

Systemic Air Embolism Causing ST Elevation Myocardial Infarction

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BACKGROUND

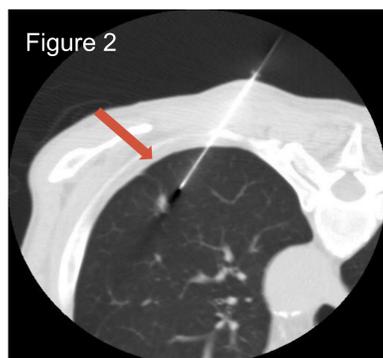
- CT guided biopsies are a common diagnostic procedure that can carry substantial risk. Complications include pneumothorax (17-26.6%), hemorrhage (4-27%), systemic air embolism (SAE) (0.3-0.7%), and tumor seeding (0.012-0.061%).^{1,2} Procedural incidence of SAE is likely under recognized as many have entry of air into the vasculature without symptoms.³
- In this case the patient had a non-fatal ST elevation myocardial infarction (STEMI) immediately after procedure.

SUMMARY OF CASE

- Patient is a 54 year old male, 60 pack year smoker, with alcoholism, and COPD. He saw his PCP after 1 year of night sweats and persistent weight loss. Urgent CT found 1 cm irregular solid nodule in posterior left upper lobe. (Figure 1)

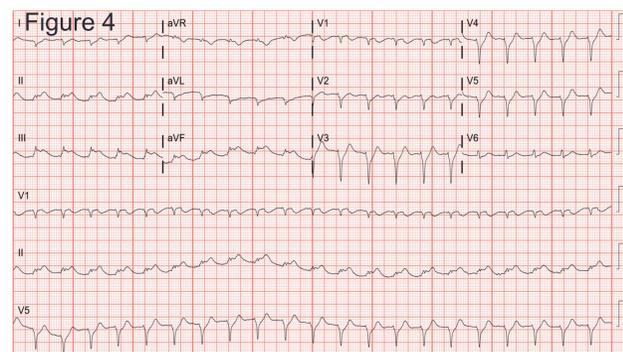


- Percutaneous CT guided needle biopsy was conducted via posterior approach with patient in prone position using a 20G coaxial needle with obtainment of 3 core samples. (Figure 2) Post procedure CT was read as localized peri-nodular hemorrhage without evidence of pneumothorax. (Figure 3)

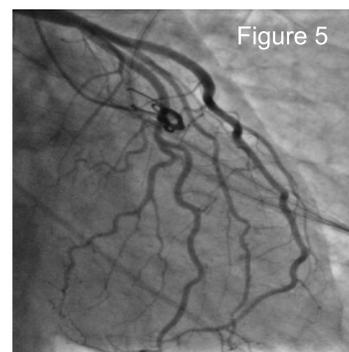


SUMMARY OF CASE

- Immediately post-procedure patient felt faint and subsequently became unresponsive, apneic, cyanotic, and pulseless – code called. Patient found to be in ventricular fibrillation (V-fib). CPR conducted for 38 minutes with multiple shocks, 3x amiodarone, calcium, and bicarb with return of spontaneous circulation. Patient was intubated during this time. ECG showed ST-elevations across inferior leads. (Figure 4)



- He was taken urgently for cardiac catheterization, which showed no obstructive disease. (Figure 5 shows left coronary system, Figure 6 shows right coronary system)



- After review of the post biopsy imaging, a large collection of air was noted in the descending aorta, suggesting an air embolism as the cause of his V-fib arrest. (Figure 7)



- Patient was extubated on hospital day 3 with chest tube removal on day 4, and discharged on hospital day 8.

DISCUSSION

- Myocardial infarction is a rare complication of SAE, especially in the setting of percutaneous needle biopsy of the lung, and can cause typical EKG changes and resulting arrhythmia without clear evidence of obstruction on coronary angiogram as in this case.
- Such an incident can be rapidly fatal. Considering that air was visible within the aorta immediately following the procedure either there was air entry into vasculature via the biopsy needle or through the creation of a broncho/alveolar to venous fistula.
- In a retrospective study, depth of needle, endotracheal anesthesia, location of the lesion above the left atrium, and prone positioning were considered independent risk factors for the incidence of SAE.⁴
- In this case the patient was lying in prone position with the lesion above the level of the left atrium, which is associated with negative intrapulmonary venous pressure allowing air to enter the vasculature through either of the methods above⁵
- Trendelenburg or left lateral decubitus positioning may allow trapping of air in the right ventricle and provide time for resorption before it can cause further harm.
- The risk of complication in fine needle biopsy (FNA) versus core needle biopsy is favorable (24% v. 38.8%) and FNA is able to provide sufficient tissue in >90% of cases³. This should be considered in order to reduce risk to the patient while obtaining adequate tissue.
- While retrospective studies such as the above exist, no prospective studies have been done to identify optimal strategies for risk management.

FUTURE IMPLICATIONS

- Acknowledgment of this rare but underestimated complication can lead to a timely response, especially when the air volume is large.
- Left lateral decubitus or Trendelenburg positioning and use of hyperbaric oxygen therapy (though it may not be readily available) should be considered.

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