

Left Ventricular and Coronary Air Embolism Complicating a Routine CT-Guided Cavitating Lung Mass Biopsy: A Case Report

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Abstract: Air embolism is an extremely rare complication of image guided trans-thoracic percutaneous lung biopsy whatever the modality or technique employed. Air embolism in the coronary arteries is an even rarer form and is scarcely reported in British medical literature. We present a case of coronary artery embolism following percutaneous trans-thoracic lung biopsy in a 70 years old female and highlight the need for both the interventional radiologist and the referring physician to be aware of this potentially risky complication. An immediate post-biopsy CT is usually adequate to make the diagnosis and is therefore recommended for patients manifesting vaso-vagal syncope and those with a previous history of myocardial infarction.

Key words: Coronary arteries, air embolism, lung biopsy, complication, post biopsy CT, myocardial infarction

INTRODUCTION

Air embolism is an extremely rare complication of image guided trans-thoracic percutaneous lung biopsy whatever the modality or technique employed. Air embolism in the coronary arteries is an even rarer form and is scarcely reported in British medical literature. Percutaneous image-guided procedures such as lung biopsy are frequently performed in the radiology departments. Several modalities are available for this purpose such MRI, ultrasound and CT. Among these, Percutaneous CT guided lung biopsy is the mainstay of image-guided lung biopsy today (Gohari and Haramati, 2004; Tomiyama *et al.*, 2006). There are possible complications for this procedure which the interventional radiologist must be aware and fully prepared to deal with (Gohari and Haramati, 2004; Anderson *et al.*, 2003; Oikonomou *et al.*, 2004; Manhire *et al.*, 2003). Coronary artery air embolism is hardly a common complication and is therefore under-reported. This case study aims at highlighting its possibility and need for adequate preparation to deal with such a potential medical emergency.

MATERIALS AND METHODS

A 72 years old lady, a smoker for over 50 years presented in the A/E department with dry cough and haemoptysis. She admitted a previous exposure to tuberculosis. Plain chest radiograph of the same day showed 4.5 cm cavitating mass in the left upper lobe (Fig. 1). A contrast enhanced (100 mL Omnipaque 300, GE



Fig. 1: Plane chest radiograph

Healthcare AS Norway) CT examination of the thorax carried out subsequently (40 slice Brilliance MDCT, Philips Medical Systems, Nederland B.V) confirmed the solid lung mass suspicious of cancer (Fig. 2). PET CT confirmed the presence of a solitary lesion without distant metastases (Fig. 3 and 4).

Following the regular study up the patient underwent a routine CT-guided core biopsy of the mass using an 18 g, 15 cm long quick core cutting needle (William Cook Europe ApS, Denmark).

Access to the lesion proved difficult due to overlying bony structures but eventual success on hitting target was immediately followed by about of coughing with haemoptysis (Fig. 5). She then lapsed into shock rapidly and required resuscitation



Fig. 2: Solid lung mass suspicious of cancer

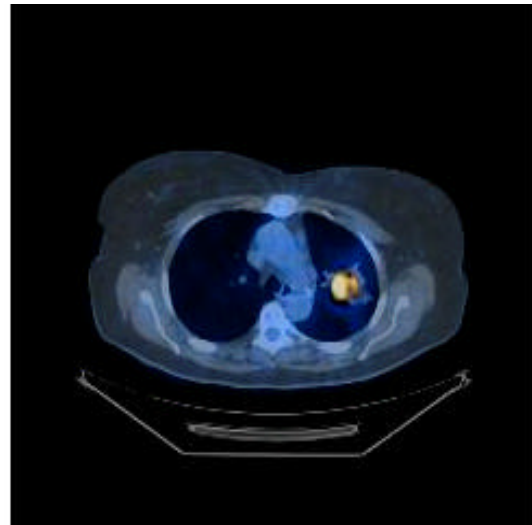


Fig. 4: CT presence of solitary lesions without distant metastases

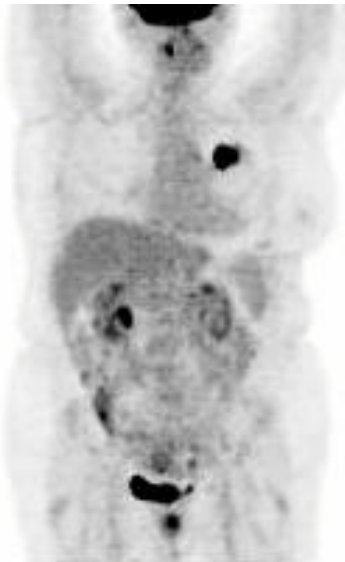


Fig. 3: PET presence of solitary lesions without distant metastases

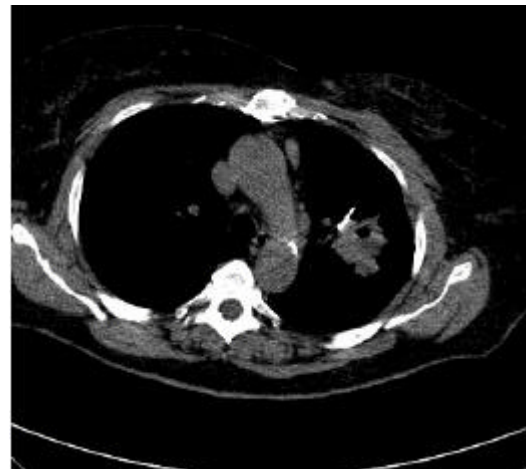


Fig. 5: Bout of coughing with haemoptysis

within the CT room. She had had 2 previous episodes of myocardial infarction and later described the symptoms, she experienced as similar.

To exclude a major pulmonary haemorrhage or haemothorax or pneumothorax we proceeded to perform a contrast enhanced CT thorax immediately she was haemodynamically stable.

This showed the presence of air bubbles in the left ventricle adjacent to the interventricular septum as well as air in the root of the aorta and in both coronary arteries (Fig. 5-9). There was also a mild left sided pneumothorax.

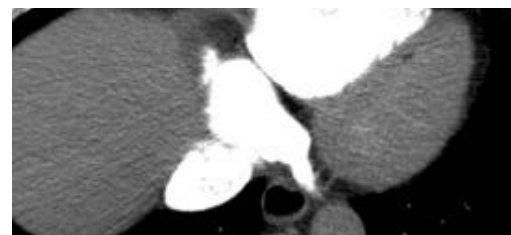


Fig. 6: Gas left ventricle

She was transferred to A/E resuscitation room and subsequently to the medical admissions unit. Her ECG did not show evidence of Myocardial infarction and Troponin



Fig. 7: Gas in aorta



Fig. 8: Right coronary artery



Fig. 9: Gas in LCA

$T < 0.010 \text{ ug L}^{-1}$ (undetectable Troponin T indicates no myocardial injury assuming at least 12 h post event). She made a complete recovery. She was back in the Day Case

ward next morning and a check chest radiograph showed resolution of the left pneumothorax. She was discharged without further incident. Consent was obtained from the Ethics committee to reproduce patients CT images and history.

RESULTS AND DISCUSSION

Percutaneous CT guided lung biopsy is the mainstay of image-guided lung biopsy today (Gohari and Haramati, 2004; Tomiyama *et al.*, 2006). Combined with bronchoscopic biopsy it makes up over 90% of diagnostic procedures for tissue diagnosis of intrapulmonary masses (Manhire *et al.*, 2003; Golfieri *et al.*, 1998). The most common documented complications of needle biopsy of the lung whether CT or other image guided are pneumothorax and pulmonary haemorrhage (Gohari and Haramati, 2004; Anderson *et al.*, 2003; Oikonomou *et al.*, 2004; Manhire *et al.*, 2003).

Infection has also been reported as well as haemothorax, seeding along the biopsy needle tract and cardiac tamponade (Manhire *et al.*, 2003; Yoshikawa *et al.*, 2000).

The incidence of air embolism in the coronary arterial system complicating percutaneous transthoracic lung biopsy has been reported only in a handful of cases often associated with myocardial infarction (Mokhlesi *et al.*, 2002; Mansour *et al.*, 2005) although post lung biopsy air embolism has been reported in the systemic circulation (Aberle *et al.*, 1987; Mahyar and Peyman, 2008) including the cerebral arterial tree (Timpert *et al.*, 2006). When it occurs it is potentially life-threatening (Arnold and Zwiebel, 2002).

Vascular air embolism is thus a rare complication of lung biopsy and coronary air embolism is rarer still (Aberle *et al.*, 1987) there has not been even a single case reported in British medical literature.

The physical theory concerning aetiology is evidently the establishment of an abnormal communication between an airway and pulmonary veins leading to introduction of gas emboli which subsequently flow in usual direction into the left atrium and ventricle and thus to the systemic circulation (Arnold and Zwiebel, 2002). With a cavitating lesion the likelihood rises because of the pressure differences with normal lung. Since pulmonary venous pressure is usually about 10 cm H_2O , Arnold and Zwiebel (2002) have postulated that coughing may have contributed to the introduction of air into the pulmonary veins as a result of the sudden increase in pulmonary airway pressure. Aberle *et al.* (1987) has

suggested in a case of fatal air embolism resulting from needle aspiration in Wergener's disease that biopsy of abnormal veins in which transmural inflammation prevented the normal vasoconstrictive responses to injury is the causative factor (Arnold and Zwiebel, 2002). In view of the above findings demonstrated by the case report, the question is whether patients should be routinely informed of the remote but documented risk of air embolism, myocardial infarction or stroke consequent to routine image-guided lung biopsy. Also should we routinely perform a full thorax CT following lung/pleural biopsies whenever a patient suffers what may appear to be fainting spell or vaso-vagal syncope?

RECOMMENDATIONS

We recommend that both should be included in the guidelines for percutaneous transthoracic CT-guided lung biopsy.

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