Pandemic (H1N1) 2009 influenza, pregnancy and extracorporeal membrane oxygenation

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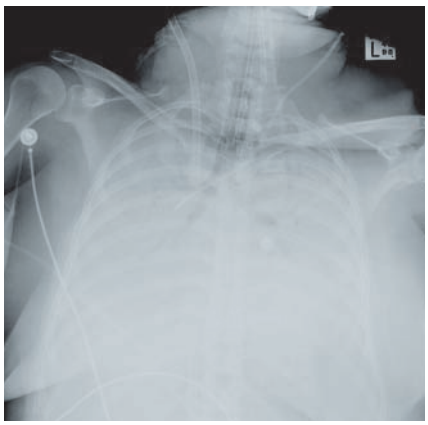
To the Editor: Treatment of critically ill pregnant women is challenging, and information on medication use during pregnancy is scant. We describe the case of a pregnant woman who required extracorporeal membrane oxygenation (ECMO), prolonged sedation and paralysis to treat acute respiratory distress syndrome secondary to pandemic (H1N1) 2009 influenza.

A 34-year-old pregnant woman (G_2P_1) at 21 weeks' gestation presented to a metropolitan hospital with level 1 intensive care unit facilities. She had known Grade 2 placenta praevia, a 5-day history of influenza-like symptoms, and no history of asthma, chronic disease or recent travel. On examination, she was severely hypoxic (PaO_2, 27 mmHg on 15 L/min O_2), conscious, tachypnoeic and speaking in single words. A chest x-ray showed extensive bilateral infiltrates (Box). She needed urgent endotracheal intubation but remained hypoxic despite maximal intensive mechanical ventilation.

The patient was transferred to St Vincent's Hospital, Sydney, where venovenous ECMO was commenced on arrival. Her oxygenation status improved and remained satisfactory. Mechanical ventilation was reduced (tidal volume, < 6 mL/kg; peak pressure, < 30 cm H_2O) to avoid ventilator-induced lung injury. The patient required very high doses of morphine, fentanyl, midazolam, propofol, dexmedetomidine, cisatracurium and heparin during ventilation and ECMO. In addition, empirical treatment with oseltamivir (150 mg twice a day, Days 1–8), azithromycin and ceftriaxone was started on admission, before a bronchoalveolar lavage specimen tested positive for influenza A and pandemic influenza. Furthermore, a multiresistant *Escherichia coli* caused ventilator-associated pneumonia, which was treated with meropenem (1 g three times a day, Days 17–30).

ECMO was discontinued on Day 19, when lung function had improved. No other organ failure developed. On Day 21, a tracheostomy was performed for severe weakness and weaning failure. The patient was weaned from the ventilator on Day 35 and was discharged home 2 weeks later, after making a full recovery. She gave birth by caesarean section at 35 weeks' gestation. The baby was in good health and the patient recovered well — both left hospital 3 days after the birth.

Chest x-ray of a pregnant woman with influenza-associated acute respiratory distress syndrome showing extensive bilateral infiltrates



Information on the use of medication in pregnant women who require intensive care is limited, especially the use of neuraminidase inhibitors.[1] We found little evidence on the safety of long-term use of neuromuscular blockers and sedation in pregnancy, with or without ECMO.[2] Most literature on this topic describes short-term use of neuromuscular blockers and sedation. Dexmedetomidine has a short postmarketing history, and has therefore had limited use.

Data from Australia and New Zealand indicate that 9% of patients admitted to an intensive care unit with pandemic influenza are pregnant. An estimated inhospital mortality rate of more than 16% in this population indicates the severity of the infection.[3,4] Single-organ lung failure is a common feature of complicated pandemic influenza, and venovenous ECMO should be considered in these circumstances.[2,4,5] Our case demonstrates that ECMO and the drugs necessary for its use can be used during pregnancy in a patient with influenza-associated acute respiratory distress syndrome, and that survival of the patient and fetus is possible.

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