CASE REPORT

Severe H1N1 virus in pregnancy requiring extracorporeal membrane oxygenation and lobectomy

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Summary: Prompt diagnosis and treatment of H1N1 is crucial during pregnancy to prevent major morbidity and mortality as the virus poses an increased risk of severe illness in pregnant women. Currently, there is limited obstetric literature concerning pregnancy and the pandemic swine flu outbreak in the UK. Although there was a concerted effort to stockpile the HIN1 virus vaccinations, critical care adult extracorporeal membrane oxygenation is only available in one centre in the UK.

Keywords: swine flu, H1N1 virus, pregnancy, extracorporeal membrane oxygenation

INTRODUCTION

The rate of hospitalization among pregnant women who contract the HIN1 virus is approximately four times the rate in the general population.[1,2] A substantial proportion of these patients have required admission to intensive care units (ICUs) or developed severe acute respiratory distress syndrome (ARDS). In severe cases, extracorporeal membrane oxygenation (ECMO) has been required for the treatment of refractory hypoxaemia, hypercapnia or both, which occurred despite mechanical ventilation and rescue ARDS therapies.[3] Here we report a severe case of the H1N1 virus diagnosed in pregnancy that was successfully treated with ECMO during the postpartum period.

CASE REPORT

SE, a 21-year-old P1G2, initially presented to our unit at 33 weeks gestation. She had no history of respiratory disorders, no allergies and was a non-smoker. She complained of a three-day history of abdominal pain, dysuria and spotting vaginally. She also complained of a dry cough and chest pain. Clinical examination revealed that she had a tachycardia; however, there was no pyrexia. Her respiratory rate was 20/min and her oxygen saturation was 92% in room air. Chest examination revealed decreased air entry in both lungs. The working diagnosis at this time was a chest infection with possibly a urinary tract infection.

Investigations and treatment commenced, which included blood tests for a full blood count, urea and electrolytes and to check the levels of C-reactive protein. In view of the history of abdominal pain and vaginal spotting, with possible preterm delivery, she had a course of antenatal corticosteroids to promote fetal lung maturity. Evidence suggests that a single course of corticosteroids does not compromise maternal health or exacerbate infection and on the basis that the benefit outweighs risk, it is recommended current practice.[4]

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Chest physiotherapy commenced and nebulized salbutamol was prescribed. Investigations were ordered including mid-stream sample of urine and sputum culture. A provisional diagnosis of community-acquired pneumonia was made and 1 g of intravenous cefotaxime plus 500 mg of clarithromycin twice daily were prescribed. Blood cultures were not performed at that time.

The patient improved over the next 48 hours, lung fields were clear on chest examination, oxygen saturation increased and she was no longer tachycardic. She was discharged from hospital on oral erythromycin.

She returned a day later complaining of a productive cough. Crepitations were heard bilaterally in the lung bases and arterial blood gases (ABG) demonstrated respiratory alkalosis. Her pulse was 117 beats per minute (bpm), temperature was 38.5°C and oxygen saturation maintained at 93% in room air. Based on the sudden deterioration of her clinical condition, swine flu was suspected. It transpired that there was also a family history of recent flu symptoms. The implemented plan included barrier nursing in a high dependency unit room, administration of zanamivir, intravenous paracetamol, intravenous fluids and intravenous antibiotics. There was multidisciplinary team involvement with anaesthetists and microbiologists. The 'rapid test' for influenza A and B (RTIDT) was negative. A chest X-ray demonstrated consolidation in the lower and middle lobe of the right lung. Six hours later the patient was stable and fetal wellbeing was satisfactory; therefore, delivery was not expedited at the time.

The patient's condition deteriorated over the next five hours with worsening ABG. She became drowsy and oxygen saturation decreased from 96% to 79% (on 60% inspired oxygen). A fetal tachycardia of 200 bpm manifested. An emergency caesarean section under general anaesthetic ensued. A live female infant weighing 1960 g was delivered with an APGAR of 10 after five minutes. The infant displayed no features of infection.

The patient remained intubated and ventilated and a central venous pressure line was inserted in theatre. A repeat chest X-ray revealed a right-sided pneumothorax (presumed to be iatrogenic) and a chest drain was inserted. The patient required transfer to another unit with intensive care facilities as the

Liverpool Women's Hospital is a standalone tertiary obstetric centre with limited critical care facilities.

In the ICU she was sedated with propofol and fentanyl and was maintained with bilevel ventilation at rate 14 (FiO_2 80% VT_2 450–550 BiPAP 35/15). Ionotropic support with noradrenaline was required for the next 48 hours.

A positive result for H1N1 virus was found on PCR Influenza Diagnostic Test (PCRIDT) and oseltamivir was prescribed as the more appropriate antiviral drug. Despite the use of protective lung strategies and maximum ICU support, the patient continued to display extreme hypoxia and ARDS. In view of her extreme hypoxic state, ECMO was recommended. There was an initial delay of 21 hours prior to transfer to an ECMO equipped unit due to bed shortages.

Pursuant to ECMO, blood gases returned to normal. The patient remained on arterio-venous ECMO for a total of four weeks and treatment was weaned over a period of eight days. Two attempts to transfer the patient to continuous positive airway pressure were made; however, she became unstable on both occasions. The patient had to endure several chest drains in the right lung as a consequence of poor drainage and malposition discovered on chest X-ray. This resulted in the development of an iatrogenic bronchopleural fistula. A pulmonary haemorrhage became very severe necessitating a right middle lobectomy. The patient is currently undergoing neuro-rehabilitation due to profound generalized myopathy secondary to prolonged intensive care treatment.

DISCUSSION

The Centres for Disease Control and Prevention (CDC)[2] recommends prompt antiviral treatment of pregnant women with suspected or confirmed 2009 H1N1 influenza, ideally within 28 hours of symptom onset. The severity of symptoms and rapid deterioration of the pregnant patient is clearly demonstrated in this case report. The immunological shift in pregnancy renders the woman more vulnerable to intracellular pathogens such as viruses.[5] Perhaps a higher index of suspicion at initial presentation may have prompted earlier testing. Local protocol recommended the 'rapid test' for influenza to be processed rather than the more sensitive PCRIDT. These events predated the RCOG H1N1 influenza virus guideline. In January 2010, Louie *et al.* reported that delayed treatment (after 48 hours) carried an increased risk of ICU admission or death. This was found to be four times the risk compared with those who received earlier treatment. Lim *et al.*[6] have conducted the largest cohort study in pregnancy to date concerning the H1N1 pandemic.

The Royal College of Obstetricians and Gynaecologists advocate that when pregnant women develop severe systemic or complicated disease due to influenza, they should be treated as an inpatient and prescribed the alternative oseltamivir.[7] In severe cases, respiratory function is compromised and the inhaled dose of zanamivir may be inadequate. Compared with the PCRIDT, the sensitivity of the rapid influenza diagnostic test for detecting novel influenza A (H1N1) virus infections ranges from 10% to 70%.[8] Since false-negative results can occur, empiric antiviral therapy should be administered, if appropriate, and infection control measures implemented. As demonstrated in this case report, confirmatory tests of swine flu were only available several days after treatment was instituted, by which time the condition rapidly deteriorated requiring ECMO. Therefore, a high index of suspicion is important.

ECMO is an established therapeutic option for patients with medically refractory cardiogenic and/or respiratory failure. ECMO requires substantial institutional and multidisciplinary commitment for implementation and is typically only available at major medical centres offering cardiovascular surgery.[9] There is only one centre in the UK offering ECMO for adults compared with 15 critical care units in Australia and New Zealand. Recent observational studies describe outcomes of ECMO in severely ill patients, almost 8% of whom were pregnant, where mechanical ventilation alone was insufficient to maintain oxygenation.[3]

There are limited publications with regard to the impact of the H1N1 virus in the UK. Anaesthetists from Birmingham describe four confirmed cases of H1N1 virus, one being a 26-year-old woman at 35 weeks gestation.[10] An emergency caesarean section was performed due to fetal distress. The authors focused on the oxygenation difficulties with critically ill patients and using different ventilatory modes. Public health implications were highlighted as well as the significance of emergency service planning within the critical care unit. To date, there has only been one publication pertaining to H1N1 and pregnancy in the UK from an obstetric point of view.[11]

A sobering observation that has emerged from this case was that the patient required transfer to several different units in order to receive the appropriate treatment and rehabilitation. This involved relocating to different parts of the country, hundreds of miles away from her newborn and supportive family.

Prompt diagnosis and treatment of H1N1 is crucial during pregnancy to prevent major morbidity and mortality. In the UK, between the outbreak in June 2009 to February 2010, 15 maternal deaths were reported to the Centre for Maternal and Child Enquiries (CMACE). It is apparent that more information is required regarding the impact of H1N1 pandemic within the UK. Health-care professionals need to be aware of the vulnerability of pregnancy and to be educated on the availability of critical care facilities.

Declaration: There are no declarations or competing interests.

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(Accepted 25 June 2010)