Surgery



Surgery



F/U

