

# A Case of Paratracheal Air Cyst Mimicking an Upper Esophageal Diverticulum

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Paratracheal air cyst (PTAC) is a small air collection in the right paratracheal area and mainly diagnosed by computed tomography (CT). Increased with ultrasonographic (US) screening of the thyroid, PTAC can be detected incidentally. However, the US findings of PTAC have not been well described. Herein, we report our experience with a rare instance of a PTAC. A 64-year-old female was referred to our hospital for fine-needle aspiration (FNA) cytology of a thyroid nodule. The lesion was identified as an ovoid, hypoechoic lesion with internal hyperechoic foci, abutting on the inferior pole of the right thyroid lobe. The margin was smooth without hypoechoic rim, which is typical in upper esophageal diverticula. US-guided FNA suggested a benign bronchial epithelial lining cyst. If a hypoechoic neck mass containing air without a thick hypoechoic rim is observed, especially at the right side of the trachea, the possibility of PTAC should be considered.

**Key Words:** Paratracheal air cyst, Ultrasonography, Computed tomography, Esophageal diverticulum, Fine-needle aspiration cytology

## Introduction

The paratracheal air cyst (PTAC) is a small air collection adjacent to the trachea, usually located in the right paratracheal area at the level of the T1–2 vertebral body.<sup>1–3)</sup> These lesions are relatively common and present in approximately 3.7% of the population as revealed on computed tomography (CT).<sup>4)</sup> Most cases are asymptomatic and incidentally found on CT examinations of the chest, neck and spine. As ultrasonographic (US) screening of the thyroid or carotid artery has increased, PTAC can be detected incidentally. However, the US findings of these lesions have not been well described. We present a case of PTAC found incidentally by US screening and discuss its peculiar findings, which might be useful to diagnose

PTAC and to prevent unnecessary invasive procedures such as fine-needle aspiration (FNA) biopsy.

## Case Report

A 64-year-old female was referred to Chonnam National University Hwasun Hospital for cytological examination of a thyroid nodule detected incidentally on neck US. She did not complain of dysphagia, neck discomfort, hoarseness or fever, and the physical examination was unremarkable. No abnormalities were noted in her biochemical tests. Her serum free T<sub>4</sub>, total T<sub>3</sub> and thyroid-stimulating hormone concentrations were 1.11 ng/dL (reference range, 0.8–1.71 ng/dL), 1.03 ng/mL (0.6–1.6 ng/mL) and 1.33  $\mu$ IU/mL (0.4–4.8  $\mu$ IU/mL), respectively.

On neck US, the lesion was identified as an ovoid,

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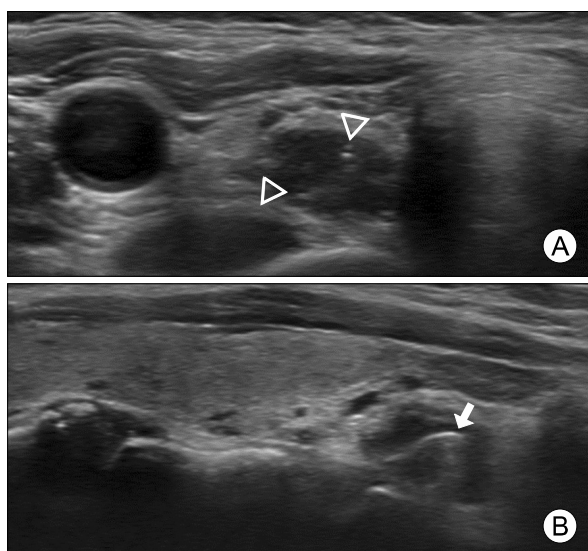
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hypoechoic lesion with internal hyperechoic foci, abutting on the inferior pole of the right thyroid lobe (Fig. 1). The hyperechoic foci appeared to be microcalcifications, but accompanying ring-down artifact depicted on longitudinal scans suggested the presence of air in the lesion. On color Doppler study, the lesion was distinguished from surrounding blood vessels and the trachea. The margin of the lesion was smooth, but there was no hypoechoic rim, which is typical in upper esophageal diverticula. However, we first suspected the lesion as an upper esophageal diverticulum because of air present in the lesion. To di-

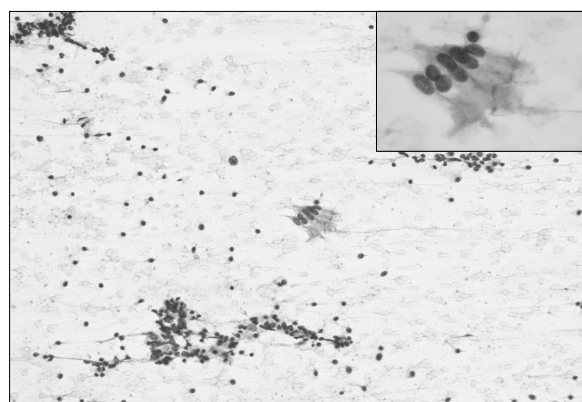


**Fig. 1.** Ultrasonography (US) findings of the lesion. (A) A transverse US scan of the inferior pole of the right thyroid lobe shows a 0.9×0.4×1.1-cm-sized hypoechoic mass with internal hyperechoic dots (arrowheads), just lateral to the trachea. (B) On longitudinal scan, the lesion showed a linear hyperechoic focus with ring-down artifact (arrow), suggesting the presence of air. A hypoechoic boundary zone typically present in esophageal diverticula is absent.

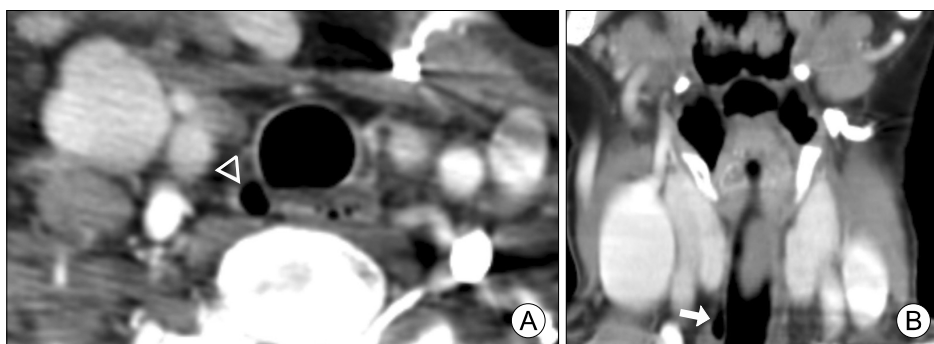
agnose the esophageal diverticulum, pharyngoesophagography was performed; however, there was no evidence of the diverticulum. The possibility of right inferior parathyroid adenoma was excluded based on normal intact parathyroid hormone and serum calcium levels. US-guided FNA was performed to exclude the possibility of malignancy. Cytology showed ciliated bronchial epithelial cells with abundant lymphocytic background, favoring a benign bronchial epithelial lining cyst (Fig. 2). PTAC was confirmed using neck CT, which revealed an approximately 1-cm-sized air-filled paratracheal air pocket (Fig. 3). The patient was reassured.

## Discussion

PTACs are small air collections adjacent to the trachea,<sup>4)</sup> and the majority of PTACs reported in the literature are diagnosed as tracheal diverticula with con-



**Fig. 2.** Fine-needle aspiration cytology revealed ciliated columnar epithelial cells (inset) in the lymphoid background with no follicular epithelial cells (Papanicolaou stain, ×200).



**Fig. 3.** (A) Neck computed tomography (CT) showed an air-filled cyst (arrowhead) in the posterolateral aspect of the trachea. (B) Anatomic location of the lesion (arrow) is displayed in a reconstructed coronal CT image.

nection to the trachea on CT.<sup>5-8)</sup> PTAC can mimic a thyroid nodule because of its anatomic proximity to the thyroid gland. However, to the best of our knowledge, only one study has reported US findings for PTAC.<sup>9)</sup> All three PTAC cases reported showed a hypoechoic mass with heterogeneous echotexture at the inferioroposterior aspect of the right thyroid lobe. Internal strong echogenic foci with ring-down artifact are due to reverberation artifacts caused by air bubbles in the cyst. These US findings could be misinterpreted as microcalcifications, common in papillary thyroid cancers, but echogenicity in the foci of air bubbles is stronger. As observed in our patient's FNA, all of these lesions were lined by ciliated columnar epithelium,<sup>1-3,10)</sup> and some had a communicating channel between the cyst and trachea.<sup>2)</sup>

Low-dose screening chest CT showed that 98.7% of the PTACs evaluated were located at the right side of the trachea.<sup>11)</sup> The right-sided predominance of PTAC may be due to the supportive effect of the esophagus and aortic arch on the left side of the trachea, and this mechanism may allow PTAC formation along the right aspect of the trachea, increasing vulnerability to the development of diverticula.<sup>2)</sup>

PTAC could be misdiagnosed as an esophageal diverticulum on US because of internal hyperechoic foci caused by the reverberation artifact of air. However, PTAC can be distinguished from esophageal diverticula based on several US findings.<sup>12)</sup> First, the unique finding of esophageal diverticulum is a hypoechoic rim with or without a multilayered pattern. This finding suggests that the digestive tract is the origin of the lesion (mucosa, submucosa and muscular layers). Second, although PTACs are usually located on the right side of the trachea,<sup>11)</sup> esophageal diverticula are usually found on the left side. The real-time observation of a connection to the adjacent esophageal wall is also helpful to distinguish the esophageal diverticulum from PTAC.<sup>12)</sup> Kim et al.<sup>12)</sup> reported a hypoechoic rim found in 85% of 13 diverticula, 92% of which were located in the posterior aspect of the left thyroid lobe, and a connection to the esophageal wall was found in 54%. In our patient, we first suspected the lesion to be an esophageal diverticulum, because

we were unaware of the PTAC entity, and US features were similar to those of esophageal diverticula. Unexpected negative findings on pharyngoesophagography prompted us to perform FNA to determine the nature of the lesion.

The pathogenesis of PTAC is controversial. Goo et al.<sup>2)</sup> suggested PTACs are associated with obstructive lung disease and emphysema caused by increased expiratory pressure, resulting in out-pouch of the tracheal wall through the weakened spot. By contrast, a recent study by Bae et al.<sup>6)</sup> found no association between the presence of emphysematous lung changes and PTACs on multi-detector CT. In accordance with Bae et al.,<sup>6)</sup> our patient had no evidence of chronic obstructive lung disease.

PTACs are usually asymptomatic, although compression of the trachea or infection of the cyst can occur.<sup>13,14)</sup> Timely and accurate diagnostic tests may include high resolution CT with 3D reconstruction technology, which can depict the nature of the lesion before performing an invasive procedure such as FNA.

In conclusion, PTAC appears as a round or ovoid hypoechoic lesion located in the right and posterior aspect of the trachea with strong internal echogenic foci. The location on the right side and the absence of hypoechoic rim are the features that differentiate from upper esophageal diverticula. A better understanding of the US characteristics of PTACs will help avoid the use of inappropriate invasive procedures such as FNA.

## References

- 1) Tanaka H, Mori Y, Kurokawa K, Abe S. *Paratracheal air cysts communicating with the trachea: CT findings. J Thorac Imaging* 1997;12(1):38-40.
- 2) Goo JM, Im JG, Ahn JM, Moon WK, Chung JW, Park JH, et al. *Right paratracheal air cysts in the thoracic inlet: clinical and radiologic significance. AJR Am J Roentgenol* 1999;173(1):65-70.
- 3) Tanaka H, Igarashi T, Teramoto S, Yoshida Y, Abe S. *Lymphoepithelial cysts in the mediastinum with an opening to the trachea. Respiration* 1995;62(2):110-3.
- 4) Buterbaugh JE, Erly WK. *Paratracheal air cysts: a common finding on routine CT examinations of the cervical spine and neck that may mimic pneumomediastinum in patients with*

- traumatic injuries. AJNR Am J Neuroradiol* 2008;29(6):1218-21.
- 5) Polat AV, Elmali M, Aydin R, Ozbay A, Celenk C, Murat N. Paratracheal air cysts: prevalence and correlation with lung diseases using multi-detector CT. *J Med Imaging Radiat Oncol* 2014;58(2):144-8.
  - 6) Bae HJ, Kang EY, Yong HS, Kim YK, Woo OH, Oh YW, et al. Paratracheal air cysts on thoracic multidetector CT: incidence, morphological characteristics and relevance to pulmonary emphysema. *Br J Radiol* 2013;86(1021):20120218.
  - 7) Morgan J, Perone R, Yeghiayan P. Paratracheal air collection in a trauma patient: a case report. *Clin Imaging* 2009;33(1):67-9.
  - 8) Ampollini L, Bobbio A, Carbognani P, Rusca M. Incidental radiological finding of tracheal diverticulum. *Eur J Cardiothorac Surg* 2007;31(3):545.
  - 9) Kim YJ, Kim EK, Kim J, Park CS. Paratracheal air cysts: sonographic findings in two cases. *Korean J Radiol* 2003;4(2):136-9.
  - 10) Haghi Z, Towhidi M, Fattahi H, Lari SM. Right paratracheal air cyst (tracheal diverticulum). *Respir Care* 2009;54(10):1409-11.
  - 11) Kim JS, Kim AY, Yoon Y. Paratracheal air cysts using low-dose screening chest computed tomography: clinical significance and imaging findings. *Jpn J Radiol* 2011;29(9):644-8.
  - 12) Kim HK, Lee JI, Jang HW, Bae SY, Lee JH, Kim YS, et al. Characteristics of Killian-Jamieson diverticula mimicking a thyroid nodule. *Head Neck* 2012;34(4):599-603.
  - 13) Infante M, Mattavelli F, Valente M, Alloisio M, Preda F, Ravasi G. Tracheal diverticulum: a rare cause and consequence of chronic cough. *Eur J Surg* 1994;160(5):315-6.
  - 14) Chaudhry I, Mutairi H, Hassan E, Afzal M, Khurshid I. Tracheal diverticulum: a rare cause of hoarseness of the voice. *Ann Thorac Surg* 2014;97(2):e29-31.