A 52-year-old smoker male with 30 pack years smoking history and history of chronic obstructive pulmonary disease (COPD) and bullous emphysema presented to our hospital with complaints of worsening dyspnea, fever, and productive cough for past 3–4 days. Physical examination revealed a well-built African-American male in moderate respiratory distress requiring supplemental oxygen through nasal cannula to maintain adequate oxygen saturation. Significant findings on respiratory system examination included tachypnea and bronchial breath sounds in the upper-right chest area. An upright PA and lateral view of chest radiograph and computed tomographic scan of the chest are shown.

QUESTIONS

Q1. What is the classic radiological finding demonstrated in the plain chest radiograph?
Q2. What is the most likely diagnoses in this patient given his underlying severe bullous emphysema?
Q3. What are the other important differential clinical diagnoses for the given radiological findings on chest radiograph and computed tomographic scan of the chest?
The pathogenesis behind the accumulation of fluid in a pre-existing emphysematous bulla is still controversial and two major possible underlying mechanisms have been proposed. Maher et al. described the role of peribullous pneumonitis and the reactive buildup of the fluid in the bulla due to surrounding lung parenchymal inflammation as underlying cause of this phenomenon. The presence of surrounding lung parenchymal infiltrates in our patient [Figure 2 arrowheads] does support this hypothesis. The second mechanism is thought to be the loss of airway communication between the bulla and larger airways due to inflammatory mucus plugging leading to the inadequate drainage of the sterile fluid within the bulla and thus subsequent development of enough fluid to cause characteristic radiological appearance [Figures 1 and 2].

Clinical presentation of the patients with fluid containing emphysematous bulla has a wide spectrum ranging from being completely asymptomatic incidental finding on chest radiograph to severe lower respiratory tract infection presenting with high fevers, dyspnea, productive cough, and sometimes respiratory failure needing mechanical ventilation support. Most of the patients, however, present with mild symptomatic disease with symptoms such as cough, low grade fever, and rarely mild pleuritic chest pain. Diagnosis relies upon the presence of characteristic air–fluid level on chest radiograph and CT scan with prior radiological evidence of bullous emphysema in the patient [Figures 1 and 2]. In the absence of prior radiological studies, some of the characteristic differentiating features include: sharper inner margins of the cavity wall, rapid changes in the amount of intrabullous fluid on serial follow up chest radiographs, the absence of purulent productive cough, and the presence of clinically milder disease. Most important differential diagnosis to rule out is the lung abscess and other possible differentials as described earlier include pulmonary fungal infections, pulmonary tuberculosis, and cavitory lung cancer.

Management of this clinical condition is controversial due to the wide spectrum of clinical presentation and low reported incidence in the medical literature. Most of the reports in the literature recommend against the use of any type of invasive procedures including percutaneous drainage of the intrabullous fluid and bronchoscopy in the management. Medical management for this disease entity has also been confusing regarding the need, choice as well as duration of antibiotic therapy for the treatment. Routine use of antibiotics in asymptomatic patients has been discouraged.

This group of patients should be followed up with expectant observation and serial chest imaging to confirm the resolution of the fluid in the bullae that can take up to weeks to months to resolve completely. Based on current clinical data, no recommendations for the use of specific antibiotics can be given for the symptomatic patients due to varied nature of causative microbiological agents. Empiric choices of antibiotics used in different reports include the use of oral penicillins like amoxicillin/clavulanic acid and respiratory fluoroquinolones such as moxifloxacin or levofloxacin for varying durations. Overall, the treatment should be tailored for each patient based on the severity of...
initial clinical presentation and presence of other underlying medical conditions. Following the resolution of the acute symptomatic disease, patient should also be evaluated for surgical resection of the bulla (bullectomy). Although an infected bulla in itself is not considered as an indication for bullectomy but some symptomatic patients of bullous emphysema are known to benefit from surgical resection of the bullae. The most common indications for bullectomy are symptomatic dyspnea due to a giant bulla (involving more than one-third of the hemi-thorax) and development of the secondary pneumothorax.[7]

In conclusion, this radiological quiz illustrates findings of a relatively rare disease entity seen as complication in one of the commonly encountered chronic lung diseases. Recognition and differentiation of this disease from other cavitary lung disease like lung abscess is very important as invasive diagnostic and therapeutic interventions can be avoided due to relatively benign disease course and good response to oral antibiotics in general.

REFERENCES
1. Peters JI, Kubitschek KR, Gotlieb MS, Awe RJ. Lung bullae with air-fluid levels. Am J Med 1987;82:759-63.
2. Richardson MS, Reddy VO, Read CA. New air-fluid levels in bullous lung disease: Are evaluation. J Natl Med Assoc 1996;88:185-7.
3. Drouet PL, Herbeuval R, Faire G, Remy D. Emphysemabulleurgeneration avec infection. F Fr Med Chir Thorac 1947;1:428-31.
4. Chandra D, Rose SR, Carter RB, Musher DM, Hamill RJ. Fluid-containing emphysematous bullae: A spectrum of illness. Eur Resp J 2008;32:303-6.
5. Mahler DA, Gerstenhaber BJ, D’Esopo ND. Air-fluid levels within lung bullae associated with pneumonitis. Lung 1981;159:163-71.
6. Henao-Martinez AF, Fernandez JF, Adams SG, Restrepo C. Lung bullae with air-fluid levels: What is the appropriate therapeutic approach? Respir Care 2012;57:642-5.
7. Palla A, Desideri M, Rossi G, Bardi G, Mazzantini D, MussiA, et al. Elective surgery for giant bullous emphysema: A 5-year clinical and functional follow-up. Chest 2003;123:2043-50.

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