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Review

An interesting case of profound hypoxemia

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ABSTRACT

A 58 year old male with a history of cirrhosis (hepatitis B and C), a long smoking history, and a recently diagnosed high-grade transitional cell carcinoma of the bladder wall presented three days after a biopsy procedure with abdominal pain, nausea, and new hypoxemia on room air. The chest radiograph was clear and the CT angiogram showed only a borderline large pulmonary artery, two small nodules (3 mm and 4 mm) in the right middle lobe of the lung, and emphysematous changes throughout the lung parenchyma. There was no evidence of pulmonary embolism.

A wide range of diagnostic possibilities were entertained, including pneumonia (community or aspiration related to the procedure), COPD exacerbation, pulmonary emboli, porto-pulmonary syndrome, pulmonary hypertension with right to left shunt, tumor emboli, allergic reaction to a medication or chemotherapeutic agent, or lymphangitic/hematogenous spread of tumor to the lungs. The diagnosis was only established on a post mortem examination. The progressive hypoxia was due to diffuse spread of tumor within alveolar capillaries.

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1. Introduction

1.1. Initial presentation

A 58-year-old male with history of hepatitis B and C, cirrhosis, a 40 pack-year smoking history, and recently diagnosed high-grade transitional cell carcinoma of the bladder wall (Fig. 1) presented to the emergency room three days following a transurethral biopsy of the bladder tumor (TURBT) with abdominal pain and nausea for two days. The patient also reported progressive shortness of breath and orthopnea for one month that acutely worsened after the TURBT. The mass was too large to remove transurethrally, and a larger procedure was planned. Of note, the patient received mitomycin irrigation at the end of the procedure.

On evaluation the patient was noted to be mildly hypoxic (pulse oximeter 89 to 90% on room air). The patient had scleral icterus, regular heart sounds, mild bibasilar crackles, and a scaphoid abdomen with mild tenderness to palpation in the right upper quadrant and suprapubic area. Arterial blood gas showed a pH of 7.44, pCO_2 of 36, and PaO_2 of 59 on room air. Chest X-ray was clear. There was no evidence of pulmonary embolism on computed tomography (CT) angiogram (Fig. 2A & B), and bilateral lower extremity dopplers were negative for deep venous thrombosis. The patient was started on empiric treatment for community and aspiration pneumonia and steroids initiated for possible COPD exacerbation.

The admission labs were notable for abnormal liver function tests with AST 176, ALT 125, total bilirubin 12.2, and alkaline phosphatase 1025. Alpha feto-protein level was 7.8 (elevated). HIV screen was

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Fig. 1. Computed tomography (CT) demonstrating the bladder mass. A computed tomography (CT) scan of the abdomen and pelvis demonstrated mild to moderate left hydroureteronephrosis to the level of the pelvis, an irregular left posterior urinary bladder wall soft tissue mass (white arrow), and no enlarged lymph nodes.

negative. An abdominal ultrasound revealed hepatomegaly with coarse liver echogenicity and a nodular liver surface consistent with cirrhosis. Also noted was a portal vein thrombosis and three echogenic liver lesions concerning for hepatocellular carcinoma versus metastases.

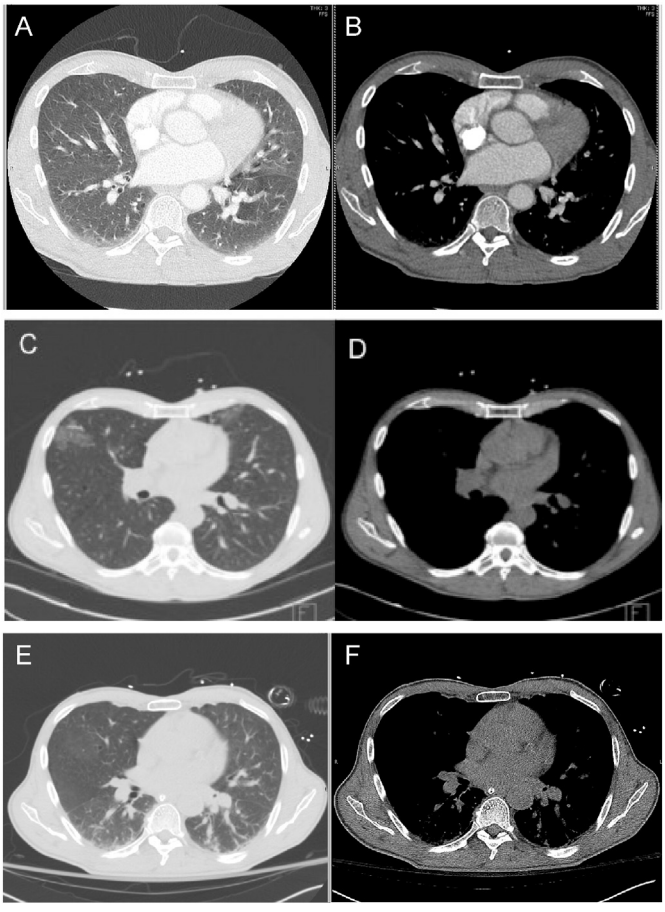

Fig. 2. CT angiogram of the chest at hospital days 1, 8, and 13. The CT angiogram (lung window and mediastinal views, panels A &B) on hospital day 1 revealed a borderline large pulmonary artery, two nodules (3 mm and 4 mm) in the right middle lobe of the lung, and emphysematous changes of the lung parenchyma. There was no evidence of large or small vessel pulmonary emboli. Repeat CT chest on hospital day 8 (panels C & D) shows new fluffy peripheral infiltrates in the right upper lobe and lingula. By hospital day 13 (panels E & F) the fluffy infiltrates have resolved but with interval development of some tree and bud findings in the bilateral lower lobes and some small nodules are noted in the lower lobes.

1.2. Hospital course

Shortly after admission, the patient's oxygen requirements rapidly increased such that his oxygen saturation was only 93% on 6 l via simple facemask with an A–a difference of 43. Pulmonary function tests revealed mild irreversible obstructive lung disease with a low DLCO and with low DL/VA.

On room air, the patient's PaO_2 was only 38 mm Hg, increasing to 446 mm Hg on 100% FiO_2, resulting in a calculated shunt fraction of 12.34% (Cruz and Metting, 1987). A transthoracic echocardiogram revealed normal ventricular function and moderate to severe tricuspid regurgitation with a right ventricular systolic pressure of 39 mm Hg. The bubble study was negative for intracardiac shunt, and a ventilation perfusion scan was negative for macroaggregated albumin uptake in the brain and kidneys, suggesting lack of intrapulmonary shunt (Fig. 3).

A bronchoscopy was not performed given the patient's persistent severe hypoxia, and a percutaneous biopsy of the lung nodules detected on CT angiogram was deferred due to the high risk of the procedure in this extremely hypoxemic patient.

The patient's oxygen requirements rose to 40% ventimask before he was transferred to the ICU and emergently intubated the next day for respiratory fatigue. The patient completed the course of antibiotics and was started on corticosteroids until he was extubated five days later, after which he was tapered off the medications. The patient was coherent postextubation and steadfast about refusing any further resuscitation efforts or reintubation. Three days later, despite continued oxygen therapy, the patient desaturated, became progressively more bradycardic, and expired. An autopsy was performed.

1.3. Postmortem examination

Autopsy revealed a final diagnosis of high-grade urothelial bladder carcinoma with metastases to the liver, lungs, and lymph nodes. There was bilateral pulmonary congestion secondary to pulmonary microscopic intravascular tumor emboli (Fig. 4) and pulmonary edema; left lung weighed 1040 g (normal 402 g) and right lung weighed 1090 g (normal 455 g). There was no anatomic right to left connection in the heart.

2. Discussion

The presumptive diagnosis regarding this patient's profound hypoxemia during his hospitalization was hepato-pulmonary syndrome made worse by his recent urologic procedure. The final anatomic diagnosis was pulmonary tumor emboli by a very aggressive urothelial tumor.

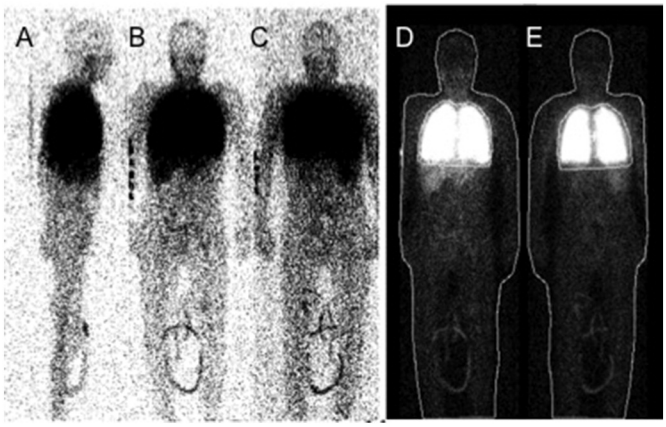

Fig. 3. Ventilation–perfusion (V/Q) scan. V/Q scan with a whole body window demonstrating the lack of accumulation of radioactive macroaggregated albumin in the kidneys and brain. This suggests the lack of a right to left intrapulmonary or intracardiac shunt.