



# Ultrasonic diagnosis of esophageal perforation and deep neck infection caused by denture swallowing: a case description

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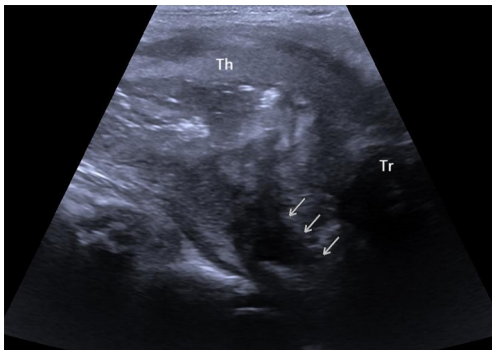
## Introduction

Foreign body perforation of the esophagus is a rare clinical emergency. It can usually be diagnosed based on ingestion history, clinical symptoms, and a computed tomography (CT) examination. However, there is no clear history of ingestion of foreign bodies, which makes rapid clinical diagnosis difficult and often delays diagnosis and treatment. Due to the unique structure of the esophagus, sharp foreign bodies are often obtuse in the cervical segment of the esophagus, resulting in perforation (1). Deep cervical infection and abscess may occur after perforation if they cannot be removed within 24 hours (2). This article describes a case of esophageal perforation and surrounding infection caused by a mistakenly swallowed denture impinged in the esophagus, which was confirmed as a denture by ultrasound diagnosis and extraction by rigid esophagoscopy. The ultrasonographer can understand the ultrasonic characteristics and clinical manifestations of esophageal perforation and deep neck infection, and improve the diagnostic accuracy.

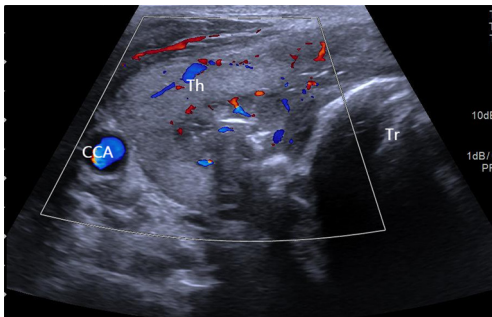
## Case presentation

A 63-year-old male patient was admitted to the hospital due to “neck swelling and pain after eating eggs, with coughing and dysphagia for 10 days”; he had no extraordinary medical history. Physical examination: body temperature of 38.0 °C, no dyspnea was observed, the pharyngeal mucosa was not hyperemic or edematous, the tonsils were not swollen, dentition defect was not found, the

right neck was swollen and tenderness was evident, and swollen lymph nodes were not found on both sides of the neck. Laboratory examination: leukocyte  $11.60 \times 10^9/L$ , neutrophil percentage 80.30%, C-reactive protein (CRP) 160.8 mg/L. Laryngoscopy revealed chronic pharyngitis. Cervical ultrasound: 47 mm × 20 mm “neuroinflammatory mass” was observed in the inner part of the inferior pole of the right lobe of the thyroid gland close to the tracheal ring, which extended inward and upward to the thyroid cartilage to the front of the neck. The boundary between the thyroid and the dorsal envelope was unclear, with an irregular shape. Multiple dots and linear gas echoes were seen in the mass, and low echoes were seen around it. After the patient was instructed to drink water, the gas in the assembly flowed in strong echo and communicated with the esophagus (*Figure 1*); the color Doppler flow imaging (CDFI) showed blood flow signal in low echo around the mass (*Figure 2*). Follow-up medical history showed that the patient had lost his denture after coughing while eating eggs 10 days ago. Ultrasonography indicated a “neuroinflammatory mass” behind the right lobe of the thyroid and between the trachea. Esophageal perforation and deep neck infection were considered. Chest CT plain scan plus 3D imaging showed a 43 mm long metal shadow in the upper esophagus (*Figure 3*) and a gas density shadow behind the right lobe of the thyroid gland and to the right of the upper esophagus (*Figure 4*), suggestive of foreign body esophageal perforation, denture waiting to be drained, rigid esophagoscopy under emergency general anesthesia + intraesophageal foreign body removal. During



**Figure 1** Two-dimensional ultrasound showed a “neuroinflammatory mass” in the back of the right lobe of the thyroid (arrows indicated that the mass communicated with the esophagus after drinking water). Th, thyroid gland; Tr, trachea.



**Figure 2** CDFI showed blood flow signal in low echo around the mass. Th, thyroid gland; Tr, trachea; CCA, common carotid artery; CDFI, color Doppler flow imaging.



**Figure 3** CT 3D reconstruction (arrow wire hook denture). CT, computed tomography.



**Figure 4** Plain CT images (arrows show gas density shadow behind the right lobe of the thyroid gland and in front of the upper esophagus). CT, computed tomography.

the operation, a denture-like foreign body was found at the esophageal entrance (15 cm away from the incisor), with an accumulation of purulent secretions around and mucosal erosion of the esophageal wall. The foreign body was removed with clamp pliers and confirmed as a denture. After the operation, a nasal feeding diet was implemented; a repeat chest CT indicated exudation and accumulation of air around the neck space and upper mediastinum, and anti-infection treatment was given with fluid rehydration and intravenous drip. No fever was detected 7 days later, and all infection indicators improved. All procedures performed in this study were in accordance with the ethical standards of the Ethics Committee of Dingxi City People’s Hospital and with the Helsinki Declaration (as revised in 2013). Written informed consent was provided by the patient and his family for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

## Discussion

Foreign body perforation of the esophagus is a medical emergency caused by sharp foreign body injury to the wall of the esophagus, resulting in full-layer perforation of the wall of the esophagus, which requires rapid and precise diagnosis to minimize complications after perforation (3). The international guidelines no longer recommend oral contrast media for diagnosing foreign body esophageal perforation, and CT is recognized as the preferred

diagnostic method (4,5). However, most patients without a clear history of swallowing foreign bodies in the esophagus seek treatment due to neck pain, and foreign bodies in the esophagus are often blunt and often occur in the neck (1). High-frequency ultrasound can quickly determine the location, shape, and size of foreign bodies in the cervical esophagus, and is especially useful for detecting secondary deep neck infection after the perforation of foreign bodies (6). The typical ultrasound manifestation of cervical esophageal perforation and deep cervical infection is the formation of a “neuroinflammatory mass” behind the thyroid with visible blood flow signals, and the mass communicates with the esophagus after the patient is asked to swallow or drink water. This case describes a relatively rare example of esophageal perforation with secondary infection. The patient had experienced neck swelling and pain 10 days after eating eggs, denied the history of swallowing foreign matter, and was clinically suspected of having sub-thyroiditis. An ultrasound examination of the neck was performed and the results led us to consider esophageal perforation and deep neck infection.

In addition to esophageal perforation, the “air mass” behind the thyroid must be distinguished from the pear-shaped recess fistula and the pharyngoesophageal diverticulum. The pear-shaped recess fistula is common in children; it emanates from the pear-shaped recess and extends to the anterolateral part of the neck, but does not communicate with the esophagus. The pharyngoesophageal diverticulum is located on the posterior wall of the theoretical part of the cricopharyngeal muscle, with frequent occurrence on the left side, high position, and regular shape. No blood flow signal is found in the mass.

In conclusion, for patients with no apparent history of swallowing foreign bodies, neck swelling, and pain, and a “neuroinflammatory mass” is detected by ultrasound behind the thyroid and connects to the esophagus, the possibility of cervical esophageal perforation and deep neck infection, a rare disease, should be considered first, to facilitate an accurate clinical diagnosis and treatment plan.

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## Footnote

*Conflicts of Interest:* Both authors have completed the

ICMJE uniform disclosure form (available at <https://qims.amegroups.com/article/view/10.21037/qims-23-1142/coif>). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the Ethics Committee of Dingxi City People’s Hospital and with the Helsinki Declaration (as revised in 2013). Written informed consent was provided by the patient and his family for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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