August 2016 Pulmonary Case of the Month

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History of Present Illness

The patient is 54-year-old man with type 1 diabetes mellitus admitted for diabetic ketoacidosis (DKA). He complained of somnolence, nausea and vomiting and right foot pain. He had been admitted 2 weeks earlier for right foot gangrene. He had been receiving daptomycin for his right foot gangrene.

PMH, SH and FH

He had a previous history of osteomyelitis, perianal abscess, maxillary abscess, Candida esophagitis, transient ischemic attack, and peripheral vascular disease. He had previous amputations along with thrombectomy/ embolectomy/bypass. He was a former Marine and construction worker with ongoing cigarette use. Family history was noncontributory.

Physical Examination

- Febrile to 38.2°C
- Crackles bilaterally
- Transmetatarsal stump with dry gangrene

Radiography

An admission chest x-ray was performed (Figure 1).

Figure 1. Admission portable AP of chest.

Which of the following are **appropriate at this time**?

1. Blood and wound cultures
2. Empiric antibiotics including coverage for *Staphylococcus aureus*
3. Intravenous insulin and fluids
4. Serially monitor renal function and electrolytes
5. All of the above

Correct!
5. All of the above

Insulin and fluids along with monitoring of electrolytes and renal function are established for treatment and monitoring of DKA (1). Infection often plays a role in inducing DKA and in this patient's case, an infected foot seems to be likely playing a role. Furthermore, there was a question of possible lower lobe consolidation on the chest x-ray. Blood and wound cultures were obtained and he was begun on piperacillin/tazobactam for possible pneumonia and his daptomycin was continued for his gangrene.

However, after 3 days he had minimally improved. He developed a cough with clear, thick mucus; had a temperature to 38.1° C overnight, and levofloxacin was empirically added. His blood cultures were negative. His chest x-ray was repeated (Figure 2).

Figure 2. Repeat portable AP of chest.

A thoracic CT scan was performed (Figure 3).

Figure 3. Representative images in lung windows from the thoracic CT scan.

Which of the following should be **performed next?**

1. Bronchoscopy with bronchoalveolar lavage
2. Empirically begin voriconazole for fungal pneumonia while awaiting cultures
3. Sputum gram stain and culture
4. Transtracheal needle aspirate
5. Video-assisted thorascopic surgery (VATS)

Correct!

1. Bronchoscopy with bronchoalveolar lavage

The patient is immunocompromised because of his diabetes, his ketoacidosis and his previous history of Candida esophagitis and at high risk for an atypical pulmonary infection (2). His chest x-ray has clearly worsened and peripheral infiltrates are noted on the thoracic CT scan. Sputum Gram stain is often unreliable in this setting and it will be several days before cultures are returned. Although the patient might have fungal pneumonia, most would establish the diagnosis before beginning empiric antifungal therapy. VATS seems overly invasive and transtracheal needle aspiration has largely been replaced by bronchoscopy with bronchoalveolar lavage.

Bronchoscopy was performed and there were no endobronchial lesions observed. Gram, silver and acid fast stains were all negative. The differential from his bronchoalveolar lavage is shown in table 1.

Table 1. Bronchoalveolar lavage (BAL) differential.

BAL % Eosinophils	45
BAL % Lymphocytes	1
BAL % Alveolar Mac/Meso	34
BAL % Other Cells	0
BAL % Polymorphs	20

Which of the following should be **done next**?

1. Begin corticosteroids
2. Empirically begin antihelminthic therapy for possible hookworm infection
3. Switch his antibiotics
4. 1 and 3
5. All of the above

Correct!
4. 1 and 3

The patient had his antibiotics switched to linezolid and corticosteroids were begun for presumed daptomycin-induced lung disease. Although hookworm infection can present in immunocompromised hosts as a severe pneumonia, its rarity in the Southwest and the absence of parasites seen on smears make it unlikely. He rapidly improved and his corticosteroids were rapidly tapered because of his diabetes.

According to Kim et al. (4), daptomycin-induced eosinophilic lung disease can be diagnosed clinically (Table 2).

Table 2. Criteria for definite diagnosis of daptomycin-induced eosinophilic lung disease (4).

Concurrent exposure to daptomycin
Fever
Dyspnoea with increased oxygen requirement or requiring mechanical ventilation
New infiltrates on chest x-ray or CT scan
Bronchoalveolar lavage with >25% eosinophils
Clinical improvement following daptomycin withdrawal

Based on these criteria, our patient would represent another case report of daptomycin-induced eosinophilic lung disease.

References

1. Umpierrez G, Korytkowski M. Diabetic emergencies - ketoacidosis, hyperglycaemic hyperosmolar state and hypoglycaemia. *Nat Rev Endocrinol*. 2016 Apr;12(4):222-32. [\[CrossRef\]](#) [\[PubMed\]](#)
2. Hansen LA, Prakash UB, Colby TV. Pulmonary complications in diabetes mellitus. *Mayo Clin Proc*. 1989 Jul;64(7):791-9. [\[CrossRef\]](#) [\[PubMed\]](#)
3. Bhatt NY, Allen JN. Update on eosinophilic lung diseases. *Semin Respir Crit Care Med*. 2012;33(5):555-571. Available at: http://www.medscape.com/viewarticle/772354_14 (accessed 7/26/16). [\[CrossRef\]](#) [\[PubMed\]](#)
4. Kim PW, Sorbello AF, Wassel RT, Pham TM, Tønning JM, Nambiar S. Eosinophilic pneumonia in patients treated with daptomycin: review of the literature and US FDA adverse event reporting system reports. *Drug Saf*. 2012 Jun 1;35(6):447-57. [\[CrossRef\]](#) [\[PubMed\]](#)