

# Sonographic Findings of Zenker Diverticula

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**Objective.** The purpose of this study was to describe the sonographic findings of Zenker diverticula.

**Methods.** This study included 6 patients (age, 26–70 years; average, 55.3 years). Three cases were detected incidentally by thyroid sonograms, and 3 cases were transferred from other hospitals for aspiration of a thyroid nodule. All the sonograms and medical records were reviewed retrospectively.

**Results.** All 6 patients had no symptoms, and diverticula were incidentally detected by neck sonography. The masses were located on the posterolateral aspect of the left lobe in 5 patients and the right lobe in the remaining patient. All lesions were located in the upper and mid portions of the thyroid glands and showed echogenic foci similar to those of a microcalcification or an arc-shaped microcalcification. The sonographic findings of a Zenker diverticulum were seen as an isoechoic or a hypoechoic mass with internal or peripheral echogenic foci and a boundary hypoechoic zone at the posterior portion of the thyroid gland on sonography. All lesions appeared connected with the adjacent esophageal wall on sonography. In all cases, diagnoses were confirmed by esophagography.

**Conclusions.** Zenker diverticula had several unique characteristics on sonography. We can, therefore, diagnose Zenker diverticula by careful thyroid sonography, avoiding unnecessary aspiration due to misdiagnosis of a Zenker diverticulum as a thyroid nodule. **Key words:** sonography; thyroid nodule; Zenker diverticulum.

The Zenker diverticulum is the most common diverticulum of the esophagus.<sup>1</sup> This diverticulum protrudes through a muscular gap in the posterior portion of the cricopharynx.<sup>1,2</sup> It is usually detected incidentally by esophagography; however, in recent years it has been detected by thyroid sonography.<sup>3</sup> It may sometimes mimic a thyroid nodule on a sonogram<sup>1</sup>; therefore, it is important to be able to differentiate between Zenker diverticula and thyroid nodules.

The objective of this study was to describe the sonographic diagnosis of Zenker diverticula.

## Materials and Methods

This study included 6 patients (age, 26–70 years; average, 55.3 years) with Zenker diverticula. Three cases were detected incidentally by thyroid sonography, and the remaining 3 cases were transferred from other hospitals for aspiration of a thyroid nodule. Sonography was performed on a Sonoline Antares system (Siemens Medical

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## Sonographic Findings of Zenker Diverticula

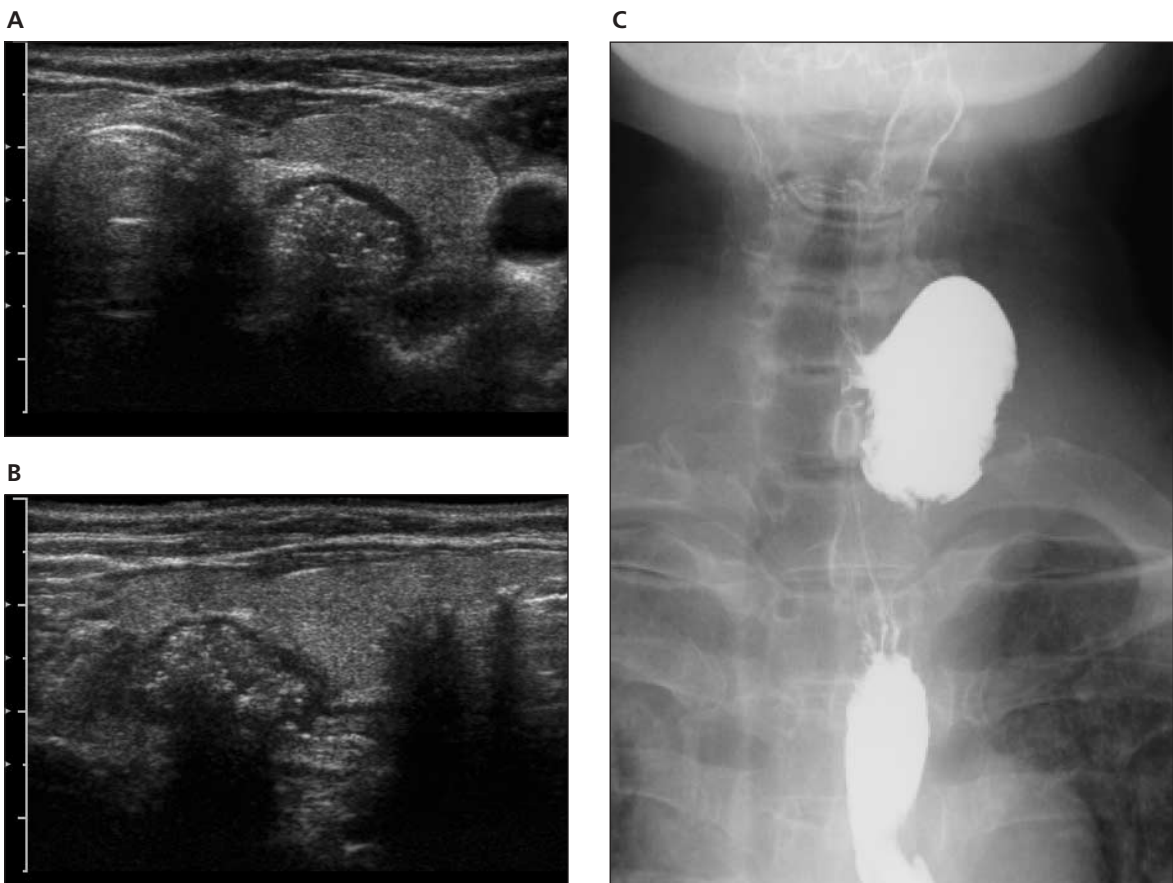
**Table 1.** Sonographic Findings of Zenker Diverticula

Age, y/Sex	Size, mm	Location	Sonographic Findings
61/F	16 × 21	Left lobe	Isoechoic mass with internal echogenic foci and boundary hypoechoic zone
56/F	14 × 20	Left lobe	Isoechoic mass with internal echogenic foci and boundary hypoechoic zone
70/F	13 × 33	Left lobe	Hypoechoic mass with internal echogenic foci and boundary hypoechoic zone
65/M	10 × 10	Right lobe	Hypoechoic mass with internal microcalcifications and peripheral echogenic line
60/F	6 × 7	Left lobe	Round mass with peripheral arc-shaped echogenic line without posterior shadowing
26/F	8 × 7	Left lobe	Round mass with peripheral arc-shaped echogenic line without posterior shadowing

Solutions, Mountain View, CA) with a 5- to 13-MHz linear array probe or an HDI 3000 or HDI 5000 system (Philips Medical Systems, Bothell, WA) with a 7- to 12-MHz linear array probe on the entire thyroid gland.

Six sonograms and clinical records were reviewed retrospectively by a radiologist. The sonograms were analyzed for the location, size, shape, and echogenicity of the diverticula, in addition to any other findings.

**Figure 1.** Images from a 61-year-old woman transferred from another hospital for aspiration of a thyroid nodule. **A**, Transverse sonogram reveals a well-defined isoechoic mass with multiple internal echogenic foci and a boundary hypoechoic zone. **B**, Longitudinal sonogram reveals the connection to the esophagus. **C**, Esophagogram confirms a Zenker diverticulum projecting to the left of and posterior to the esophagus. After the diagnosis of the esophageal diverticulum, the needle aspiration was canceled.



## Results

All 6 Zenker diverticula were found incidentally by neck sonography. Five lesions were located at the posterolateral aspect of the left lobe, and 1 lesion was found on the right lobe. The patient with the right-sided Zenker diverticulum had an esophagus unusually placed on the right side. All lesions were located in the upper and mid portions of the thyroid glands.

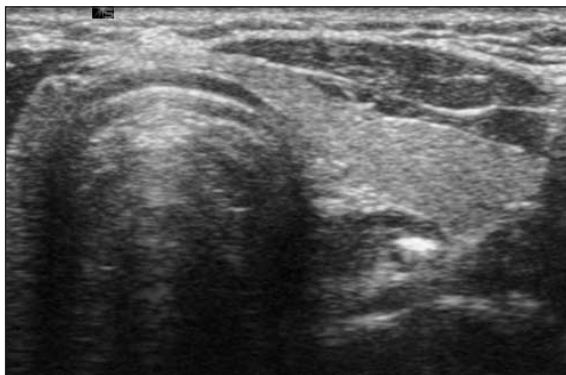
The long diameter of all Zenker diverticula characterized by sonography ranged from 7 to 33 mm (average, 11.3 mm). The sonographic findings of Zenker diverticula are described in Table 1. All lesions showed echogenic foci similar to that of a punctate or arc-shaped microcalcification. Four of the masses, larger than 10 mm, showed internal punctuate echogenic spots with or without posterior shadowing and a boundary hypoechoic zone or peripheral echogenic line (Figure 1). Two masses, smaller than 10 mm, showed a peripheral echogenic line without posterior shadowing or a boundary hypoechoic zone (Figure 2).

All lesions were found by sonography to be connected with the adjacent esophageal wall. The 3 cases that were transferred from other hospitals had sonography performed before aspiration of the thyroid nodule. All 3 cases showed a connection to the adjacent esophageal wall. All 6 patients' diagnoses were verified by esophagography after the sonography. After confirmation, needle aspiration in the 3 transfer cases was canceled.

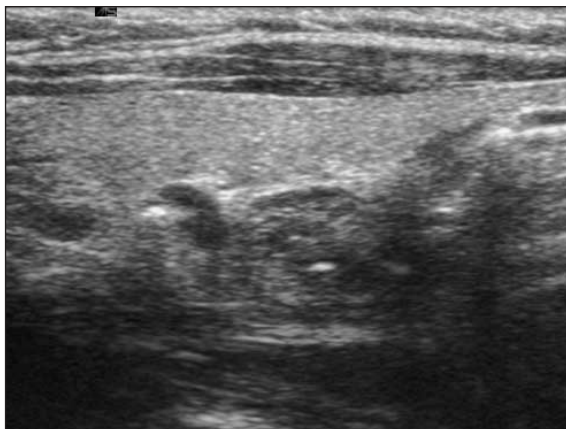
## Discussion

Pharyngoesophageal diverticula occur at sites of anatomic weakness in the hypopharynx or in the cervical esophagus near the cricopharyngeus muscle.<sup>4</sup> Pharyngoesophageal diverticula are classified as either Zenker diverticula or Killian-Jamieson diverticula. The Zenker diverticulum is the most common esophageal diverticulum. It originates on the posterior wall of the pharyngoesophageal segment in a weak area at the midline just above the cricopharyngeus.<sup>5</sup> The diverticulum may be asymptomatic or may appear with

**A**



**B**



**Figure 2.** Images from a 26-year-old woman with a Zenker diverticulum detected incidentally on a thyroid sonogram. **A**, Transverse sonogram reveals an 8-mm round mass with a peripheral arc-shaped echogenic line. **B**, Longitudinal sonogram reveals the connection to the esophagus. **C**, Esophagogram confirms a Zenker diverticulum projecting to the left of and posterior to the esophagus.

**C**



dysphagia, regurgitation of food, aspiration, or occasionally a neck mass.<sup>6</sup> In this study, all Zenker diverticula were found incidentally on sonography.

Currently, there are few reports on sonographic findings of Zenker diverticula.<sup>1,6-9</sup> All of these are case reports, and some describe symptomatic cases. In our study, all cases were incidentally detected by sonography, and 3 cases were even misdiagnosed as a thyroid nodule at other hospitals. The sonographic findings of Zenker diverticula could be similar to those of thyroid nodules because the Zenker diverticulum is also present at the thyroid level projecting toward the thyroid. Change of the shape and shadowing from microbubbles entering the diverticulum during swallowing, connection to the esophagus, a peripheral echogenic line, and a boundary hypoechoic zone have been reported as means to differentiate between thyroid nodules and diverticula. The presence of a peripheral echogenic line or a boundary hypoechoic zone is suggestive of the striated structure of the digestive tract.<sup>1,6-9</sup>

In this study, the sonographic findings of Zenker diverticula were seen as an isoechoic or hypoechoic mass with internal or peripheral echogenic foci and a boundary hypoechoic zone at the posterior portion of the thyroid gland on sonography. The use of high-frequency sonography led to the identification of a multilayer appearance and contiguity with the esophageal wall.

Internal echogenic foci within Zenker diverticula were often misdiagnosed as punctuate microcalcifications such as those frequently seen in papillary cancer. Microcalcifications are useful for the diagnosis of malignant thyroid nodules<sup>10,11</sup>; however, we found that a boundary hypoechoic zone or echogenic line on a sonogram with a connection to the esophagus could be indicative of a Zenker diverticulum.

In conclusion, Zenker diverticula have several unique characteristics on sonography. Therefore, we can diagnose a Zenker diverticulum by careful thyroid sonography and can avoid unnecessary aspiration due to misdiagnosis of a Zenker diverticulum as a thyroid nodule.

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