ORIGINAL ARTICLE

Successful multidisciplinary urgent management of life-threatening intraprocedural bleeding after EUS-guided fine-needle biopsy of a pulmonary mass

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EUS-guided fine-needle biopsy (FNB) is a safe technique with a low rate of adverse events (AEs), ranging from 0% to 2% maximum for solid lesions. Furthermore, to date, no cases of intrabronchial bleeding have been reported after sampling pulmonary masses.[1,2]

An 82-year-old man with a previous diagnosis of adenocarcinoma in the right side of the colon was referred to our thoracic unit because of a pulmonary lesion suspected of malignancy in the left upper lobe (LUL). A CT scan showed a 40-mm lesion in the LUL. No lymph nodes were suspected of being malignant in the thorax and abdomen. EUS-FNB was scheduled to distinguish the primary tumor from colonic metastasis. The patient had atrial fibrillation and arterial hypertension, so he was under anticoagulant therapy with apixaban (a direct-acting oral anticoagulant). This was switched to low-molecular-weight heparin (LMWH) more than 72 hours before the procedure, with the last administration of LMWH more than 12 hours before the procedure, as per the guidelines.[1] EUS showed the pulmonary lesion behind the aorta with a window for biopsy between the aortic arch and the left subclavian artery (Fig. 1), so we performed an FNB of the lesion with 2 passes of a 22-gauge Franseen-tip needle (Acquire; Boston Scientific, Marlborough, Mass, USA), excluding any interposed vessels with color Doppler mode before each pass. At the end of the procedure, an abundant quantity of fresh blood started to flow out of the mouth, even though the esophagus was clear without any sign of transparietal bleeding. The bleeding was identified as coming from the glottis with a frontal-view scope (Fig. 2; Video 1, available online at www.videogie.org). Oxygen saturation suddenly lowered to under 50% and blood pressure dropped to 60/40 mm Hg. Immediately, the anesthesiologist performed endotracheal intubation, maintaining vital signs through the administration of vasoactive drugs and volume resuscitation with a high volume of saline. Simultaneously, the thoracic surgeon performed a bronchoscopy with the aim of locating the source of and treating the bleeding. Bronchoscopy showed a mixture of fresh blood and blood clots filling the left bronchus (Fig. 3), but the bleeding site was inaccessible because of its peripheral location, so treatment included administration of local tranexamic acid and simultaneous aspiration of the blood and clots. Oxygen saturation was around 90% after the first bronchial toilette but, unfortunately, the patient developed a right pneumothorax during ventilation (Fig. 4), so a chest drainage tube was inserted. Bronchial toilette was performed repeatedly until saturation stayed permanently above 95% and pressure was raised to 100/60 mm Hg without vasoactive drugs. Before removing the tracheal intubation, a cardiac US was performed, and it did not show any sign of ischemic disease. The patient woke up in a clinically stable condition without any pathologic signs of neurologic involvement, so transfer to the intensive care unit was not necessary. Antibiotics were administered, and his left lung was monitored by serial chest radiographs over the following week, showing progressive clearing of the pulmonary parenchyma (Fig. 5A). Histology showed squamous cell carcinoma (p40 positive, thyroid transcription factor 1 negative), subtype non-small cell lung cancer with 40% of PD-L1 at immunohistochemical examination. Chest drainage was removed after 3 days, and the patient was discharged 1 week later. Final staging of the patient was IIIA according to the 8th edition of the American Joint Committee on Cancer TNM (tumor, node, metastasis) staging system,[3] so he was referred to a tertiary oncological center for radiotherapy and systemic chemotherapy. At his 1-month follow-up, he did not complain about further FNB-related bleeding signs, and the lung was clear at x-ray evaluation (Fig. 5B).

Abbreviations: AEs, adverse events; FNB, fine-needle biopsy; LMWH, low-molecular-weight heparin; LUL, left upper lobe.

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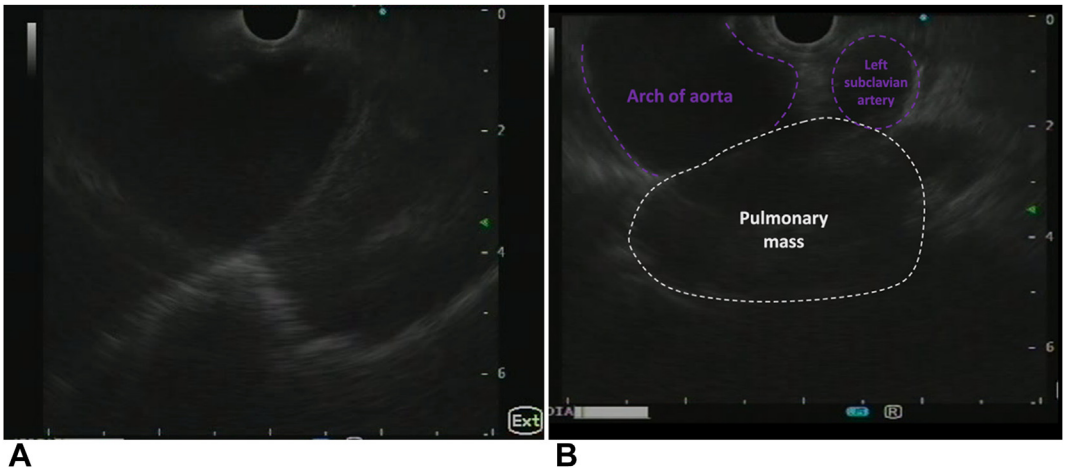

Figure 1. A and **B,** EUS transesophageal evaluation of the pulmonary mass, which is behind the arch of the aorta, next to the origin of the left subclavian artery.

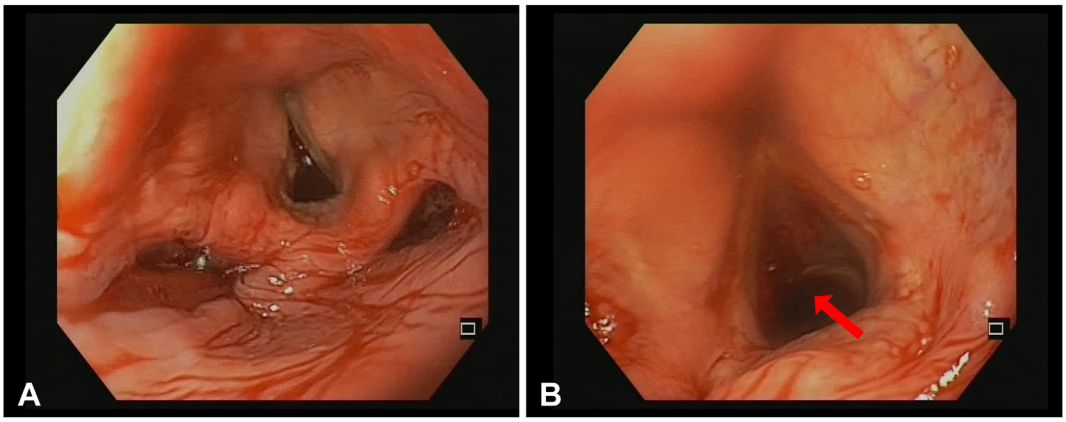

Figure 2. Glottis endoscopic view after transesophageal EUS-guided fine-needle biopsy. **A,** Panoramic glottis view. **B,** Glottis view showing a clot (*red arrow*) in the trachea.

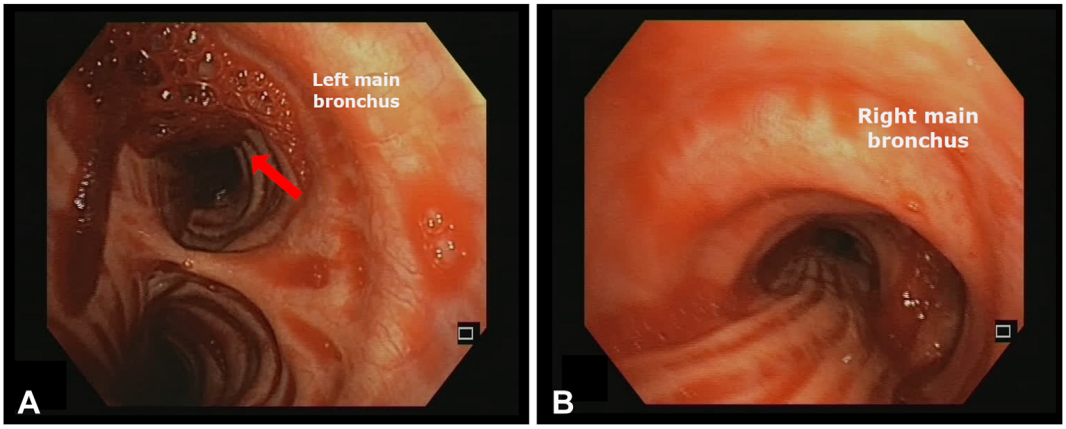

Figure 3. Bronchoscopy view showing **(A)** tracheal carina with fresh blood and blood clots filling the left main bronchus (*red arrow*) and **(B)** the right main bronchus with no clot and only supplied by fresh blood.

Despite preventive and recommended measures, the risk of bleeding after EUS-FNB is not nullified, so early identification of AEs is the first, most fundamental step toward effectively managing intrabronchial bleeding when it occurs. Late management can keep patients alive, but the outcomes range from death to "long-term" adverse events, such as loss of

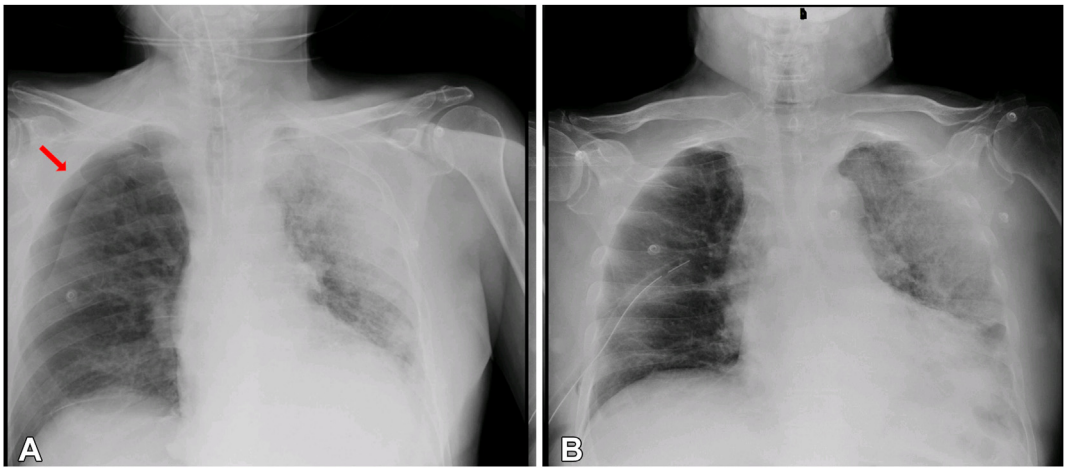

Figure 4. Chest x-ray examinations during procedure (time 0). **A,** Right pneumothorax (*red arrow*) and diffuse opacity of the left lung from massive bleeding. **B,** Resolution of pneumothorax after drainage insertion.

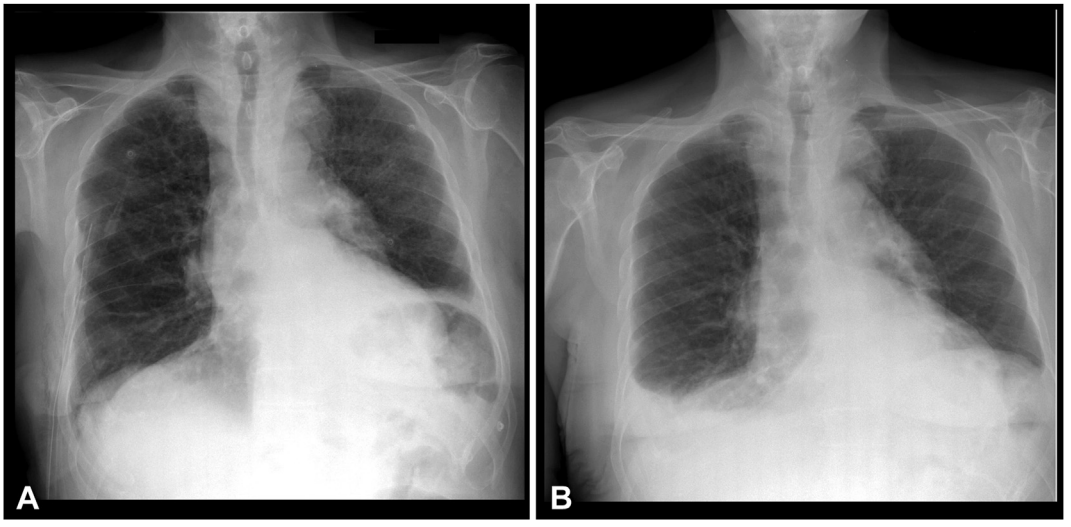

Figure 5. Chest x-ray examination at follow-up. **A,** After 3 days. **B,** After 9 days.

neurologic, respiratory, or cardiac functions. In our case, intraprocedural bleeding could have been caused by the rupture of intratumoral vessels from trauma resulting from the needle passes, with blood passing into the bronchial tree as a result of infiltration through the peripheral bronchial branches. However, in a prospective study on EUS-FNA in 168 patients with lung masses and/or mediastinal lymphadenopathy, no patients developed bleeding and only 1 patient (0.006%) had chest pain as a postprocedural AE for a mediastinal mass without further adverse events.[4] In addition, bleeding after EUS-FNB of pulmonary masses is rare, even in patients taking antiplatelet drugs.[5] Considering the anatomical structures crossed by the needle, intra- or postprocedural bleeding may be esophageal, mediastinal, pulmonary/pleural, or intrabronchial, so the procedure could affect vital functions such as respiratory exchange. Moreover, EUS-FNB of mediastinal, hilar, and lung lesions is described as a safe technique even when sampling is made through a vessel with a transvascular approach, such as crossing the aorta or other arteries, showing no significant AEs.[6,7] Even though post–EUS-FNB bleeding is rarely described in pulmonary masses, the involved team should always be ready to treat it effectively. In view of our long experience with EUS-FNB procedures, management of AEs are best dealt with in a shared, dedicated room where both bronchoscopy and digestive endoscopy can be performed, and should involve a multidisciplinary team including endoscopists, anesthesiologists, bronchoscopists, interventional radiologists, and thoracic surgeons. In conclusion, the key to our successful outcome came from both our dedicated endoscopic room and the expertise and responsiveness of our multidisciplinary team through an immediate, coordinated approach. Unfortunately,

considering the involvement of different medical specializations in these cases, only a few tertiary centers may have adequate facilities (including shared endoscopic rooms, monobloc buildings, and wards close to each other), skilled nurses, dedicated consultants, and structured internal policies to safely perform EUS-FNB of lung masses.

DISCLOSURE

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