Killian-Jamieson Diverticulum Revisited: a potential diagnostic pitfall on neck sonography

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Learning objectives

• To tell the difference between Killian-Jamieson and Zenker's diverticula.
• To illustrate the sonographic features of esophageal diverticula, and to discuss the differential diagnosis on neck sonography.
Background

In the modern era, esophageal diverticula are being identified incidentally due to improved imaging modalities and increased frequency of imaging studies [1].

Killian-Jamieson diverticulum, first documented by Ekberg and Nylander in 1983 [2], is the less common outpouching emerging from the proximal cervical esophagus than Zenker’s diverticulum [3]. Cases of misinterpretation on sonography have been reviewed [4, 5], but to our knowledge, no one has compared the sonographic appearance of Killian-Jamieson diverticulum to the pathologies, other than thyroid nodules, which may be encountered in neck region.
Here we present a case of a Killian-Jamieson diverticulum which was misdiagnosed on sonography in the first place, and a brief review about its mimics in neck region based on sonographic findings.

CASE

A 50-year-old man visited our hospital for annual check-up of known thyroid nodules. During the checkup, a neck sonography was performed showing a 1.6 cm lesion at the inferoposterior aspect of left lobe of thyroid gland (Fig. 1). The lesion, located outside of the thyroid capsule, had a well-circumscribed hypoechoic margin and contained multiple hyperechoic foci which appeared similar to small calcifications. A US-guided fine-needle aspiration (FNA) biopsy was planned in order to identify if the lesion is a calcified parathyroid lesion or an exophytic thyroid nodule.

The lesion was reexamined carefully before the FNA procedure and found it to be in continuity with the esophagus (Fig. 2A, 2B). Color Doppler sonography showed peripheral vascularity of the lesion (Fig. 3). Its multilayered appearance indicated it is originated from the gastrointestinal tract and the true nature as an esophageal diverticulum. Consequently, the FNA was cancelled, and an esophagography was performed, which showed a barium-filling sac hanging lateral to the cervical esophagus (Fig. 4) on frontal images and overlapping the anterior esophageal wall on lateral images. The diagnosis of Killian-Jamieson diverticulum was confirmed.

DISCUSSION

Both Zenker's and Killian-Jamieson diverticula occur at sites of anatomic weakness near the cricopharyngeus muscle, and are now likely to be detected on sonography [1] despite the rare prevalence [5] because of the increasing use of high-frequency sonography in neck examinations.

Killian-Jamieson diverticulum is a rare esophageal diverticulum protruding through a muscular gap, Killian-Jamieson space, in the anterolateral wall of cervical esophagus inferior to the cricopharyngeus and lateral to the longitudinal tendon of the esophagus [3]. It should be differentiated from where a Zenker's diverticulum is located, a posterior midline weakness of the pharyngoesophageal segment just above the cricopharyngeus, also known as the Killian dehiscence [3].
**Esophageal diverticula on sonography**

Sonographic features of esophageal diverticula have been described for characterization [1, 4]: bright internal hyperechoic foci with reverberation artifacts caused by air bubbles, a multilayered boundary continuous with the esophagus, and dynamic changes in position, shape, and even internal echotexture during swallowing.

When an esophageal diverticulum is suspected, the diagnosis of either Zenker’s or Killian-Jamieson diverticulum relies primarily on the radiographic findings instead of on endoscopy [3]. It is crucial to identify the location of the opening of the diverticulum in relation to the cricopharyngeus muscle, which is best shown on esophagography, in order to differentiate between those two [3].

**Thyroid nodules**

However, the connection between the lesion and the esophagus may not be definitely shown on sonographic evaluation [6]. And the air bubbles within a diverticulum and its hypoechoic mural portion may resemble calcifications and the hypoechoic solid part of a thyroid nodule, respectively [6]. Furthermore, thyroid nodules are far more frequently encountered in routine examinations. When an esophageal diverticulum is large enough and in the proximity of thyroid gland, it may be considered as a thyroid nodule and leads to subsequent unnecessary investigation such as fine-needle aspiration [2, 5, 7].

**Parathyroid adenoma or carcinoma**

In addition to thyroid nodules, parathyroid lesions and paratracheal air cysts may complicate the diagnosis of Killian-Jamieson diverticulum. Parathyroid adenoma typically appears as a well-circumscribed round to oval hypoechoic nodule but may have cystic degeneration and contain calcifications [1, 8]. They are generally highly vascular lesions often with an enlarged feeding thyroidal artery or a peripheral vascular arc [8]. Parathyroid carcinoma is rare, and it may have very similar appearance of parathyroid adenoma on sonography [8].

**Paratracheal air cysts**

Paratracheal air cysts are rare lesions communicating with the trachea and mostly located at its right posterolateral aspect [9]. It appears a mass-like lesion containing hyperechoic foci without chronologic changes during swallowing [9], which provides a useful clue to be differentiated from esophageal diverticula.
In the presented case, the lesion was considered to be outside the thyroid gland as the interface was clearly identifiable. However, due to the limited documented cases in our area, we did not identify the actual relation between the lesion and the esophagus on the initial sonogram.

Retrospectively, even considering the minute possibility of heterogeneous appearance and calcifications, the lack of hypervascularity of the lesion in our case should have ruled out the likelihood of a parathyroid lesion. Paratracheal air cysts also could have been excluded from the differential diagnoses, due to their less-likely locations and most importantly, the lack of concurrent change with the esophagus on real-time sonography as reported by D. Mercer, et al [5].

Knowledge of the various pathologies in neck region assists in narrowing the radiologic differential diagnosis and optimizing patient management.
Fig. 1: Initial sonogram of the left side of the neck shows a well-defined, hypoechoic lesion with small hyperechoic foci in the posterior aspect of the left lobe of the thyroid.

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**Fig. 2:** Transverse (A) and sagittal (B) scans of neck sonogram demonstrate the continuity of the esophageal wall (arrows) with the wall of the lesion indicating its nature to be an esophageal diverticulum.

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Fig. 3: Color Doppler sonogram shows vascularity at the periphery of the lesion.

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**Fig. 4:** Spot radiographs from a barium study performed with the patient in frontal (A), right posterior oblique (B), and lateral (C) positions show a barium-filled sac protruding from the left lateral wall of the cervical esophagus (A, B) and its overlapping of the anterior wall of the collapsed cervical esophagus (C), consistent with a Killian-Jamieson diverticulum.

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Conclusion

The prevalence of incidental finding of extrathyroid lesions has increased along with the more common use of neck sonography. Although Killian-Jamieson diverticulum is rare, we believe it should be included in the differential diagnoses in order to avoid any unnecessary examination such as the fine-needle aspiration procedures, provided the distinctive sonographic findings are noted.

To identify Killian-Jamieson diverticulum correctly, it is recommended that a meticulous sonogram be performed with a high index of suspicion and awareness to characterize the lesion, and followed with an esophagography when needed to obtain a more accurate diagnosis in indeterminate cases.
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