Swine-Origin Influenza A (H1N1) Viral Pneumonia
Published on 01.03.2010

DOI: 10.1594/EURORAD/CASE.8257
ISSN: 1563-4086
Section: Chest imaging
Case Type: Clinical Cases
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Patient: 26 years, male

Clinical History:
A 26-year-old male patient with acute myeloid leukemia and bone marrow transplant one year ago, presented with low-grade fever, dry cough and dyspnea for several days. He stated recent contact with several family members who had influenza-like illnesses.

Imaging Findings:
Figure 1: Frontal and lateral chest radiographs showing perihilar ground-glass opacities and consolidation. Peripheral faint ground glass opacities are also questioned.

Figures 2: A few selected trans-axial CT images of the chest in lung window showing consolidative and ground-glass opacities in a peribronchovascular and subpleural distribution. A few scattered thickened interlobular septa are thought to be due a background of volume overload.

Figure 3: A few selected trans-axial CT images of the chest in soft tissue window show the absence of lymphadenopathy. Small bilateral pleural effusions are seen secondary to volume overload.

The patient had negative cultures for bacterial organisms and a real-time reverse-transcriptase-polymerase chain reaction (rRT-PCR) confirming the presence of swine-origin influenza A (H1N1) virus in a processed nasal swab. The patient improved with Tamiflu and supportive treatment.

Discussion:
Swine-origin influenza A (H1N1) virus (S-OIV) is a highly contagious respiratory infection which has been a recent worldwide concern. The disease presents with an influenza-like picture. There is no specific age or sex predilection. Most cases are self limited. However, a subset of high-risk patients may have a severe course. High-risk patients include: children less than 5 years old, adults aged 65 years or older, pregnant females, asthmatics, diabetics, immunosuppressed patients, or patients with other underlying chronic conditions.

The laboratory findings may include: lymphopenia, Thrombocytopenia, and elevated serum lactate dehydrogenase and serum creatine kinase levels. Respiratory samples can be processed by several means to evaluate for S-OIV; however, rRT-PCR is the gold standard method. It is important to note that most circulating influenza nowadays is of the S-OIV type.

Most cases do not require specific treatment. However, the latest recommendation is to start anti-retroviral medications (Tamiflu or Relenza) empirically in severe and high-risk cases. In most regions of the world, the disease has shown decreasing activity after initiating an extensive global vaccination campaign.

The chest radiographs may be normal. The typical findings are those of airspace disease. Ground-glass opacities
are usually the earliest finding. As the disease progresses, consolidation superimposes the picture. The disease can be unifocal or multifocal, unilateral or bilateral and confined or diffuse. Any lung zone can be involved, but basal disease is noted to be the most common.

On CT, more extensive involvement is usually encountered. Again, airspace disease predominates, being more ground-glass than consolidative in nature. A peculiar commonly seen distribution is that of subpleural and peribronchovascular predominance. This appearance has been linked to that of organising pneumonia. The overall appearance can be complicated by superadded bacterial pneumonia, adult respiratory distress syndrome (ARDS), air leaking and pulmonary embolism.

Pleural effusions and lymphadenopathy are usually absent. Another notable observation is the lack of septal thickening, bronchial wall thickening, centrilobular nodularity, tree-in-bud arrangement or mosaic attenuation. The pattern of small airway inflammation or interstitial thickening - which is usually expected in the cases of viral pneumonia - was not observed in most S-OIV cases. Tow recent studies reported an exception to this observation. The first is a study that dealt with children having mild forms of the disease, where bronchial wall thickening and hyperinflation were noted. However, severe cases in this study showed airspace involvement. The second study dealt with immunocompromised adults and showed predominance of centrilobular nodularity and bronchial wall thickening, a pattern supporting small airway inflammation. The reason for this different appearance in these two groups is theorised to be due to the lack of sensitisation in the former and inability to induce an immune response in the latter. Another potential explanation is that both groups are likely to seek medical attention earlier in the course of the disease, which may lead to earlier imaging investigations. Thus, it is possible that the imaging features described in those two groups are merely the earlier manifestations of the disease.

**Differential Diagnosis List:** Swine-Origin Influenza A (H1N1) Viral Pneumonia

**Final Diagnosis:** Swine-Origin Influenza A (H1N1) Viral Pneumonia

**References:**


**Figure 1**

**Description:** Perihilar ground-glass opacities and consolidation are noted. Peripheral faint ground glass opacities are also suspected. **Origin:**
Description: Perihilar airspace opacities are re-demonstrated. Origin:
Description: Consolidative and ground-glass opacities are noted in a peribronchovascular and subpleural predominance. A few scattered thickened interlobular septa are thought to be due a background of volume overload. Origin:
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