Differential Diagnosis

Common
- Direct extension into parapharyngeal space from neoplasm from adjacent space
  - Pharyngeal mucosal space/surface → parapharyngeal space
    - Nasopharyngeal Carcinoma
    - Squamous Cell Carcinoma, Palatine Tonsil
    - Non-Hodgkin Lymphoma, Pharyngeal Mucosal Space
  - Masticator space → parapharyngeal space
    - Sarcoma, Masticator Space
    - Rhabdomyosarcoma, Masticator Space
  - Parotid space → parapharyngeal space
    - Benign Mixed Tumor, Parotid Space
    - Adenoid Cystic Carcinoma, Parotid Space
    - Mucoepidermoid Carcinoma, Parotid Space
- Direct extension into parapharyngeal space from abscess from adjacent space
  - Abscess, Masticator Space
  - Tonsillar Abscess, Pharyngeal Mucosal Space
  - Parotitis, Acute, Parotid Space

Less Common
- Primary parapharyngeal space lesion
  - Pterygoid Venous Plexus Asymmetry
  - Venolymphatic Malformation
  - Lipoma

Rare but Important
- Benign Mixed Tumor, Parapharyngeal Space
- 2nd Branchial Cleft Cyst, Variant
- Ranula, Diving

Essential Information

Key Differential Diagnosis Issues
- Parapharyngeal space (PPS) lesion is suprahyoid only
  - Some literature separates PPS into pre- & poststyloid compartments
  - Using this scheme, functional differential considerations by space can be sorted as
    - Prestyloid PPS = PPS (differential considerations here)
    - Poststyloid PPS = carotid space (not addressed here)
    - Carotid space masses are uncommon but displace PPS fat anteriorly
      - Considerations include vascular lesions, neurogenic tumors, & parangangiomas (not addressed here)
- Primary PPS lesions are rare
  - Intact fat plan separates mass from adjacent spaces
  - Displacement of PPS fat is useful to determine origin of masses arising from adjacent suprahyoid head & neck spaces
  - PPS most commonly affected secondarily by direct spread of local malignancy or infection

Helpful Clues for Common Diagnoses
- Pharyngeal mucosal space/surface (PMS) → PPS
  - PPS fat displaced laterally if mass located in PMS
  - Most common etiologies are infection or malignancy
- Nasopharyngeal Carcinoma
- Squamous Cell Carcinoma, Palatine Tonsil
  - Induration of PPS fat & irregular margin between fat & tumor are key findings
  - CT/MR: Tumor arises in tonsillar fossa, extends laterally with either mass effect or direct invasion of PPS
  - Tumor staged as T4 if PPS invaded
- Non-Hodgkin Lymphoma, Pharyngeal Mucosal Space
  - CT/MR: Bulky PMS tumor bulges medial wall of PPS, without direct invasion
  - Homogeneous density, usually without necrosis
- Masticator space (MS) → PPS
  - PPS fat displaced posteromedially for mass in MS
- Sarcoma, Masticator Space
  - CT/MR: Aggressive MS tumor ± calcific matrix
- Rhabdomyosarcoma, Masticator Space
  - CT/MR: Aggressive noncalcified MS tumor in child
- Parotid space (PS) → PPS
  - PPS fat displaced medially
    - Most deep lobe parotid tumors compress &/or involve PPS
    - Fascia less adherent along medial aspect of deep lobe parotid
  - When tumor is large, may be difficult to determine if site of origin is PS or PPS
  - Lesion of parotid gland can arise in, or spread to, deep lobe of parotid & extend medially
    - Widening of stylomandibular tunnel characterizes primary parotid masses extending into (prestyloid) PPS
- Benign Mixed Tumor, Parotid Space
  - Benign deep lobe tumor often asymptomatic until large
  - May be hard to determine if tumor is from deep lobe of parotid or primary PPS
  - CT/MR: Large, well-circumscribed mass flattening lateral aspect of PPS
- Adenoid Cystic Carcinoma, Parotid Space
  - CT/MR: Invasive parotid mass with propensity for perineural spread (CNVII)
- Mucoepidermoid Carcinoma, Parotid Space
  - CT/MR: Invasive parotid mass; enhances, “feathery” margins
- Abscess, Masticator Space
  - Odontogenic origins; recent tooth extraction or lucency around molar
  - CT/MR: Pus pocket in MS; edematous muscles; induration of PPS from lateral aspect
  - Direct extension into PPS from abscess from adjacent space
- Tonsillar Abscess, Pharyngeal Mucosal Space
  - CT/MR: Palatine tonsil pus with surrounding edema & induration
  - Displaces PPS fat laterally if intratonsillar; abscess may rupture laterally into PPS
- Parotitis, Acute, Parotid Space
  - CT/MR: Edematous parotid gland with increased density/enhancement
○ Swollen, deep lobe causes mass effect on lateral wall of PPS
○ Look for radiopaque calculus as predisposing cause
○ Unilateral bacterial; bilateral viral

Helpful Clues for Less Common Diagnoses

- Pterygoid Venous Plexus Asymmetry
  ○ Prominent venous plexus at pterygoid plates involves PPS & MS
    - May simulate venous malformation
    - Usually more linear serpiginous than cystic
  ○ CECT: Asymmetric prominent venous enhancement in MS & anterior PPS near pterygoid plates

- Venolymphatic Malformation
  ○ Common congenital suprahyoid transspatial lesion usually presents in childhood
  ○ Typically asymptomatic; incidental finding on imaging
  ○ CT/MR: Can be limited, but typically involves multiple contiguous spaces, including PPS
    - Appearance determined by whether lesion is primarily venous, lymphatic, or mixed in composition
  - Cystic mass with T2 hyperintensity (may be uni- or multilocular)
  - Lymphatic malformations are nonenhancing; venous & venolymphatic malformations enhance
  - Calcified phleboliths on CT are characteristic of venous malformation

- Lipoma
  ○ Benign fatty tumor almost always incidental finding
  ○ CT/MR: Enlarged but otherwise normal-appearing PPS
    - Should have no soft tissue component & no enhancement

Helpful Clues for Rare Diagnoses

- Benign Mixed Tumor, Parapharyngeal Space
  ○ Arises in PPS from ectopic salivary gland rests
    - Primary PPS benign mixed tumor that has no connection to deep lobe of parotid gland
    - Tumor often large when diagnosed
  - PPS lesions “silent” & asymptomatic
  ○ CT/MR: Variable enhancement

○ Ovoid mass typically low T1, high T2 signal on MR
○ If part of mass appears more aggressive or irregular, think of malignancy arising in benign mixed tumor, “carcinoma ex pleomorphic adenoma”

- 2nd Branchial Cleft Cyst, Variant
  ○ Primary cyst in PPS most likely branchial in origin
  ○ CT/MR: Benign, nonenhancing cyst
    - May point towards or be connected to palatine tonsil

- Ranula, Diving
  ○ Sublingual gland retention cyst ruptures into submandibular space & PPS
  ○ CT/MR: Tail sign in sublingual space leads to SMS & PPS cystic components
    - No fascial boundary between submandibular space & PPS
    - PPS component rarest area for pseudocyst to spread

SELECTED REFERENCES


(Nasopharyngeal Carcinoma)

(Nasopharyngeal Carcinoma)

(Left) Axial T1WI MR shows a nonkeratinizing EBV(+) nasopharyngeal carcinoma filling the pharyngeal mucosal space. The parapharyngeal space and prevertebral muscles are invaded by the tumor. (Right) Coronal T1WI MR in the same patient reveals carcinoma in the nasopharyngeal mucosal space invading laterally into the right parapharyngeal space. Note the normal left parapharyngeal space fat.
**Parapharyngeal Space Lesion**

*Left* Axial CECT shows a large palatine tonsil squamous cell carcinoma (SCCa) invading posterolaterally into the parapharyngeal space. Note the fatty triangle of the normal contralateral parapharyngeal space. *Right* Axial CECT in the same patient demonstrates the palatine tonsillar SCCa invading the sublingual space and lateral parapharyngeal space. Bilateral malignant level II nodes are also noted.

*Left* Axial CECT demonstrates a bulky, bilateral nasopharyngeal non-Hodgkin lymphoma bulging into both parapharyngeal spaces. The “feathery” appearance on the left suggests invasion of the parapharyngeal space. *Right* Axial CECT in the same patient shows the mass nearly obliterating the left parapharyngeal space.

*Left* Axial CECT shows a masticator space osteosarcoma with destruction of the mandible and extension through the maxillary sinus wall. Note mild mass effect on the parapharyngeal space. *Right* Axial bone CT in the same patient demonstrates “sunburst” malignant periosteal changes of osteosarcoma. Parapharyngeal space compression, from lateral to medial, is characteristic of a masticator space tumor.
Parapharyngeal Space Lesion

**Rhabdomyosarcoma, Masticator Space**

(Left) Axial T1 MR shows a large masticator space rhabdomyosarcoma in a 7-year-old boy. The parapharyngeal space fat is displaced medially and is partly effaced. Note the normal-appearing left parapharyngeal space fat. The right parotid gland is also invaded by tumor. (Right) Axial T2WI MR reveals a large rhabdomyosarcoma in the medial masticator space, destroying the mandible. The mass displaces and invades the parapharyngeal space.

**Benign Mixed Tumor, Parotid Space**

(Left) Axial T1WI MR shows a large, deep parotid tumor with effacement of the pterygoid muscles, airway compromise, and mass effect on the soft palate. The parapharyngeal space is markedly flattened and displaced medially but not invaded. (Right) Coronal T1WI MR in the same patient confirms a thin, hyperintense fat stripe, supporting that the parapharyngeal space is stretched over the mass but not invaded.

**Adenoid Cystic Carcinoma, Parotid Space**

(Left) Axial T1 C+ FS MR shows an enhancing, invasive, recurrent tumor in the parotid gland with extension into the parapharyngeal space in a patient previously treated for parotid adenoid cystic carcinoma. Parapharyngeal fat has been replaced by tumor. (Right) Coronal T1 C+ FS MR in the same patient demonstrates a deep lobe tumor extending into the parapharyngeal space. There is also perineural tumor along the 3rd division of the trigeminal nerve at the foramen ovale.
Suprahyoid and Infrahyoid

Parapharyngeal Space Lesion

(Left) Axial CECT of high-grade mucoepidermoid carcinoma of the parotid (2) shows focal calcifications (2) at the tumor component involving the deep lobe. Parapharyngeal fat is displaced medially (2). Compare to normal parapharyngeal fat on right (2). (Right) Abscess (2) of the medial pterygoid muscle (2), causing effacement & medial displacement of parapharyngeal space fat (2), is shown on axial CECT. Note normal right parapharyngeal fat (2). Inflammatory stranding extends to the deep lobe of the parotid (2).

(Left) Axial CECT in a patient with a 2-week history of tonsillitis shows pus in the parapharyngeal space (2) with a large, adjacent, inflamed palatine tonsil (2) and associated masticator space phlegmon (2). (Right) Axial CECT in the same patient reveals an inferior palatine tonsil abscess (2) causing extensive submandibular space cellulitis (2) and parapharyngeal and masticator space abscess (not shown).

(Left) Axial CECT demonstrates asymmetric enlargement and enhancement of the right parotid gland (2). There is stranding in the subcutaneous fat and increased density in the right parapharyngeal space fat (2) from associated edema. (Right) Axial CECT demonstrates a prominent asymmetric left pterygoid venous plexus as racemose enhancement in the deep masticator (2) and anterior parapharyngeal (2) space.
Parapharyngeal Space Lesion

Venolymphatic Malformation

(Left) Axial CECT in a patient with violaceous oropharyngeal mucosa shows a tissue density venous malformation with phleboliths, involving the pharyngeal mucosal and parapharyngeal space. (Right) Axial T2WI FS MR reveals a high-signal venolymphatic malformation that fills the parapharyngeal space and ipsilateral retropharyngeal space. The transspatial nature, fluid signal, and shape all suggest venolymphatic malformation.

Lipoma

(Left) Axial CECT demonstrates a lipoma in the parapharyngeal space. This lipoma extended inferiorly and involved the submandibular space (not shown). (Right) Axial CECT shows an ovoid benign mixed tumor centered in the parapharyngeal space. Note the sharp delineation between the deep lobe of the parotid gland and the tumor, indicating that the lesion arose in the parapharyngeal space and not in the deep lobe of the parotid gland.

Benign Mixed Tumor, Parapharyngeal Space

2nd Branchial Cleft Cyst, Variant

(Left) Axial NECT reveals an ovoid, low-density cyst in the right parapharyngeal space deep to the palatine tonsil. This is a rare example of a 2nd branchial cleft cyst projecting superiorly into the parapharyngeal space. (Right) Axial CECT reveals a fluid-density lesion in the left parapharyngeal space. This superior extension of a diving ranula is confirmed on inferior images, defining the ranular sublingual space origin (not shown).

Ranula, Diving

(Left) Axial CECT in a patient with violaceous oropharyngeal mucosa shows a tissue density venous malformation with phleboliths, involving the pharyngeal mucosal and parapharyngeal space. (Right) Axial T2WI FS MR reveals a high-signal venolymphatic malformation that fills the parapharyngeal space and ipsilateral retropharyngeal space. The transspatial nature, fluid signal, and shape all suggest venolymphatic malformation.