INTRODUCTION
The number of cardiac surgical procedures performed has increased exponentially since its advent in the 1950s, and with it an increase in postoperative pulmonary complications. Post cardiac surgery patients often present to the emergency department (ED) with shortness of breath due to a wide variety of possible etiologies. To our knowledge, this is the first case report of a patient with bilateral pneumothoraces and bilateral pulmonary emboli presenting with dyspnea after coronary artery bypass graft (CABG).

PRESENTING CONCERNS
An 82 year old male on post-operative day 11 status post CABG presented to our emergency department with dyspnea. After presenting with chest pain 12 days prior to presentation, he underwent left heart catheterization which showed severe 3 vessel disease. The following day he had off-pump 3 vessel CABG with left internal mammary artery graft to left anterior descending artery. Intraoperative heparin and partial dose protamine were given. He was discharged 3 days prior to presentation.

CLINICAL FINDINGS
He had shortness of breath for two days but was uncertain of the context or exact onset. He reported a non-productive cough but no fever. He had new bilateral lower extremity edema that he noticed the day prior to presentation, but denied any chest pain, palpitations, orthopnea or paroxysmal nocturnal dyspnea. He had otherwise been well with an otherwise negative review of systems.

He had a history of hypertension, atrial fibrillation, diabetes, and hyperlipidemia. He was a non-smoker with no allergies and no family history of coagulopathy. His medications included aspirin, metoprolol,
amlodipine, lovastatin, lisinopril, and amiodarone and he had been complaint.

The initial physical examination included the following vital signs: Blood pressure (BP) 184/77, heart rate (HR) 92, respiratory rate (RR) 36, temperature 36.8 C, and oxygen saturation (SaO2) 97% on 6 liter nasal cannula. He was speaking four-word sentence and had accessory muscle use. The midline sternotomy scar was clean and intact with no drainage through the staples. He had decreased breath sounds bilaterally with diffuse wheezes and no rales. Examination of his lower extremities revealed 2+ pitting edema in his bilateral extremities. The remainder of his physical exam was within normal limits.

**DIAGNOSTIC FOCUS AND ASSESSMENT**

He was placed on BiPAP and minutes later he appeared clinically improved with the following vital signs: BP 121/59, HR 87, RR 27, SaO2 100%. The initial ECG showed sinus tachycardia at a rate in the high 90s with normal intervals and no ST or T wave changes. A bedside ultrasound was done which showed no pericardial effusion. Portable chest x-ray (CXR) followed which showed bilateral pneumothoraces (figure 1). BiPAP was discontinued and a single right sided chest tube was placed. Repeat CXR showed evacuation of the pneumothoraces.

![Figure 1: Initial chest x-ray demonstrating large right and small left sided pneumothorax.](image)

His laboratory tests showed a white blood cell count of 19.8 with left shift, hemoglobin of 12.1 (up from post-op hemoglobin of 9.6 recorded 6 days ago), platelets of 250k/uL, INR 1.2, glucose 442, troponin 0.031 (normal = <0.040), bnp 209. Thirty minutes after thoracostomy he was normotensive but tachycardic at 100, tachypneic to 29, and hypoxic with a SaO2 of 93% on 15 liter non-rebreather. Due to persistent hypoxia a Computed tomography pulmonary angiogram was ordered which showed large pulmonary emboli in the right main pulmonary artery extending into right upper, middle, and lower lobes as well as left superior segmental branch (Figure 2, 3).

![Figure 2: Computed tomography pulmonary angiogram axial view showing large right sided pulmonary embolism.](image)
FOLLOW-UP AND OUTCOMES

The patient was placed on a heparin drip and admitted. When his platelets plateaued at 69K/µL on hospital day three he was diagnosed heparin induced thrombocytopenia (HIT) with thrombosis and was switched to lepirudin. The remainder of his coagulopathy work-up was unremarkable. His lower extremity ultrasound found bilateral deep vein thrombosis. He was started on warfarin, the chest tube was removed on hospital day five, and he was discharged after a fifteen day stay. He was readmitted one month later with a supratherapeutic INR of 19.

DISCUSSION

The incidence of primary cardiac complications causing dyspnea is low. In one prospective study with over 3400 CABG patients causes of 30 day re-admission included arrhythmia/heart block most commonly in 3% of patients, followed by CHF in 1.6%, pericardial effusion/tamponade in 0.4%, and MI in 0.2% (Lee 2012). This patient had an unremarkable EKG, negative troponin, minimally elevated bnp, and a negative bedside ultrasound for effusion.

Respiratory complications after CABG are much more common, occurring in up to 95% of patients. The differential diagnosis of pulmonary causes is broad and frequencies vary. Pleural effusion is most common and found in up to 95% of patients in one series, followed less commonly by atelectasis in up to 88%, phrenic nerve paralysis in up to 75%, diaphragmatic dysfunction in up to 54% and pneumonia in up to 20% of patients (Wynne 2004).

There is general agreement in the cardiac surgery literature that acute PE after cardiopulmonary bypass is uncommon (Goldhaber 2004). One meta-analysis of over 8553 post-CABG patients over 34 years found 111 PEs, an incidence of 1.3% (Protopapas 2011), a second study found the incidence varied from 0-9.5% (Kuklinski 2007). PE occurs more frequently after off-pump CABG. A study of 326 consecutive CABG patients found the frequency of PE with off-pump CABG was twice that of conventional CABG (Lee 2011). While the standard intraoperative heparin dose for conventional CABG is ³300U/kg, most surgeons prefer a low-dose intraoperative heparin regimen of ²150 U/kg for off-pump CAGB (Englberger 2008). Some authors have proposed the reduced heparin dose, along with reduced hemodilution, as the cause of the difference in incidence of thromboembolism between off-pump and conventional CABG (Hashimoto 2006).

In adult cardiac surgery, the frequency of HIT is 1.0-2.4% (Jang 2005). Though his platelets dropped from 224k/µL preoperatively to 134k/µL on post-op day two, HIT was not suspected during the patient's initial visit. The diagnosis of HIT is based on its typical clinical picture including the 4 T's: Thrombocytopenia, Timing of the platelet fall after heparin exposure, the presence of Thrombosis, and exclusion of other causes for thrombocytopenia. The treatment is immediate cessation of all heparins and alternative anticoagulation with argatroban (Warkentin 2003). Our patient's eventual diagnosis of HIT with thrombosis raises the prospect that his hypercoagulable state and subsequent
thromboembolism began after receiving intraoperative heparin.

Pneumothoraces are equally uncommon, with a reported incidence of 1.4% of patients undergoing cardiac surgery (Douglas 2002). Median sternotomy can sever pleural reflections leading to an iatrogenic interpleural communication. As in this patient, a unilateral chest tube has been shown to be effective in treating bilateral pneumothoraces (Wagar 2009, Lee 1999).

SUMMARY

Though PE and PTX are uncommon complications, they are life threatening and must be considered in patients presenting with dyspnea after CABG. The incidence of PE after off-pump CABG is double that of conventional CABG. To our knowledge, this is the first case report of a patient with bilateral pneumothoraces and bilateral pulmonary emboli after CABG. It reinforces the need for continued investigation in the presence of persistently abnormal vital signs, highlights the thromboembolic differences between off-pump and conventional CABG, and reminds us that HIT is a potential cause of thrombosis after heparin exposure.

REFERENCES


