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IMAGING IN THORACIC CANCER

Asymptomatic air-embolism following percutaneous radiofrequency ablation of lung tumor: Rare or underestimated complication?

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Background

Air embolism is an insidious but potentially life-threatening complication very rarely occurring after radio-frequency ablation (RFA). Its incidence has been reported to be 0.02% to 0.07%[1–3] after trans-thoracic cutting needle biopsy (TTNB) of lung lesions.[4] Clinical impact is devastating in most cases, with a high rate of death and catastrophic sequelae (myocardial infarction, stroke). Prompt recognition is crucial for a successful treatment.

Case presentation

A 71-year-old man was scheduled for RFA of a metachronous lung neoplasm located in the left lower lobe (Fig. 1a). Medical history was characterized by multi-centric lung adenocarcinoma, treated by iterative surgery. The procedure was performed under local anaesthesia (lidocaine 2%) and sedation, with the patient placed in the right lateral decubitus. A new catheter consisting of a 17G non-coring needle with integrated RF antenna without electrode tines (Amica, General Hospital, Aprilia, Italy) was placed under computed tomography (CT)-guidance (Fig. 1b, red-arrow). The procedure was well tolerated, but a routine CT-scan performed just before catheter removal surprisingly revealed small air blebs in the upper pulmonary vein. The patient was left in the right lateral decubitus and the Trendelenburg position was immediately applied in order to prevent cephalic embolism. Subsequent scans showed the air blebs migrating into the left ventricle and then in the descending aorta (Fig. 2a–c, red-arrows). Despite the remarkable amount of air, the patient remained asymptomatic and no signs of cardiac ischemia were recorded during electrocardiogram (ECG)-monitoring. Anti-platelet treatment was immediately started and the clinical course was uneventful.

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Discussion

Among the mechanisms that may produce this very rare phenomenon, transient bronchovenous fistula is probably the most likely. Because of its very low incidence, risk factors are hard to assess; however, a multicentric study investigating TTNB results showed that lesions in the lower lobe, higher diameter of the needle, and parenchymal haemorrhage independently predict the occurrence of an air embolism.[5] Moreover, conditions and diseases characterized by increased airway pressure (chronic obstructive pulmonary disease, mechanical ventilation) can dramatically increase the amount of air entering blood circulation. Pleural adhesions (as in this case) prevent pneumothorax and lung collapse, theoretically favouring air embolism (air not escaping to the pleural space can overtake the pressure of pulmonary venous vessels disrupted and enter blood circulation). What is interesting about this challenging case is the occurrence of an air embolism despite the use of a non-cutting, non-coring needle without electrode tines. Moreover, the absence of a relationship between the amount of air embolism and its clinical impact suggests that the incidence of such a complication is probably largely underestimated, especially in high-risk patients, who should be adequately informed of this possibility.

In conclusion, radiologists must be confident with the diagnosis and management of an air embolism: a routine CT-scan is amenable after positioning of the RF-cathether, because it may create an aerial-vascular fistula. The Trendelenburg position, if tolerated, is routinely recommended. Platelet activation during aerial embolism worsens ischemia and may be effectively treated by salicylates.

Disclosure

No authors report any conflict of interest.

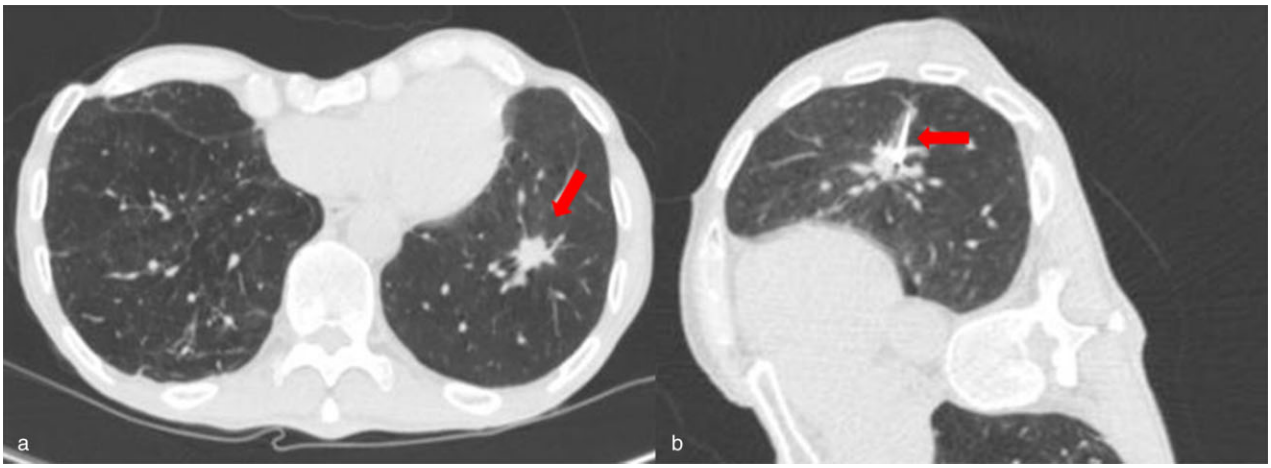

Figure 1 (**a**) Chest computed tomography scan showing neoplasm of the residual lower lobe, (**b**) with the 17G non-coring needle with integrated radiofrequency-antenna placed by the tip into the lesion.

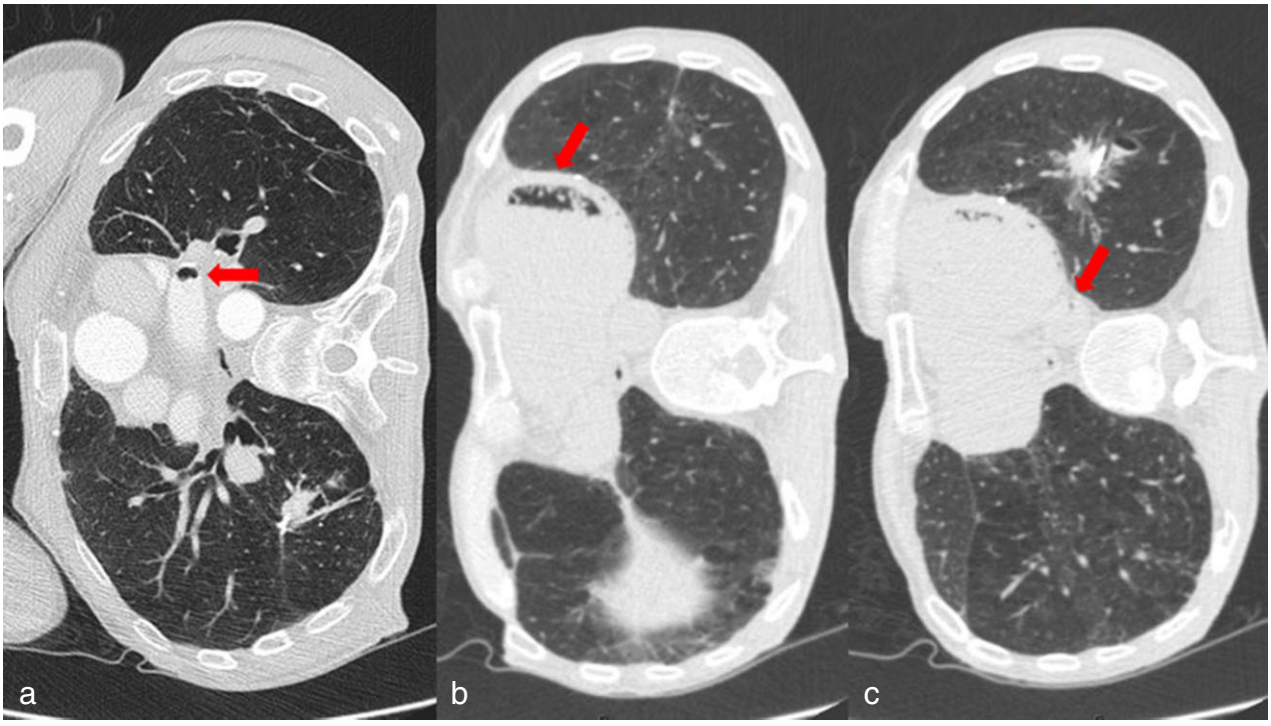

Figure 2 (**a**) Post-procedural chest computed tomography demonstrating air blebs in the left pulmonary vein, (**b**) with subsequent scans showing migration to the left ventricle, (**c**) and to the descending aorta.

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