Case Presentation

A 34-year-old man presented with worsening neck pain and an enlarging neck mass. Physical examination demonstrated a palpable left neck mass that was tender to palpation with overlying skin erythema; a contrast-enhanced neck CT was performed (Figure 1).

FIGURE 1. Axial (A) and reformatted sagittal (B) and coronal (C) contrast-enhanced CT images through the neck reveal a well-circumscribed, nonenhancing, low-attenuation cystic mass posterior to the left submandibular gland, lateral to the carotid sheath, and anteromedial to the sternocleidomastoid muscle.
Key Imaging Finding  
Cystic neck mass

Differential Diagnosis  
Cystic nodal metastasis  
Abscess  
Branchial cleft cyst

Discussion  
Cystic neck masses are commonly encountered in imaging practices and can result from a variety of entities, both benign and malignant. The most important factors in diagnosing cystic neck masses are a thorough history and physical, as the clinical presentation and patient age often determine the differential diagnosis. Diagnostic imaging provides anatomic characterization and assessment of potential complications, and aids in management and treatment planning.

Interrogation of a neck mass may be initially performed with ultrasound, followed by contrast-enhanced CT. Neck masses can be characterized by anatomic location, attenuation, vascularity, and whether they are cystic or solid. These characteristics, in combination with demographic factors, can yield a fairly accurate differential diagnosis. Cystic neck masses can be congenital or acquired.\(^1\),\(^2\)

Common congenital cystic neck masses include thyroglossal duct cysts, branchial cleft anomalies, and lymphatic malformations. Acquired cyst-like lesions include abscesses, cystic nodal metastasis, and neurogenic tumors.\(^2\) For the purpose of this article, the discussion will be limited to cystic nodal metastasis, abscesses, and branchial cleft cysts.

Cystic Nodal Metastasis  
Up to 80% of cystic neck masses that present in adults over age 40 are determined to be cystic nodal metastasis.\(^3\) Necrotic lymph node metastases frequently result from primary head and neck squamous cell carcinoma or well-differentiated papillary thyroid carcinoma.\(^3\) CT demonstrates a thick enhancing wall with eccentric solid components, and possible calcifications in the setting of papillary thyroid metastases. Necrotic lymph nodes may be solitary, multiple, or conglomerate. Occasionally, the necrotic component of the lymph node is the dominant feature with imaging characteristics similar to a second branchial cleft cyst, particularly if posterior to the submandibular gland, lateral to the carotid sheath, and medial to the sternocleidomastoid muscle near the angle of the mandible. On US, the solid component of a necrotic lymph node may demonstrate intralesional color Doppler signal. Although ultrasound cannot reliably distinguish between malignant and benign cystic lesions, it may provide sonographic features that can help determine which lesions to biopsy if the clinical suspicion for metastasis is high, for example, in a patient with known papillary thyroid cancer.\(^4\)

Abscess  
Abscesses can occur anywhere in the neck, but most commonly occur in the parapharyngeal, parotid, submandibular, or retropharyngeal spaces.\(^5\) Abscesses in the neck do not have a gender predilection, but parapharyngeal abscesses occur most commonly in the pediatric population and in adult diabetic patients.\(^5\) On US, abscesses appear as hypoechogenic or anechoic masses with thick walls, variable compressibility, and peripheral vascularity, and may demonstrate internal septations. On CT, abscesses appear as hypoattenuating masses with thick rim-enhancing walls. They may be unilocular or multilocular and may contain foci of air.\(^2\) Surrounding inflammatory changes are often seen. Treatment of neck abscesses ranges from antibiotic therapy to emergent surgical drainage in the event of airway compromise.\(^5\)

Branchial Cleft Cyst  
Branchial cleft anomalies represent a variety of congenital defects that arise from aberrations in the embryonic development of the branchial apparatus, which gives rise to the ear and mesodermal structures of the head and neck.\(^1\) They do not demonstrate a gender predilection and most often present in individuals between 10 and 40 years of age.\(^2\) Branchial cleft anomalies can present as cysts, sinuses, fistulas, or a combination thereof, with cysts being the most common.\(^5\)

Four branchial cleft anomalies have been described in the literature, with the second branchial cleft cyst being the most common.\(^1,\(^2\),\(^6\) Subclassification of second branchial cleft cysts was originally described in 1929 by Bailey with four subcategories based on location.\(^7\) The type II second branchial cleft cyst is the most common, located posterior to the submandibular gland, lateral to the carotid sheath, and medial to the sternocleidomastoid muscle.\(^2,\(^7\)

On CT, branchial cleft cysts appear as nonenhancing, sharply margined, hypoattenuating masses with thin walls. Wall thickness may increase in the event of secondary infection. In the less common Bailey type III second branchial cleft cyst, a thin rim of tissue may point medially between the internal and external carotid arteries, which is referred to as a “beak sign.”\(^1,\(^2\) On US, branchial cleft cysts commonly appear as well-circumscribed, compressible, anechoic masses with posterior acoustic enhancement and thin walls. Peripheral vascularity with mural thickening may be appreciated with superimposed infection.
Diagnosis
Second branchial cleft cyst – Bailey type II

Summary
Cystic masses of the neck are commonly encountered in imaging practices and may be benign or malignant in etiology. Patient demographics and clinical presentation in conjunction with imaging findings play a key role in developing differential diagnoses, assessing for complications, and guiding treatment and management of these lesions. In our 34-year-old patient, the imaging characteristics supported the diagnosis of a Bailey type II second branchial cleft cyst, which was confirmed upon surgical excision.

References