Case 1

30 year old HIV+ male with increasing bilateral facial fullness, left > right.

What is the most likely diagnosis?
A) 1st Branchial Cleft Cyst
B) Metastatic disease
C) Sjogren Syndrome
D) Warthin Tumor
E) HIV associated salivary gland disease

CECT

Case 1

In which suprahyoid neck space is this mass located?
A) Masticator Space
B) Parapharyngeal Space
C) Mucosal Space
D) Parotid Space
E) Carotid Space

Case 1

Parotid Space.
Lateral to parapharyngeal fat without significant fat displacement.
Claw of parotid parenchyma surrounding mass.
Peripheral enhancing, centrally hypoattenuating/cystic.
**Case 1 - Cystic Parotid Mass**

**Differential Diagnosis**
- 1st Branchial Cleft Cyst
- Metastatic disease to parotid lymph nodes
- Parotid Sjogren Syndrome
- Warthin Tumor
- HIV associated salivary gland disease

**Imaging**
- Unilateral cystic mass in parotid, periparotid, or EAC region
- Unilocular or multilocular
- May have surrounding inflammatory change

**Clinical**
- Majority present < 10 years old (earlier if sinus tract present)
- Can present with recurrent inflammation
- Tx: Surgical excision

**Imaging**
- Intraparotid lymphatics serve as the primary drainage pathway for the anterior parietooccipital scalp, cheek, pinna, and parotid tissue
- SCC, BCC, melanoma, pharyngeal SCC
- Bilateral symmetric atrophy with cysts, nodules and calcifications/stones
- Chronic appearance consists of fatty atrophy
• Autoimmune destruction of salivary glands (typically bilateral)
• Parotid involvement seen in 90% of patients with Sjogren’s (8:3 F:M)
• Often associated with connective tissue disorders
• Increased risk of parotid lymphoma

Case 1 - Cystic Parotid Mass - Sjogren Syndrome

Clinical

Imaging

Case 1 - Cystic Parotid Mass - Warthin Tumor

Clinical

Imaging

Case 1 - Cystic Parotid Mass - Warthin Tumor

Clinical

Imaging

Case 1 - Cystic Parotid Mass - HIV Associated Salivary Gland Disease

Clinical

Imaging

21 year old male with one week history of dysphagia, odynophagia.

Case 2
In which suprahyoid neck space is this mass located?

A) Masticator Space  
B) Parapharyngeal Space  
C) Mucosal Space  
D) Parotid Space  
E) Carotid Space

21 year old male with one week history of dysphagia, odynophagia.

What is the most likely diagnosis?

A) Tonsillitis  
B) Tonsillar/peritonsillar abscess  
C) Pharyngeal carcinoma  
D) Mucous retention cyst  
E) Tornwaldt cyst

Mucosal space.

Medial to, with lateral displacement of the parapharyngeal fat.

Located within the left palatine tonsil.

Peripherally enhancing, centrally hypointense.

Differential Diagnosis

- Pharyngeal carcinoma
- Mucous retention cyst
- Tornwaldt cyst
- Tonsillitis
- Tonsillar/peritonsillar abscess

Pharyngeal Carcinoma

• Tobacco is most common etiology with synergistic contribution from EtOH
• Think of HPV/EBV in younger patients
• Tx depends on primary location and staging
Case 2 – Mucosal Space Mass - Mucous Retention Cyst

**Imaging**
- May appear as simple cyst (T1 hypointense/T2 hyperintense) or proteinaceous (T1 hyperintense); no wall enhancement
- Usually less than 1 cm
- Commonly in lateral pharyngeal recess of nasopharynx

**Clinical**
- Typically incidental, although may result in eustachian tube occlusion and middle ear/mastoid effusion
- Postinflammatory etiology
- Do not touch!

Case 2 – Mucosal Space Mass - Tornwaldt Cyst

**Imaging**
- Round/ovoid cystic mass in midline of nasopharynx
- Homogeneous T1/T2 signal which may be intermediate depending on protein content
- +/- minimal wall enhancement

**Clinical**
- Benign developmental cyst resulting from notochord remnants
- Asymptomatic and incidental (although rarely can become infected)
- Seen on up to 5% of routine brain MRI

Case 2 – Mucosal Space Mass - Tonsillitis

**Imaging**
- Bilateral > unilateral tonsillar enlargement
- Striated internal enhancement
- +/- reactive adenopathy

**Clinical**
- Present with fever, sore throat, stridor, dysphagia/odynophagia
- Most common in children and young adults
- Can lead to tonsillar/peritonsillar cellulitis/abscess, scarlet fever, rheumatic fever
- Tx: Antibiotics. Tonsillectomy if chronic/recurrent
Case 2 – Mucosal Space Mass - Tonsillar/Peritonsillar Abscess

**Imaging**
- Enlarged tonsil(s) with peripherally enhancing, centrally hypoattenuating collection = tonsillar abscess
- Inflammation/pus in adjacent PPC/NFG/OMS = peritonsillar abscess

**Clinical**
- Present with fever, sore throat, adenopathy, trismus (lockjaw)
- May initially treat with antibiotics if no PTA or airway compromise
- I&D if PTA and/or airway compromise

Case 3

25 year old female with left neck swelling.

In which suprahyoid neck space is this mass located?

A) Parapharyngeal Space  
B) Carotid Space  
C) Mucosal Space  
D) Parotid Space  
E) Masticator Space

What is the most likely diagnosis?

A) Carotid body paraganglioma  
B) Carotid space neurilemmoma  
C) Carotid space chondroma  
D) Internal jugular vein thrombosis  
E) Carotid artery pseudoaneurysm

Oropharyngeal carotid space.

Displaces parapharyngeal fat and posterior belly digastricus anterolaterally.

Bows carotid vessels anteriorly and splays from internal jugular vein.

Heterogeneously enhancing, cystic mass that does not splay ICA/ECA.
Case 3 – Carotid Space Mass

Differential Diagnosis
- Internal jugular vein thrombosis
- Carotid artery pseudoaneurysm
- Carotid body paraganglioma
- Carotid space neurofibroma
- Carotid space schwannoma

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Case 3 – Carotid Space Mass - IJV Thrombosis

Imaging
- Filling defect within enlarged IJV lumen
- Wall enhancement + surrounding inflammatory change in setting of acute thrombophlebitis

Clinical
- Typically seen in older patients with other illness (malignancy, infection)
- In young patients, think of Lemierre syndrome (oropharyngeal Fusobacterium infection and 2/2 septic thrombophlebitis)
- Tx: Anticoagulation only used in severe cases. Antibiotics for underlying infection

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Case 3 – Carotid Space Mass - Carotid Artery Pseudoaneurysm

Imaging
- Focal luminal enlargement and/or saccular outpouching from ICA
- Commonly at proximal or distal ICA
- Wall calcification if chronic

Clinical
- May result from trauma (most common), radiation, surgery, infection, congenital wall abnormalities
- May present with stroke, pulsatile mass, CN palsy
- Tx: Anticoagulation (if small), endovascular stent graft or surgical repair if large

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Case 3 – Carotid Space Mass - Carotid Body Paraganglioma

Imaging
- Avidly enhancing mass splaying the ECA/ICA and extending cephalad from carotid bifurcation
- Salt and pepper appearance on T1WI (Salt = methemoglobin, phleboliths, and/or slow flow; pepper = flow voids)
**Clinical**
- May be familial (SDH, VHL, MEN)
- Slow growing, painless, pulsatile. Catecholamine production is rare
- Can result in compressive neuropathy of CN XI, XII
- Tx: surgical excision +/- preop embolization based on size

**Imaging**
- Ovoid/fusiform mass with mild enhancement
- Low density on CT
- Central T2 hypointensity (target sign)
- Interposed between carotid and IJV

**Carotid Body Paraganglioma**
- CECT
  - Ovoid/fusiform mass with mild enhancement
  - Low density on CT
  - Central T2 hypointensity (target sign)
- Interposed between carotid and IJV

**Carotid Space Neurofibroma**
- CECT
  - Benign, typically asymptomatic neck mass. If large, may cause dysphagia, CN palsy, UV occlusion
  - 50% secondary to NF1; 50% sporadic. NF1 may be larger and plexiform
  - May excise and/or radiate if symptomatic.

**Carotid Space Schwannoma**
- CECT
  - Benign, typically asymptomatic neck mass. If large, may cause dysphagia, CN palsy, UV occlusion
  - CN IX – XII (vagus most common)
- Tx: nerve sparing gross total resection

**Clinical Case 3 – Carotid Space Mass – Carotid Body Paraganglioma**

**Imaging Case 3 – Carotid Space Mass – Carotid Space Neurofibroma**

**Imaging Case 3 – Carotid Space Mass – Carotid Space Schwannoma**

**Clinical Case 4**
- 30 year-old female with trismus.

**Imaging Case 4**
In which suprahyoid neck space is this mass located?

A) Parapharyngeal Space  
B) Carotid Space  
C) Muscular Space  
D) Parotid Space  
E) Masticator Space

What is the most likely diagnosis?

A) Nerve sheath tumor  
B) Asymmetric venous plexus  
C) Chondrosarcoma  
D) Other sarcoma  
E) Infection/abscess

30 year-old female with trismus.

30 year-old female with trismus.

Masticator space.

Displaces parapharyngeal fat posteromedially.

Adjacent musculature appears enlarged with hyperenhancement.

Multiloculated, peripherally enhancing fluid collection with central diffusion restriction.

Case 4

Masticator Space Mass

Differential Diagnosis

• Nerve sheath tumor/perineural tumor spread
• Asymmetric venous plexus
• Sarcoma
• Infection/abscess

T1

T1+C

T1+C+FS

T1 without FS: loss of fat planes at foramen ovale and inferior alveolar canal/mandibular foramen

T1+C: optimal for showing abnormal perineural enhancement (esp. in coronal plane)

Look for focal mass and foraminal enlargement (NST) or abnormal thickening and enhancement (PNT) along course of V3

T1+C+FS: optimal for showing abnormal perineural enhancement (esp. in coronal plane)

Both: commonly asymptomatic, may have CN palsy

Clinical NST/PNT Spread
Unilateral prominence of facial pterygoid venous plexus draining cavernous sinus

Tubular enhancement in medial masticator space, iso to other facial venous structures

May extend to foramen ovale, but not beyond

Asymmetric Venous Plexus Imaging

Case 4 – Masticator Space Mass

Incidental, asymptomatic

May be produced/exacerbated by CCF

Clinical

Sarcoma Imaging

Case 4 – Masticator Space Mass

Large, aggressive appearing mass with bone destruction and invasion of adjacent H&N spaces

May have bone production/calcification

Evaluate for perineural tumor spread along V3

Clinical

Sarcoma

Malignant tumors arising from soft tissue

FDG-PET can aid with biopsy guidance

Evaluate for genetic predisposition (Li-Fraumeni, Rb, Gardner syndrome)

Infection/Abscess Imaging

Case 4 – Masticator Space Mass

Rim-enhancing fluid collection adjacent to mandible which may become transpatial

Look for osteomyelitis with cortical breakthrough and periosteal elevation. Likely adjacent dental source

Associated with surrounding phlegmon, cellulitis, myositis, +/- adenopathy

Clinical

Infection/Abscess

Present with trismus, SL/SM swelling, tongue pain

May clinically mimic TMJ disease

Results from dental disease or recent dental procedure

Tx: Treat dental disease, I&D + Abx
Case 5
40 year-old female with dysphagia.

In which suprahyoid neck space is this mass located?
A) Parapharyngeal Space
B) Carotid Space
C) Mucosal Space
D) Parotid Space
E) Masticator Space

What is the most likely diagnosis?
A) Benign mixed tumor
B) Warthin tumor
C) Mucoepidermoid carcinoma
D) Adenoid cystic carcinoma
E) Non-Hodgkin lymphoma

Parotid space.
Lateral to, with medial displacement of parapharyngeal fat.
Mass effect upon posterior margin of pterygoid musculature. Carotids displaced posteriorly.
Circumscribed, T2-hyperintense, enhancing solid mass.

Differential Diagnosis
- Warthin tumor
- Non-Hodgkin lymphoma
- Mucoepidermoid carcinoma
- Adenoid cystic carcinoma
- Benign mixed tumor

Imaging
- Circumscribed cystic lesions +/- minimally enhancing components
- TC-99m pertechnetate and 18-FDG uptake (also seen with oncocytomas)
- "Earring lesion"
Case 5 — Solid Parotid Space Mass - Warthin Tumor

**Clinical**
- Benign. Almost exclusive to parotid glands
- High association with smoking (OR > 8)
- 20% bilateral. Older patients (age > 60)
- Tx: Biopsy required to exclude malignancy

**Imaging**
- May appear as:
  - Diffuse infiltration
  - Intraparotid masses

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Case 5 — Solid Parotid Space Mass - Non-Hodgkin Lymphoma

**Clinical**
- Increased risk with autoimmune disease (Sjogren’s most common)
- Lymphoma of the salivary glands is often isolated to the glands, although some parotid lymphomas have nodal origin (must do not)
- Average age 63 (rare in children). May be bilateral

**Imaging**
- Heterogenous, enhancing parotid mass with circumscribed (low-grade) or ill-defined (high-grade) margins
- Can have internal areas of cystic change
- Low ADC values (but similar to that of Warthin tumor)

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Case 5 — Solid Parotid Space Mass - Mucoepidermoid Carcinoma

**Clinical**
- Most common primary parotid malignancy
- Tx: Wide excision +/- parotidectomy. Radiotherapy. Neck dissection (high grade)
- Long-term follow up necessary after treatment due to late recurrences

**Imaging**
- Homogenously enhancing parotid mass with circumscribed (low-grade) or ill-defined (high-grade) margins
- Internal cystic change is less likely than with MECa

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Case 5 — Solid Parotid Space Mass - Adenoid Cystic Carcinoma
Case 5 – Solid Parotid Space Mass: Adenoid Cystic Carcinoma

Clinical
- Slow growing; typically in 5th-7th decade of life
- Up to 1/3 present with pain and CN VII paralysis
- Tx: wide resection and radiotherapy
- Good short-term, poor long-term prognosis with late recurrence and metastasis (bone, lung)

Case 5 – Solid Parotid Space Mass

Perineural Tumor Spread

Imaging
- Circumscribed intraparotid mass with uniform (< 2 cm) or heterogeneous (> 2 cm) enhancement
- T2 hyperintense with ADC values higher than other benign and malignant parotid masses

80% Rule – 80% of:
- Parotid tumors are benign
- Benign parotid tumors are pleomorphic adenomas
- Salivary gland PAs are located in parotid glands
- Parotid PAs are in the superficial lobe
- Untreated PAs remain benign (15-20% undergo malignant transformation)

Case 5 – Solid Parotid Space Mass: Benign Mixed Tumor

Imaging
- Painless, slow growing
- Malignant transformation in up to 15%