Respiratory Failure in Pregnancy

Introduction

Respiratory failure during pregnancy poses some unique challenges for the intensivist. The intensivist has to treat the mother and also has to prevent adverse outcome for the foetus. We are presenting this case to insist that proper treatment and respiratory support will save both the mother and the baby.

Case Report

A 23 year old primigravida with 9 months amenorrhoea was admitted with complaints of dyspnoea, cough and fever for 7 days. On examination she was drowsy, tachypnoeic, dyspnoeic and febrile. Her respiratory rate was 36/min, pulse 140/min, BP 100/76mmHg, spO2 84% in room air and 88% with oxygen support through polymask @ 6L/min. Auscultation revealed bilateral crepitations. ABG- pH 7.32, pO2 52mmHg, pCO2 34mmHg, HCO3 23mEq/L. Provisional diagnosis of viral pneumonitis with type 1 respiratory failure was made. Patient was intubated and ventilatory support started. After ventilatory support ABG-pH 7.38, pO2 86mmHg, pCO2 30mmHg, HCO3 24mEq/L. After 2 days she delivered an alive female baby by normal vaginal delivery. After 5 days of ventilatory support patient recovered well and passed the spontaneous breathing trial. She was extubated and was discharged on the 7th day.

Discussion

Hormones prevalent during pregnancy—including progesterone, human chorionic gonadotropin, alpha-fetoprotein and cortisol—may inhibit cell mediated immune function. These changes could theoretically increase the risk from infection, particularly by viral and fungal pathogens. The clinical course of bacterial pneumonia seems to be minimally altered by pregnancy, whereas viral pneumonia carries a significantly worse prognosis when encountered during gestation.

Munn MB et al did a case control study of 59 women and 118 controls, in which both anaemia—measured as a haematocrit of 30% or less on admission—and a history of asthma were found to be independently associated with a fivefold increased risk for the development of pneumonia on multivariate analysis. Established risk factors for pneumonia in pregnancy include anaemia, asthma, antepartum corticosteroids given to enhance fetal lung maturity, and the use of tocolytic agents to induce labour. The inherent physiologic respiratory changes that accompany pregnancy makes the pregnant woman with pneumonia more vulnerable to respiratory failure. Anatomically, the enlarging uterus causes elevation of the diaphragm by up to 4cm and splaying of the thoracic cage. A 2.1cm increase in the transverse diameter of the chest and a 5–7cm increase in the circumference of the thoracic cage has been reported. These changes may decrease the mother's ability to clear secretions. The decrease in functional residual capacity, and increase in lung water that occur during pregnancy add to the vulnerability of the lung to injury from infection. Viral pneumonia can cause severe disease, increasing the risk of preterm delivery, abortion, cesarean section, maternal respiratory failure, and death. Our patient presented with severe respiratory distress and symptoms compatible with pneumonia and hence a provisional diagnosis of viral pneumonia was made. In patients with severe dyspnoea during pregnancy, pneumonia must be considered. Other possible causes include asthma, pulmonary embolism, amniotic fluid embolism, air embolism, and aspiration pneumonitis. Cough is not usually a symptom of pregnancy and should arouse clinical suspicion of an underlying cause. Clinical signs should be sought, although crepitations at the lung bases may occasionally be heard in pregnancy, presumably due to atelectasis from the raised diaphragm compressing the lower lung fields. Even in patients with symptoms consistent with a lower respiratory tract infection and unilateral chest signs, radiologically proven pneumonia is confirmed in only 39% of cases. Ultimately, a firm diagnosis of pneumonia can only be made with the aid of a chest radiograph. In our patient we did a chest radiograph after delivery of the baby. It revealed patchy infiltrates in middle and lower zones of both lungs. There is persuasive evidence to indicate that fetal outcome is affected by maternal pneumonia. Mothers with pneumonia are significantly more likely to deliver before 34 weeks gestation, with preterm delivery occurring in up to 43% of cases. Prostaglandin production or the host’s inflammatory response could theoretically increase the risk from infection.
Prompt diagnosis, the initiation of respiratory support, and appropriate antimicrobial/antiviral therapy are key components of therapy for women in whom pregnancy is complicated by pneumonia. Because preterm labor frequently accompanies pneumonia, women should be monitored closely for the occult onset of preterm labor and appropriate interventions initiated if indicated.

We started the patient on antimicrobials, bronchodilators and mucolytics. She was intubated and put on ventilator support in VACV mode. As the patient was drowsy Non-Invasive Ventilation was not attempted due to risk of aspiration. Patient maintained a 

<table>
<thead>
<tr>
<th>Time</th>
<th>Mode</th>
<th>Volume</th>
<th>Respiratory Rate</th>
<th>PEEP</th>
<th>FiO2</th>
<th>I/E ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 PM</td>
<td>Synchronised intermittent mandatory Ventilation</td>
<td>420 ml</td>
<td>6 per minute</td>
<td>3 cmH2O</td>
<td>40% spO2</td>
<td>1:2</td>
</tr>
<tr>
<td>6 PM</td>
<td>Synchronised intermittent mandatory Ventilation</td>
<td>420 ml</td>
<td>4 per minute</td>
<td>3 cmH2O</td>
<td>40% spO2</td>
<td>1:2</td>
</tr>
<tr>
<td>8 PM</td>
<td>Synchronised intermittent mandatory Ventilation</td>
<td>420 ml</td>
<td>2 per minute</td>
<td>3 cmH2O</td>
<td>40% spO2</td>
<td>1:2</td>
</tr>
</tbody>
</table>

This case is reported to stress the fact that proper ventilatory support can save both the mother and foetus in a case of pneumonia complicating pregnancy.

References