Contrast-enhanced ultrasound (CEUS) and CEUS-guided biopsy in the diagnosis of lung abscess in a patient with achalasias: Case report

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Abstract: Primary achalasia is a rare disorder of unknown aetiology characterized by dysfunction of esophageal motility secondary to degeneration of esophageal neurons. Some diseases, in particular neoplastic diseases, can cause symptoms similar to achalasia, and this condition is called pseudoachalasia. Pseudoachalasia can be indistinguishable from primary achalasia, and many investigations are often necessary to detect or exclude an underlying neoplasia. We report a case in which thoracic contrast-enhanced ultrasound (CEUS) and percutaneous CEUS-guided lung biopsy played a central role in differentiating aspiration pneumonia secondary to achalasia and complicated by lung abscess from pseudoachalasia secondary to lung carcinoma, after computed tomography (CT) yielded inconclusive findings. US contrast agent SonoVue® has an exclusively intravascular distribution, and its ability to discriminate between contrast vascular signal and tissue signal is greater than that of CT, making CEUS superior to CT in distinguishing perfused, viable tissues from avascular necrotic tissues. Although its use in pleuropulmonary pathology is still off-label, CEUS can play a useful role in characterizing peripheral pulmonary masses in selected cases.

Keywords: achalasia, pseudoachalasia, contrast-enhanced ultrasound, thoracic ultrasound, lung biopsy, lung abscess

Introduction

Primary achalasia is a rare disorder of unknown aetiology characterized by dysfunction of esophageal motility secondary to degeneration of esophageal neurons. Some diseases can cause symptoms similar to achalasia, and this condition is called pseudoachalasia. Pseudoachalasia occurs mainly in the elderly, and malignancies are its most common cause. Age over sixties and duration of symptoms shorter than six months increase the likelihood of paraneoplastic pseudoachalasia and require further diagnostic procedures to detect the suspected underlying neoplasia [2].

We report a case in which thoracic ultrasonography (US) and contrast-enhanced US (CEUS) played a central role in differentiating aspiration pneumonia secondary to achalasia and complicated by lung abscess from pseudoachalasia secondary to lung carcinoma, after computed tomography (CT) yielded inconclusive findings.

Case Report

A 74-year-old man with long-term smoking history was admitted to our department with asthenia and one-month history of weight loss, dysphagia, intermittent cough, and fever. Physical examination showed mild elevated temperature (37.8 °C) without any other relevant abnormalities; chest X-ray showed lung consolidation in the left lower lobe. After obtaining blood samples for culture, empiric antibiotic therapy was started, and thoracic and abdominal (CT) was carried out in the suspicion of lung cancer. CT showed severely dilated oesophagus with retained food, left pleural effusion extended to the apex, and loculated basal fluid collection with associated parenchymal consolidation of the left lower lobe (Fig. 1). No evidence of lesions compressing the esophagus below the dilated area was documented. The patient underwent esophagogastroduodenoscopy (EGDS) that confirmed ectasy of the esophagus with no macroscopic mucosal abnormalities. Based on CT and EGDS findings, primary achalasia with aspiration pneumonia was suspected, but pseudoachalasia secondary to occult neoplasia could not be excluded. Two days after CT, US-guided thoracentesis was performed, and 40 mL of cloudy yellow fluid was obtained for biochemical, cytologic, and microbiologic examinations. Chest US examination showed a 46×43 mm inhomogeneous hypoechoic parenchymal consolidation contiguous to compressive atelectasis due to the left pleural effusion, with an anechoic area of 25 mm in diameter inside the hypoechoic consolidation (Fig. 2). CEUS was performed...
to characterize both the parenchymal consolidation and the anechoic area. CEUS was performed with a low mechanical index contrast-specific nonlinear technique (CnTI, Esaote, Genova, Italy). An intravenous bolus of 2.4 mL of an 8 microliters/mL solution of sulfur hexafluoride microbubbles stabilized by a phospholipid shell (SonoVue®, Bracco, Milan, Italy) was used as US contrast agent. CEUS showed rapid and intense enhancement of the atelectasis in the arterial phase, whereas both the parenchymal consolidation and the anechoic area appeared as a single avascularised lesion surrounded by hyperenhancing rim (Fig. 3). These findings suggested the diagnosis of lung abscess. The patient underwent CEUS-guided aspiration of the avascularised lesion using an 18-gauge Chiba needle (Fig. 4), and about 5 mL of greenish pus were obtained. CEUS-guided biopsy of the peripheral hyperenhancing rim was then performed using a 20-gauge Tru-cut needle. Culture resulted positive for *Streptococcus anginosus*, and cytological examination showed macrophages, reactive and white blood cells. These results confirmed the diagnosis of aspiration pneumonia with lung abscess formation, and primary achalasia was confirmed by esophageal manometry. The patient underwent endoscopic balloon dilatation of the oesophagus, and recovered from aspiration pneumonia after further US-guided aspiration of the lung abscess and a three-week course of pathogen-directed antibiotic treatment.

**Discussion**

In elderly people, clinical findings suggestive of achalasia should alert the physician to rule out pseudoachalasia. Pseudoachalasia can be misdiagnosed, as it may be
endoscopically indistinguishable from primary achalasia and can be secondary to malignancies distant from the gastrointestinal tract [3]. Malignancies can cause pseudoachalasia either by invading the esophagus, or by releasing unknown factors that impair esophageal motility. In this case, the diagnosis is hard to be reached, and many investigations are often necessary to identify or exclude an underlying neoplasia [2].

In our patient, thoracic US depicted the inhomogeneous hypoechoic parenchymal consolidation differentiating it from the contiguous compressive atelectasis, and CEUS played a key role in rapidly addressing the diagnosis and correctly guiding the percutaneous biopsy into the target.

In the last few years, CEUS has gained a well-established role in the detection and characterization of focal liver lesions [4], and the most recent guidelines of the European Federation of Societies of Ultrasound in Medicine and Biology (EFSUMB) have extended the use of CEUS to other abdominal districts [5]. Conversely, its usefulness in pleuropulmonary pathology has been scarcely investigated [6], and at present, the use of CEUS in this field is to be considered off-label. SonoVue® has an exclusively intravascular distribution, and its well-known ability to depict macro- and microcirculation enables to distinguish perfused, viable tissues from necrotic tissues. Such an ability is widely exploited to assess the local response to ablation treatments of liver tumors, as well as to improve the diagnostic yield of percutaneous biopsy of largely necrotic masses. In this regard, some reports suggested that the diagnostic accuracy of biopsy of peripheral pulmonary lesions can also be increased by CEUS guidance [7, 8]. According to these experiences, in our patient, CEUS played a key role in characterizing the lung lesion, suggesting the diagnosis of lung abscess that was then confirmed by CEUS-guided biopsy. We do not know why CT failed in recognizing the lung abscess. Maybe, abscess formation occurred in the interval between CT and US examination. However, US was carried out just 2 days after CT, and intermittent fever was already present when CT was performed. The different position assumed by the patient undergoing CT and US determines different pleural fluid distribution, and the consequent different extension of the compressive atelectasis could have hidden the lesion at CT examination.

In conclusion, according to other experiences, this case-report suggests that thoracic US and CEUS can yield additional useful information in selected cases, and should be included in the diagnostic work-up of peripheral pulmonary lesions, especially when CT findings are inconclusive. Of course, further studies are needed to better define the actual role of CEUS in pulmonary pathology.

References

1. Kahrilas PJ, Kishk SM, Helm JF, Dodds WJ, Harig JM, Hogan WJ: Comparison of pseudoachalasia and achalasia. Am J Med 82, 439–446 (1987)
2. Tracey JP, Traube M: Difficulties in the diagnosis of pseudoachalasia. Am J Gastroenterol 89, 2014–2018 (1994)
3. Feczko PJ, Halpert RD: Achalasia secondary to non-gastrointestinal malignancies. Gastrointest Radiol 10, 273–276 (1985)
4. Claudon M, Cosgrove D, Albrecht T, Bolondi L, Bosio M, Callida F, Correas JM, Darge K, Dietrich C, D’Onofrio M, Evans DH, Filice C, Greiner L, Jager K, Jong N, Leen E, Lencioni R, Lindsell D, Martegani A, Meairs S, Nolsøe C, Piscaglia F, Ricci P, Seidel G, Skjoldbye B, Solbiati L, Thorelius L, Tranquart F, Weskott HP, Whittingham T: Guidelines and good clinical practice recommendations for contrast enhanced ultrasound (CEUS)-update 2008. Ultraschall in Med 29, 28–44 (2008)
5. Piscaglia F, Nolsøe C, Dietrich CF, Cosgrove DO, Gilja OH, Bachmann Nielsen M, Albrecht T, Barozzi L, Bertolotto M, Catalano O, Claudon M, Clevert DA, Correas JM, D’Onofrio M, Drudi FM, Eyding J, Giovannini M, Hocke M, Ince A, Jung EM, Klauser AS, Lassau N, Leen E, Mathis G, Safoua A, Seidel G, Sidhu PS, ter Haar G, Timmerman D, Weskott HP: The EFSUMB Guidelines and Recommendations on the Clinical Practice of Contrast Enhanced Ultrasound (CEUS). Update 2011 on non-hepatic applications. Ultraschall in Med 32, 1–27 (2011)
6. Gorg C: Transcutaneous contrast-enhanced sonography of pleural based pulmonary lesions. Eur J Radiol 64, 213–221 (2007)
7. Sartori S, Nielsen I, Trevisani L, Tombesi P, Cecchetti P, Abbasciano V: Contrast-enhanced sonography as guidance for transthoracic biopsy of a peripheral lung lesion with large necrotic area. J Ultrasound Med 23, 133–136 (2004)
8. Bing-Sheng Cao, Ji-Hua Wu, Xiao-Lin Li, Deng J, Liao QG: Sonographically guided transthoracic biopsy of peripheral lung and mediastinal lesions. J Ultrasound Med 30, 1479–1490 (2011)