Necrotising pneumonia due to influenza A (H1N1) and community-acquired methicillin-resistant *Staphylococcus aureus* clone USA300: successful management of the first documented paediatric case

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**ABSTRACT**

Necrotising pneumonia in young, previously healthy patients due to Panton–Valentine leucocidin (PVL) producing *Staphylococcus aureus* has been increasingly recognised. PVL pneumonia is often associated with influenza co-infection and high mortality. This case report describes the successful management of the first documented paediatric case of a previous healthy adolescent who developed necrotising pneumonia due to community-acquired methicillin-resistant (CA-MRSA) clone USA300 with pandemic influenza A (H1N1) co-infection, and highlights the importance of early recognition and initiation of appropriate therapy for this potentially fatal co-infection. PCR remains the gold standard to diagnose pandemic H1N1 since it may not be detected by rapid antigen tests. Bacterial necrotising pneumonia should be suspected in those presenting with worsening flu-like symptoms and clinical and/or radiological evidence of PVL infection (multifocal infiltrates, effusion and cavitation). These patients may benefit from the administration of toxin neutralising agents. In light of the current H1N1 pandemic, healthcare professionals will be increasingly confronted with this clinical scenario.

**BACKGROUND**

Necrotising pneumonia in young, previously healthy patients due to Panton–Valentine leucocidin (PVL) producing *Staphylococcus aureus* has been increasingly recognised. PVL pneumonia is often associated with influenza co-infection and mortalities of over 50% have been reported.1 2 In the USA increasing numbers of cases of this condition have been reported in recent years, mostly related to community-acquired methicillin-resistant (CA-MRSA) USA300 clone, which may have an epidemic character due to the presence of the arginine catabolic mobile element (ACME).3 In contrast, in Europe most of the reported PVL cases are due to more genetically diverse community-acquired methicillin-susceptible *S aureus* strains.2

Optimal therapy for this potentially lethal disease has not yet been established. Vancomycin remains the mainstay of treatment for invasive MRSA infections, but concerns regarding its effectiveness in pulmonary infection are increasing.1 Based on in vitro studies, combination therapy with toxin-suppressing agents such as clindamycin have been advocated for this clinical condition.4

The case report below describes the successful management of the first documented paediatric case of a previous healthy adolescent who developed necrotising pneumonia due to CA-MRSA clone USA300 with pandemic influenza A (H1N1) co-infection.

**CASE PRESENTATION**

A 12-year-old previously healthy adolescent developed increased respiratory symptoms and fever while flying to Spain from California, USA. He was admitted to a district hospital and a chest x-ray showed right pleural effusion and consolidation of both lower lobes. He was feverish and blood tests revealed a leucocyte count of 5.9×10⁹/l (neutrophils 76%) and C-reactive protein of 206 mg/l. Initial therapy consisted of ceftriaxone, vancomycin and clarithromycin and the patient was transferred into our care on day 5 of his illness. On admission, his temperature was 38.5°C, he had moderate respiratory distress (respiratory rate 40/min, oxygen saturation 92% in 1 l/min O₂ via a nasal cannula) and a chest x-ray showed a small spontaneous left pleural effusion and consolidation of both lower lobes. Linezolid was switched to oral therapy on day 27 to complete a total of 3 weeks of treatment. The patient was discharged on day 28 in good clinical condition.
Case report

Figure 1  (A) Chest x-ray on admission: right sided pleural effusion with consolidation of both lower lobes. There is a small left sided pneumothorax. (B) Chest x-ray at discharge: bilateral multiple small pneumatoceles with right sided residual pleural fluid and thickening.

condition, although chest x-ray showed bilateral multiple small pneumatoceles with residual pleural thickening (figure 1b).

This case highlights the importance of early recognition and initiation of appropriate treatment and supportive care for successful outcome in patients with this potentially fatal toxin-mediated disease. Over the last few years increased numbers of deaths due to influenza A and community-acquired S aureus co-infection have been reported, including that of an adult who died from pandemic H1N1 and MRSA co-infection. Furthermore, the Centers for Disease Control and Prevention have recently described the characteristics of 36 children who died of pandemic H1N1 influenza, five of whom died as a result of S aureus co-infection (MRSA was isolated from three patients and MSSA from two). Bacterial necrotising pneumonia due to S aureus, Streptococcus pyogenes or Streptococcus pneumoniae should be suspected in previous healthy patients presenting with worsening flu-like symptoms and clinical (low white cell count, raised C-reactive protein) and/or radiological evidence of this disease (multifocal infiltrates, pleural effusions and cavitation). These patients may benefit from toxin neutralising agents such as clindamycin.

CONCLUSION

In the current H1N1 pandemic it is of great importance that this potentially fatal co-infection is quickly recognised and appropriate management initiated, especially as it generally manifests in previous healthy young patients. A diagnosis of pandemic H1N1 should be made using PCR as rapid antigen tests for influenza A may be falsely negative and appropriate therapy may thus be delayed or not administered at all. Based on experience from the 1918 and 1957 influenza pandemics and the epidemic potential of the MRSA USA300 clone, it is likely that the general practitioner as well as specialist hospital doctors will now be increasingly confronted with this clinical scenario, including those in countries with a low prevalence of CA-MRSA, due to globalisation.

Competing interests  None.

Provenance and peer review  Not commissioned; not externally peer reviewed.

Patient consent  Obtained from the parents.

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*Arch Dis Child* 2010 95: 305-306
doi: 10.1136/adc.2009.175281