Killian–Jamieson diverticulum: real-time sonographic findings

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Abstract Killian–Jamieson diverticulum (KJD) is a pharyngoesophageal diverticulum that can be observed during a neck ultrasound examination. Because of its position, it is frequently misinterpreted as a thyroid nodule. We present a case of an incidental finding of KJD, where changes in shape during dynamic scanning led to the correct diagnosis, preventing from invasive procedures such as fine needle aspiration.

Riassunto Il diverticolo di Killian–Jamieson (KJD) è un diverticolo faringoesofageo che può essere individuato durante una valutazione ultrasonografica del collo. A causa della sua posizione, è frequentemente interpretato come un nodulo tiroideo. Presentiamo un caso di un riscontro occasionale di KJD, in cui le variazioni della forma durante le scansioni dinamiche hanno condotto ad una corretta diagnosi, evitando procedure invasive quali il prelievo con agoaspirato.

Introduction

Killian–Jamieson diverticulum (KJD) is a rare esophageal diverticulum [1].

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It originates from the anterolateral wall of the proximal esophagus, an anatomic region of lower resistance where the recurrent laryngeal nerve enters the pharynx, first described in 1908 by Killian and confirmed by Jamieson in 1934 [2, 3].

Although Zenker diverticulum is four times more common than KJD, the latter is more frequently misdiagnosed with a thyroid nodule for its anatomical location [4, 5].

We present a case of an asymptomatic patient, in which, at first, the diverticulum was considered to be a calcified thyroid nodule. The evidence of contiguity with the esophageal wall and the real-time sonography, by showing the change of shape of the diverticulum due to esophageal peristalsis during swallowing, showed the correct nature of the lesion.

Case report

A 40-year-old woman was referred to our attention to perform an ultrasound examination of the thyroid, because of a suspicious nodule detected during the evaluation of the carotid vessels. The patient was asymptomatic and the nodule was not palpable.

US exam was performed with a Toshiba APLIO XG (Toshiba Medical Systems Corporation, Otawara, Japan) and a 12–5 MHz linear transducer (PLT-805AT). The patient was supine with the neck hyperextended during the sonographic examination.

In the posterior region of the left thyroid lobe, there was an inhomogeneous hypoechoic nodule with internal hyperechoic foci, at first suspected for microcalcifications (Fig. 1). This nodule had no internal flow at Color and PowerDoppler. A more careful evaluation pointed out that

Fig. 1 US scan of the left lobe of the thyroid, axial and longitudinal. Size of the diverticulum mimicking thyroid nodule

Fig. 2 US scan of the left lobe of the thyroid (longitudinal oblique scan; the caudal part is on the right of the image). A connection with the esophagus can be clearly depicted (*green arrows*), as well as a cleavage plane from the thyroid (*blue arrows*)

the nodularity was separated by a cleavage plane from the thyroid itself and it was connected to the esophagus directly (Fig. 2). The patient was then invited to swallow,

thus revealing the nature of the “nodule”: it changed its shape and the internal echostructure, with air and fluid that dynamically moved from the esophagus to it and vice versa (Fig. 3, Movie 1). Accordingly, the air in the esophagus caused a comet tail, or reverberation artifact, resulting in the hyperechoic foci, that were previously interpreted as suspected calcifications.

A diagnosis of pharyngoesophageal diverticulum was made, the location was consistent with a KJD and an esophagography was requested to confirm it.

Discussion

An esophageal diverticulum is a congenital or acquired circumscribed pouch generated by the herniation of the lining mucous membrane through a defect in the esophageal wall. KJD are rare hypopharyngeal diverticula that protrude through a muscular gap in the anterolateral region of the cervical esophagus, inferior to the transverse portion of the cricopharyngeus muscle and lateral to the longitudinal muscle of the esophagus. They are usually unilateral. Because of the advanced age distribution of patients, they

Fig. 3 Dynamic scanning, during swallowing. Frames captured in succession. The diverticulum changes in shape, size and internal echostructure

are likely acquired being the result of a functional esophageal obstruction. The high intraluminal pressure, which is caused by the inappropriate constriction of the hypopharyngeal muscular fibers during swallowing, produces the herniation in the anatomical area of weakness. Surgical approach is often not recommended, as the most of the patients are asymptomatic [4].

Barium study and endoscopy are the gold standard for the diagnosis of pharyngoesophageal diverticulum, even if computer tomography could be requested to define the anatomical location and distinguish KJD from Zenker diverticulum [6, 7]. However, KJD may be incidentally detected during a sonographic neck examination, which is often performed for other clinical reasons, such as the study of the thyroid or carotid vessels. In the literature, there are six articles regarding KJD revealed by neck US. If the research comprehends both KJD and Zenker diverticulum, in total, twenty-five articles have been found. Among these, there are two major reviews describing the suggestive features for the diagnosis of pharyngoesophageal diverticulum [5, 8]. In particular, KJD belongs to those benign lesions that may mimic thyroid nodules on ultrasound examination. Several characteristics are reported to distinguish the KJD from the thyroid nodules. First, air bubbles or other particles are usually misdiagnosed with papillary thyroid cancer's microcalcifications, although the former are more hyperechogenic and present a fainter acoustic shadow. Second, the origin from the digestive tract may be suggested by a hypoechoic rim, or a multi-layered zone, such as the structure of the digestive tube wall. Third, a connection with the esophagus may be occasionally demonstrated. Finally, transient changes in size, margins and echogenicity that are detected during swallowing or by the compression of the probe suggest the nature of the lesion [5, 8, 9].

Other differential diagnoses are considered thyroid abscess, parathyroid adenoma or hyperplasia, lymphadenopathy, pharyngocele and paratracheal air cysts [5].

Thyroid abscess appears at US as complex heterogeneous mass, which clinical signs such as a rapid onset, anterior neck pain and fever may guide the diagnostic process [10].

Parathyroid adenomas are intimately related to the thyroid gland, and are typically ovoid or bilobed. Compared to KJD, they are solid, hypervascular and homogeneously hypoechoic lesions [9]. Cervical lymph nodes may be immediately adjacent to the thyroid; recognizing the echogenic central hilum suggests the correct diagnosis [9]. Pharyngocele is a herniation of the pharyngeal mucosa and like KJD may exhibit dynamic changes, however, it is located at the level of the thyrohyoid membrane and during the Valsalva maneuver it enlarges [11]. Paratracheal air cysts are mass-like lesions in connection with the trachea

and, similar to KJD, contain hyperechoic foci due to air but they do not show any changes during swallowing [12].

The previously reported cases of KJD are not accompanied by a dynamic view, as showed by the clip herein attached. This clearly shows how to perform the US examination when a suspicious nodule is detected, by inviting the patient to swallow to reveal the real-time features of the pathology. In our case, we demonstrated a pseudonodular lesion with internal echoic foci, which had a cleavage plane from the thyroid and was connected with the esophagus, and showed dynamic changes during swallowing.

In our view, the dynamic variations together with the relationship with the digestive tube represent “direct” signs of the diverticulum because they clearly show the origin from the esophageal structure. However, in the two reviews of reported cases of KJD mimicking thyroid nodules, changes in internal echo and the relationship with the esophagus were detected in only 50 % of the cases. In the authors' opinion, this could be related to the diverticula narrow necks or to the bigger size of the diverticula, as showed by the esophagogram [5, 8].

We believe that although not so sensitive, these features may be suggestive and would lead to the diagnosis, avoiding fine-needle aspiration of the lesion.

Compliance with ethical standards

Conflict of interest The authors have no conflict of interest.

Informed consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. All patients provided written informed consent for enrolment in the study and for the inclusion in this article of information that could potentially lead to their identification.

Human and animal studies The study was conducted in accordance with all institutional and national guidelines for the care and use of laboratory animals.

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