
Cystic Lesions of the Head and Neck: Benign or Malignant?

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Editor's note: This is the second part of a two-part series. Part 1 appeared in the September/October 2020 issue of Applied Radiology.

Cystic head and neck lesions run the gamut in severity from incidental to life-threatening. Diagnostic specificity can be improved by identifying the involved anatomical spaces and correlating with a detailed clinical history.

Part 1 of this article series discussed differential diagnoses for lesions in the oral cavity, pharynx, masticator space, and parotid space. Here, we explore lesions of the carotid space and associated lymph nodes, retropharyngeal space, prevertebral space, visceral space, and supraclavicular fossa.

Carotid Space and Internal Jugular Chain Lymph Nodes

The carotid space extends from the aortic arch to the skull base, just lateral to the retropharyngeal space; it contains primarily the common carotid artery, internal carotid artery (ICA), internal jugular vein (IJV), and portions of cranial nerves 9-12 (Figure 1).

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These components are enveloped by the carotid sheath, which defines the boundaries of the space. Important structures closely associated with the carotid space and lying along the outer surface of the carotid sheath, include the sympathetic trunk (chain) and the internal jugular (deep cervical) chain lymph nodes.¹

The most common cystic lesions within or associated with the carotid space are necrotic or suppurative lymph nodes. The term “necrotic” implies metastatic disease and “suppurative” implies infection (ie, an intranodal abscess), but their imaging features can be very similar. Associated inflammatory changes favor infection, often related to periodontal disease or pharyngitis. However, metastatic disease should always be the primary concern in adults, especially in the absence of signs or symptoms of infection.²

The primary tumor will most likely be a squamous cell carcinoma arising from the pharynx. Less commonly, cervical lymphadenopathy with cystic and partially calcified nodes in a young woman is strongly suggestive of papillary

thyroid cancer (Figure 2).³ In both cases, the primary tumor may be small and difficult to identify without a high index of suspicion. Of note, tuberculosis can mimic metastatic disease and also should be considered in cases involving risk factors such as HIV, intravenous drug use, or time spent in areas with high rates of tuberculosis.⁴

Another mass occasionally seen in the carotid space is a schwannoma, most commonly arising from the vagus nerve. Like most masses in the carotid space, schwannomas are typically solid, but larger schwannomas can demonstrate non-enhancing cystic areas (Figure 3).⁵ A vagal schwannoma characteristically appears as a fusiform enhancing mass that splays the ICA and IJV.⁶ A schwannoma arising from the sympathetic chain is more likely to displace the ICA and IJV anteriorly, although splaying of the carotid bifurcation, a finding typically associated with a carotid body paraganglioma, has also been described.⁷ On magnetic resonance imaging (MRI), however, schwannomas lack the flow voids characteristic of paragangliomas.⁸



FIGURE 1. Carotid space. Axial CECT image at the level of the nasopharynx demonstrates the carotid space (white outline), retropharyngeal space (mostly a potential space approximated by the dashed line), and prevertebral soft tissues (black outline). The carotid space contains the internal carotid artery (gray arrow), internal jugular vein (black arrow), and portions of some cranial nerves (not visible here). A retropharyngeal lymph node (white arrow) is visible in the retropharyngeal space at the level of the nasopharynx, medial to the ICA. The longus capitis muscle (asterisk) belongs to the prevertebral space. The longus colli muscle lies inferior to this level. Note that the prevertebral space also includes the vertebral bodies; for clarity, only the prevertebral soft tissues are labeled.

Retropharyngeal and Prevertebral Spaces

The retropharyngeal space lies posterior to the pharynx and esophagus and contains only the retropharyngeal lymph nodes (adjacent to the nasopharynx) and fat (Figure 1). The prevertebral space lies posterior to the retropharyngeal space and contains the vertebral bodies, longus colli and capitis muscles, scalene muscles, roots of the brachial plexus, and the vertebral artery and vein (Figure 1).¹

Cystic lesions in these spaces comprise a fairly short differential diagnosis. An enlarged cystic retropharyngeal node may represent metastatic disease (most commonly from nasopharyngeal carcinoma or squamous cell carcinoma) or, in younger patients, a suppurative node related to a pharyngeal infection.² A more diffuse fluid collection between the pharynx/esophagus and vertebral body represents either retropharyngeal edema or an abscess (retropharyngeal and/or prevertebral). The distinction is critical: a retropharyngeal abscess is a serious condition requiring urgent otolaryngology consultation and possible

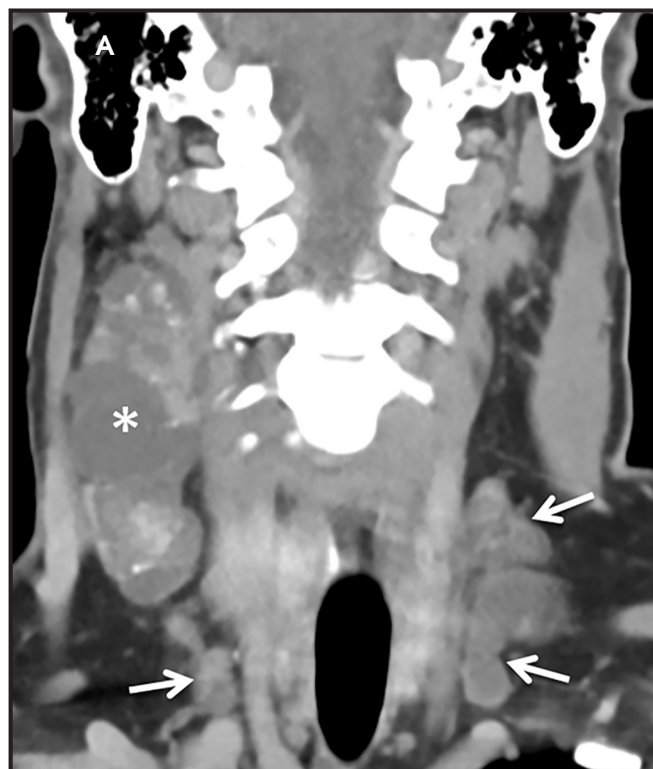


FIGURE 2. Metastatic lymphadenopathy. Metastatic thyroid carcinoma in a 30-year-old with neck pain and swelling. Coronal CECT images (A,B) demonstrate extensive bilateral lower cervical lymphadenopathy (white arrows), including a large cystic and partially calcified lymph node conglomerate on the right (white asterisk).

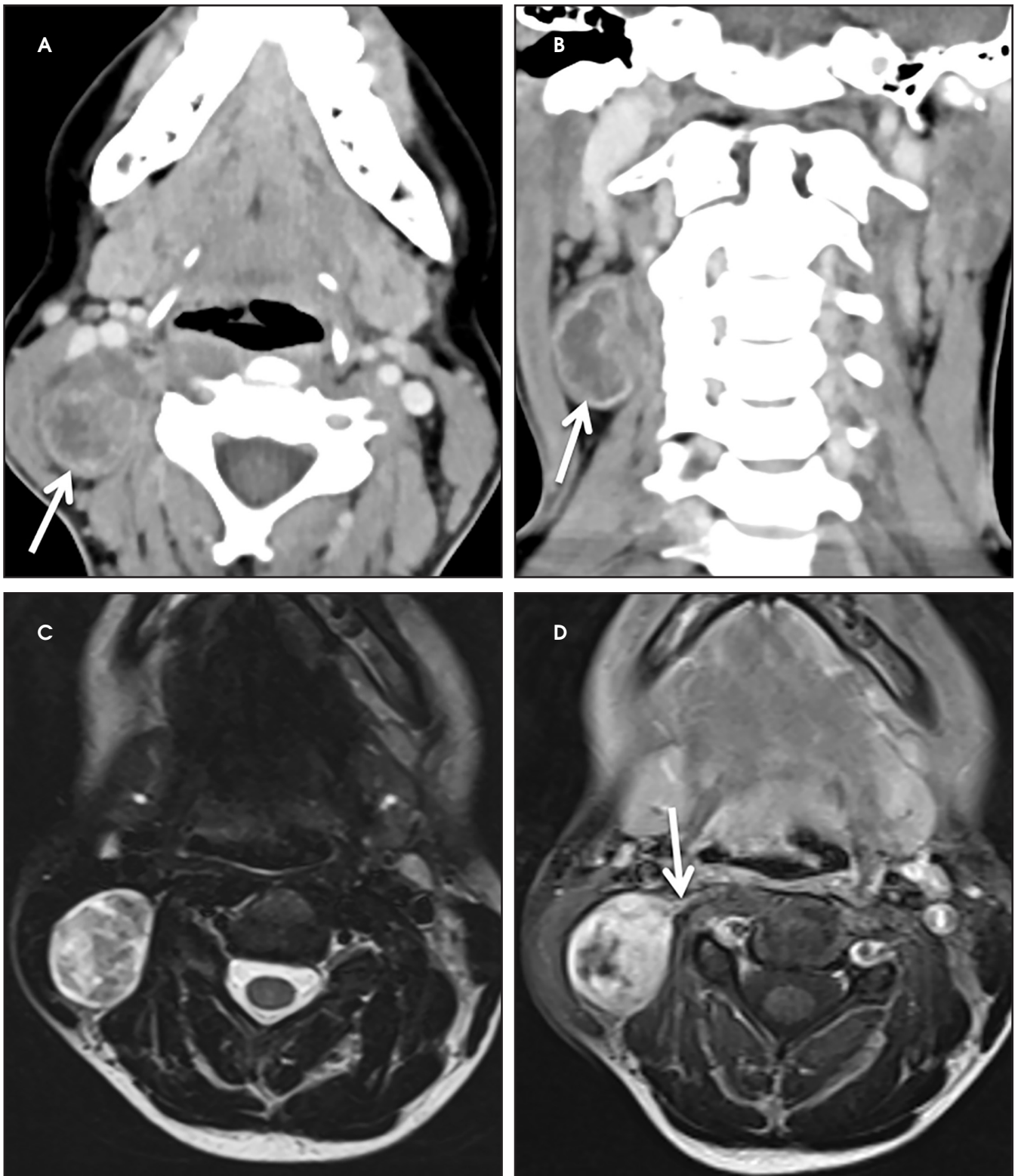


FIGURE 3. Carotid space schwannoma. 36-year-old with a neck lump for a year. Axial (A) and coronal (B) CECT images demonstrate an ovoid, circumscribed mass (white arrow) deep to the right sternocleidomastoid muscle, anteriorly displacing the internal jugular vein and internal carotid artery. Although schwannoma was favored, the differential diagnosis included a necrotic lymph node. On MRI, the lesion is predominantly hyperintense on axial T2 images (C), with heterogeneous enhancement on the axial T1 images with contrast and fat saturation (D), and no evidence of local infiltration. The mass is isointense to muscle on precontrast T1 images (not shown). Its location (posterior to the carotid artery) and a “tail” of tissue extending towards the anterior surface of the longus colli (D, white arrow) suggest origin from the sympathetic chain.

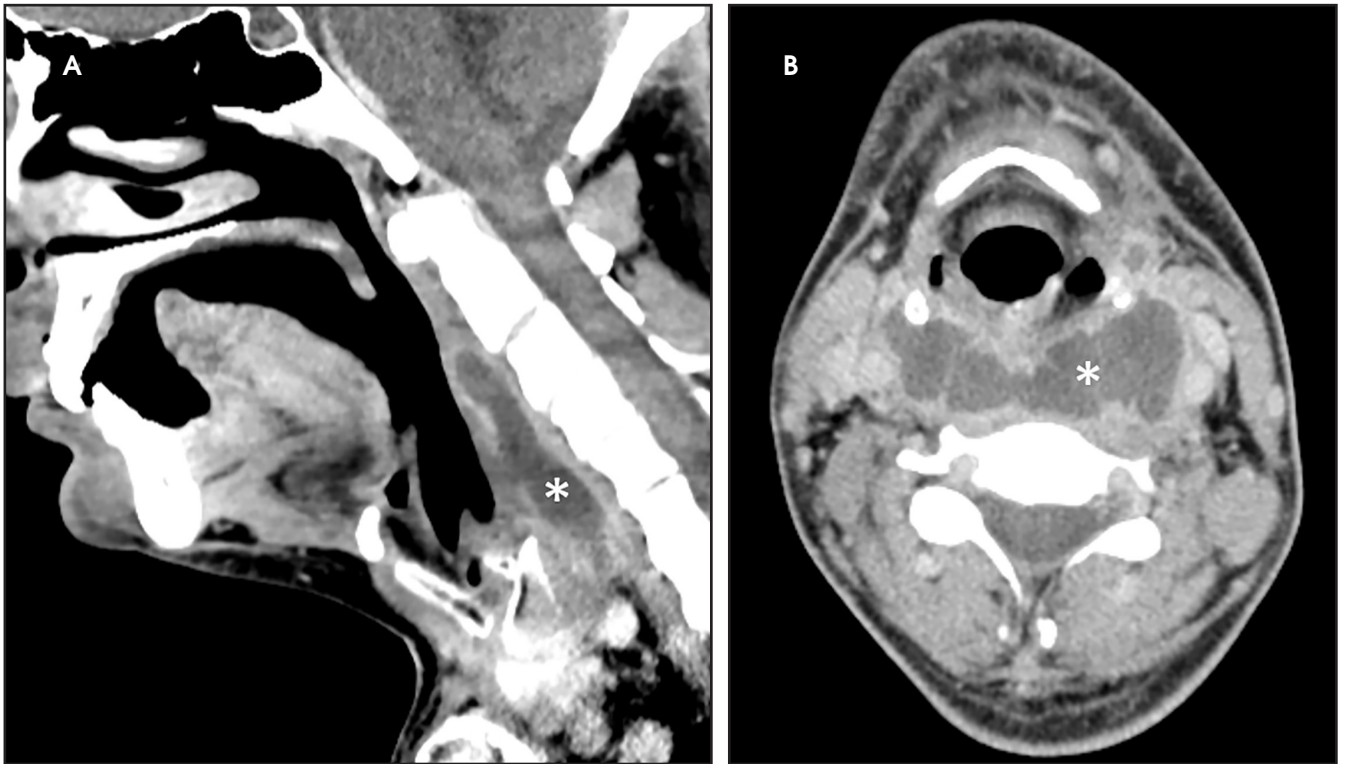


FIGURE 4. Retropharyngeal abscess. 33-year-old on immunosuppressive therapy. Sagittal (A) and axial (B) CECT images demonstrate a loculated retropharyngeal fluid collection with rim enhancement and mass effect (white asterisks).

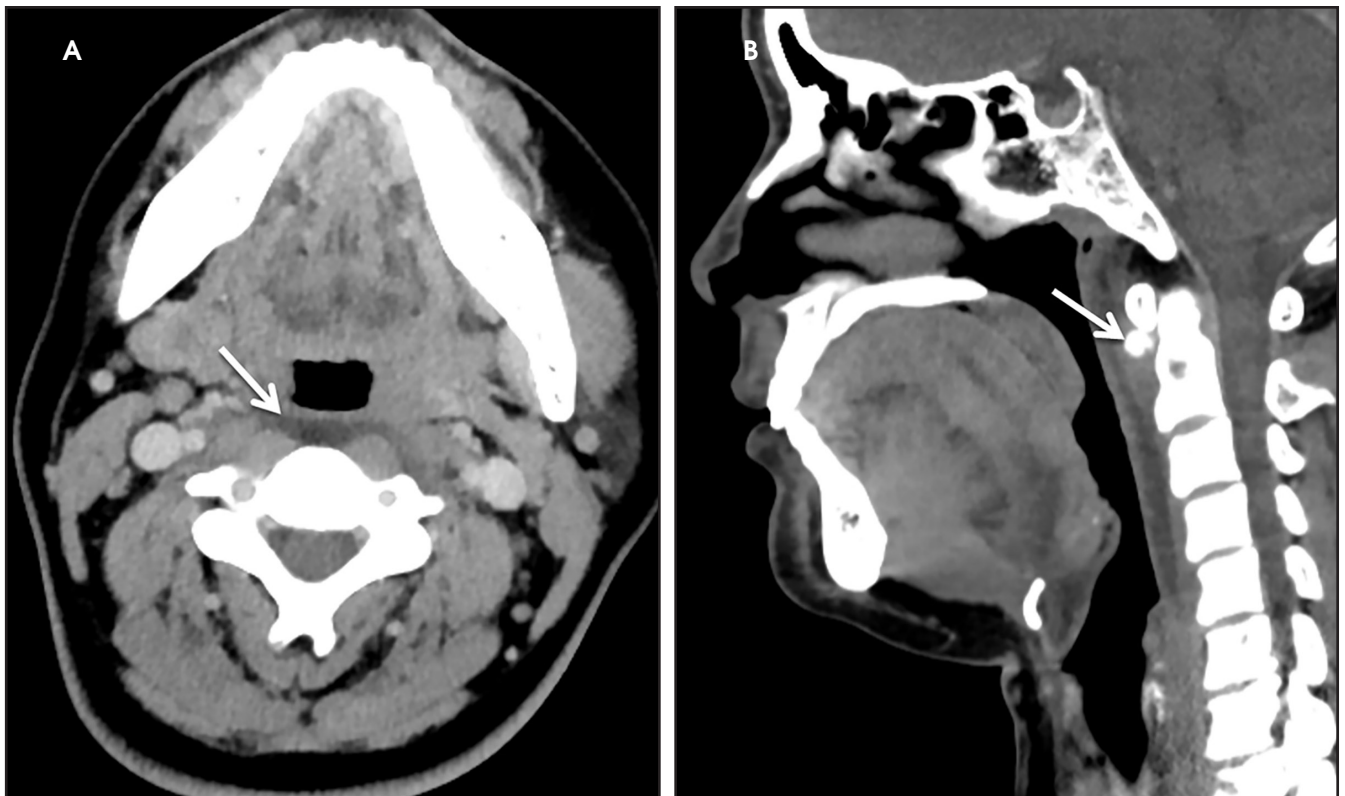


FIGURE 5. Longus colli calcific tendinitis. 40-year-old with neck pain and difficulty moving neck. Axial (A) and coronal (B) CECT images demonstrate hypoattenuating retropharyngeal fluid without rim enhancement (A, white arrow). A focal calcification is seen near the insertion of the longus colli muscle, just anterior to C2 (B, white arrow).

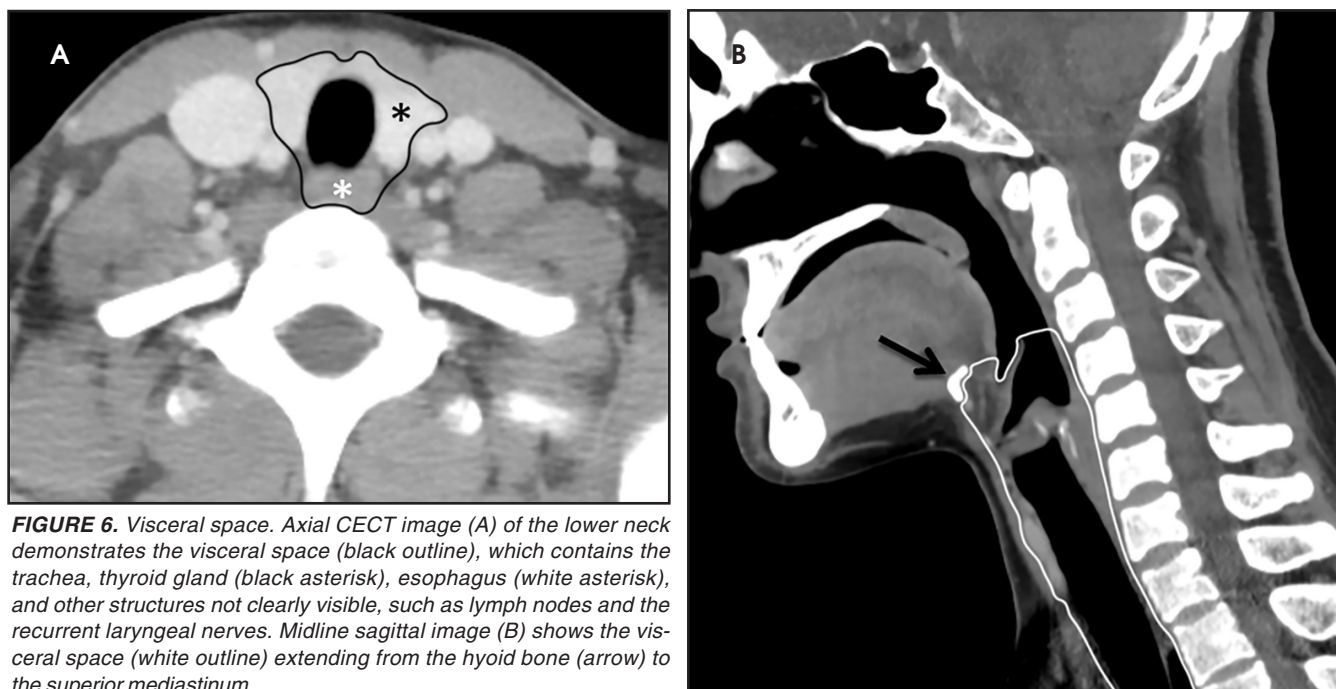


FIGURE 6. Visceral space. Axial CECT image (A) of the lower neck demonstrates the visceral space (black outline), which contains the trachea, thyroid gland (black asterisk), esophagus (white asterisk), and other structures not clearly visible, such as lymph nodes and the recurrent laryngeal nerves. Midline sagittal image (B) shows the visceral space (white outline) extending from the hyoid bone (arrow) to the superior mediastinum.

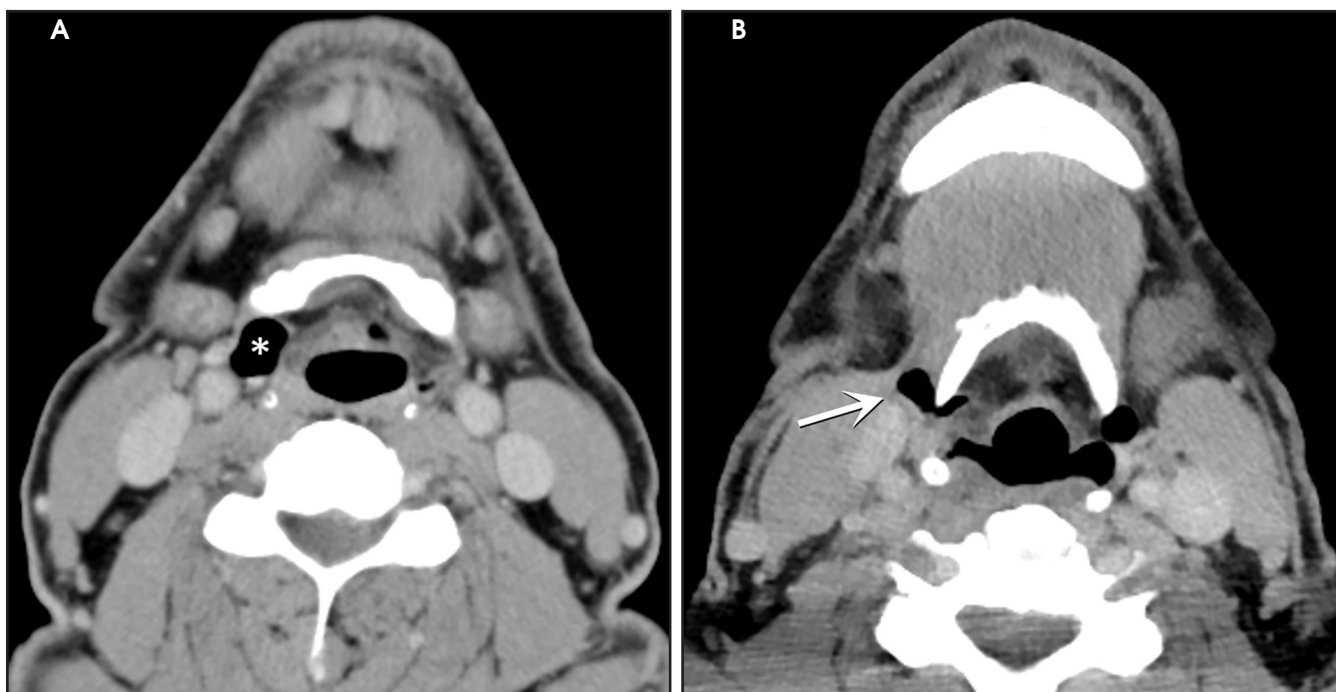


FIGURE 7. Laryngocele. Axial CECT images demonstrate an internal air-filled laryngocele (A, white asterisk) in the right paraglottic region of the supraglottis. Different patient with an external laryngocele (B, white arrow) extending laterally through the thyrohyoid membrane.

surgical drainage, whereas retropharyngeal edema resolves spontaneously when the cause is treated.⁹

A retropharyngeal abscess typically appears as a large retropharyngeal fluid collection with rounded margins, pronounced mass effect, and rim en-

hancement (Figure 4).⁹ The source of the infection may be a ruptured, suppurative retropharyngeal node or a penetrating foreign body. In older patients, ventral extension of prevertebral abscess associated with discitis/osteomyelitis is more likely. Another

consideration is a mediastinal infection that has spread superiorly along the retropharyngeal “danger space.”

Retropharyngeal edema has more benign imaging features, with tapered inferior and superior margins, minimal mass effect, and no rim enhancement

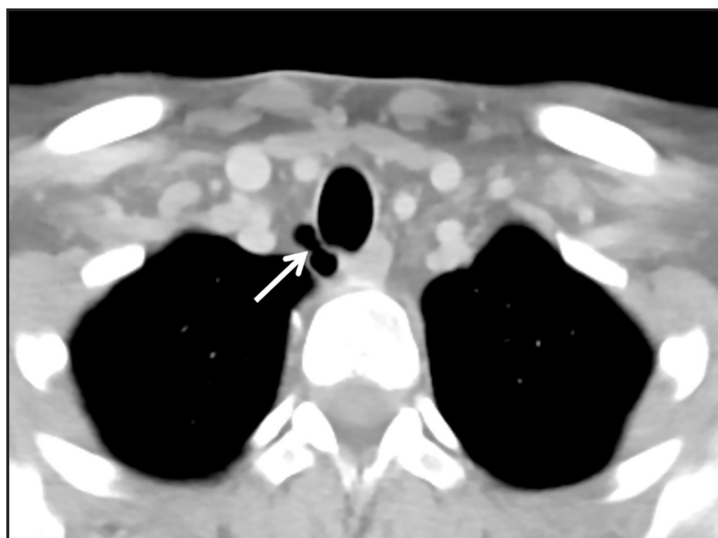


FIGURE 8. Tracheal diverticulum. Axial CECT image demonstrates an air-filled cystic lesion (white arrow) in the right paratracheal region at the level of the thoracic inlet.



FIGURE 9. Anterior cervical abscess. 30-year-old with type I diabetes. Axial CECT image of the supraclavicular neck demonstrates a large mixed cystic and solid mass (asterisk) with associated inflammatory changes extending to skin, right carotid space, and visceral space.

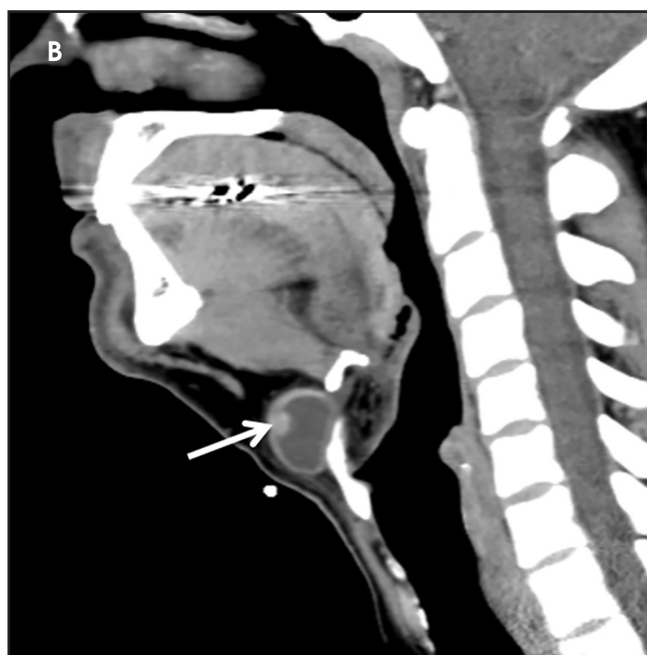
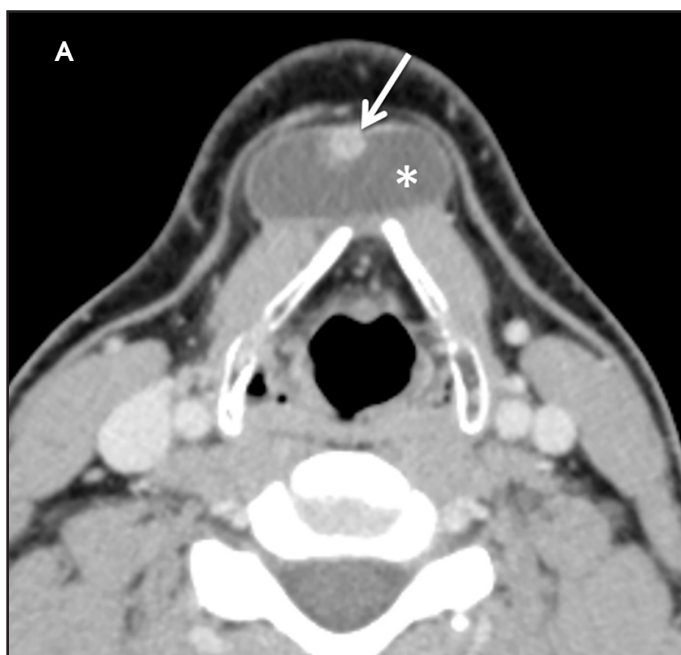


FIGURE 10. Thyroglossal duct cyst carcinoma. 35-year-old with an enlarging neck lump. Axial (A) and midline sagittal (B) CECT images demonstrate a circumscribed cystic lesion (asterisk) in the midline anterior cervical space, just inferior to the hyoid bone. The thyroglossal duct cyst contains a mural nodule (arrow), histologically a papillary thyroid cancer.

(Figure 5).⁹ There are multiple etiologies, including recent radiation therapy, IJV thrombosis, pharyngeal infection, and longus colli calcific tendinitis. Longus colli calcific tendinitis is an uncommon inflammatory reaction to calcium hydroxyapatite deposition in the longus colli tendons, and is characterized by

amorphous prevertebral calcifications at the level of C1-C2, along with mild retropharyngeal edema.¹⁰ Diagnosing this condition can be particularly helpful because, while its clinical presentation can mimic a serious infection, the condition resolves with nonsteroidal anti-inflammatory treatment.¹¹

Visceral Space

The visceral space is the midline anterior space extending from the hyoid bone to the superior mediastinum and containing the larynx and trachea, hypopharynx and cervical esophagus, thyroid and parathyroid glands, recurrent laryngeal nerves, and lymph nodes (Figure 6).¹



FIGURE 11. Necrotic metastatic supraclavicular lymphadenopathy (Virchow node). Coronal CECT image demonstrates irregular rim-enhancing cystic lesion (white asterisk) with ill-defined margins suggestive of extracapsular spread of neoplasm.

imaging spectrum, a large, heterogeneous, invasive cystic and solid mass centered in the thyroid gland in an elderly patient is the classic imaging presentation of an anaplastic thyroid carcinoma.¹⁸ In younger patients, a thyroid or anterior cervical abscess is more likely, especially if they are immunocompromised (Figure 9).¹⁹

Outside of the organs, the most important lesion in the visceral space is the thyroglossal duct cyst. A developmental remnant of the thyroglossal duct, this congenital lesion can occur anywhere along the duct from the base of the tongue to the thyroid gland, but it is most frequently located at or near the midline anterior to the thyroid cartilage.¹² The typical appearance is that of a circumscribed, thin-walled, fluid-density cyst that may show rim enhancement in the setting of inflammation or infection.²⁰ On MRI, the fluid often demonstrates T1 hyperintensity related to hemorrhage or proteinaceous contents.²¹ Rarely, a thyroglossal duct carcinoma can arise within the cyst, suggested by the presence of a solid nodule or calcification (Figure 10).²² Most thyroglossal duct cysts present clinically in childhood.²⁰

Supraclavicular Fossa

Two lesions in the supraclavicular fossa deserve special mention: the necrotic left supraclavicular lymph node and the much less common lymphocele. A left supraclavicular lymph node (or Virchow node) that is enlarged, with or without central necrosis, is strongly suggestive of metastatic disease, especially from a primary tumor in the abdomen (Figure 11).²³

In contrast, a lymphocele (or lymphatic cyst) is benign and usually incidental, with the imaging features of a simple cyst or fluid collection. Lymphoceles are most commonly found in the left supraclavicular fossa, where both the thoracic duct and cervical lymphatic duct drain into the confluence of the left subclavian vein and IJV. Often the cysts are sequelae of prior surgery or trauma. No further work-up is required unless

The differential diagnosis for a cystic lesion in this space depends on the organ. In the larynx, the most frequently seen cystic lesion is a laryngocele, a dilated laryngeal saccule (lateral and superior to the glottis) containing fluid or air. An internal (or simple) laryngocele is confined to the paraglottic space; a mixed (or external) laryngocele extends through the thyrohyoid membrane into the submandibular space (Figure 7).¹²

Another air-filled outpouching, the tracheal diverticulum, is often found incidentally at the right posterolateral aspect of the trachea near the thoracic inlet (Figure 8).¹³ Laryngoceles and tracheal diverticula are associated with chronic cough and other causes of increased airway pressure.

At the junction of the hypopharynx and esophagus, the Zenker diverticulum

and the less common Killian-Jamieson diverticulum may have a cystic appearance, containing trapped ingested debris and air. Best evaluated with a barium swallow, these outpouchings can be distinguished by their orientation: a Zenker diverticulum protrudes posteriorly at the midline, while a Killian-Jamieson diverticulum is usually unilateral and left-sided.^{14,15}

A cystic nodule in the thyroid is usually incidental and benign (eg, a colloid cyst). Most thyroid nodules found on CT, whether solid or cystic, are better evaluated with ultrasound if they meet criteria for further imaging work-up.¹⁶ Cystic, almost completely cystic, or spongiform nodules on ultrasound are considered benign and assigned zero points using the Thyroid Imaging Reporting and Data System (TI-RADS).¹⁷ At the opposite end of the clinical/

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atypical features such as enhancement or a solid component are present.²⁴

Conclusion

A remarkable variety of cystic lesions, including congenital and acquired cysts, simple and complex fluid collections, and benign and malignant masses, are encountered in the neck and oral cavity. Knowledge of anatomical spaces, other helpful imaging features, and patient history can improve diagnostic accuracy and clinical management.

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