Prone position in a spontaneously breathing near-drowning patient

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Sir: In 1977 Douglas et al. [1] first observed improvement in arterial oxygen tension (PaO_2) by prone positioning that prevented the need for mechanical ventilation in a patient with acute lung injury. Now, we describe a second case with moderate respiratory insufficiency where managing the spontaneously breathing patient in the prone position avoided the need for endotracheal intubation and mechanical ventilation.

A 16-year-old boy with a history of epilepsy was admitted to hospital with acute, moderate respiratory insufficiency resulting from near drowning after a generalized seizure. On examination his temperature was 37.5 °C and blood pressure 130/80 mmHg. He was slightly confused, there were spontaneous movements of the extremities and idiomuscular reflexes were present. Cardiac and abdominal examination revealed no specific abnormalities. He presented with tachypnea and mild cough and produced frothy blood-tinged sputum. His respiration rate varied between 30 and 40 breaths/min. Oxygen was applied through a face mask [approximate fractional inspired oxygen (FIO_2) of 0.40]. On auscultation, crackles were noted over the left lung. Moderate respiratory insufficiency was based on the clinical symptoms and the PaO_2/FIO_2 was 31 kPa (233 mmHg).

In order to improve gas exchange and reduce the work of breathing in our patient, we considered continuous positive airway pressure by face mask, but we first tried the prone position. The positional change was well tolerated and resulted in a remarkable clinical recovery with improved oxygenation: PaO_2 rose from 12.5 to 22 kPa, arterial carbondioxide tension from 5.7 to 6.0 kPa, and the alveolar-arterial oxygen difference changed from 17.8 kPa (134 mmHg) to 4.1 kPa (33.2 mmHg) within 2 h. As a result, the high fractional inspired oxygen was tapered down. Chest radiograph in the supine position showed left unilateral consolidations (Fig. 1 a). On the chest radiographs (taken in the supine position) after 3 and 20 h of prone position, the pulmonary abnormalities had resolved (Figs. 1 b and 1 c). The patient made an uneventful recovery, mechanical ventilation was redundant and he was discharged from hospital on day 4.

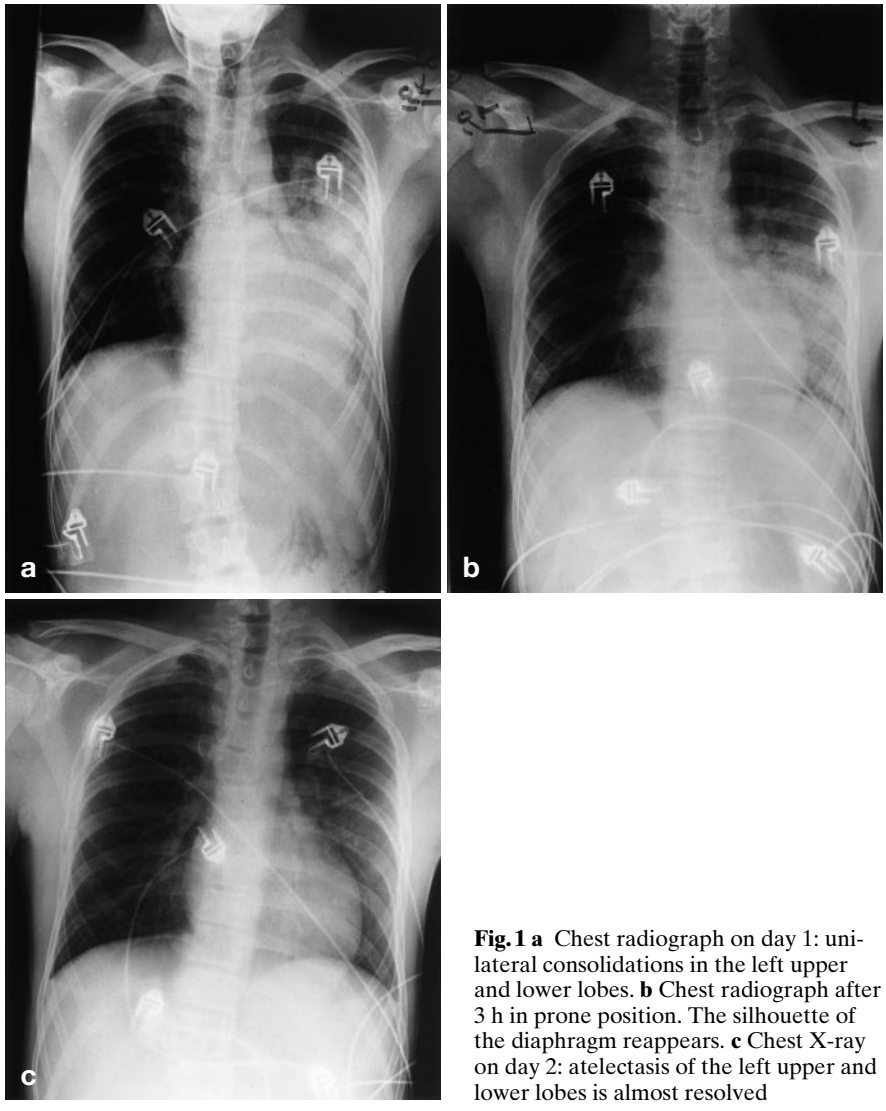

Fig. 1 a Chest radiograph on day 1: unilateral consolidations in the left upper and lower lobes. **b** Chest radiograph after 3 h in prone position. The silhouette of the diaphragm reappears. **c** Chest X-ray on day 2: atelectasis of the left upper and lower lobes is almost resolved

While there seems to be little doubt of the beneficial effects of prone position on oxygenation in mechanically ventilated patients with the acute respiratory distress syndrome (ARDS) [2,3], it remains unclear whether the same holds true in moderate respiratory insufficiency. In our patient, prone positioning rapidly reversed hypoxemia and prevented the necessity of orotracheal intubation and mechanical ventilation. Prone position alters the transpulmonary pressure in the atelectatic dorsal lung regions with a reduction in V_A/Q mismatch and shunt [4]. The observed improvement in the alveolar-arterial oxygen difference coincided with favorable changes in radiographic appearance when the patient was turned from the supine to the prone position. Whether the changes in transpulmonary pressure due to maneuvering the body position of our patient are of an order of magnitude sufficient to open consolidated pulmonary units has often been suggested but is still questioned [5]. Perhaps the overall improvement in aeration observed in our patient is an additive

effect of better drainage of lung secretions in the prone position. This explanation is, however, not supported by any scientific data and remains speculative.

In conclusion, our case illustrates that the benefits of prone positioning are not confined to ventilated ARDS patients only. This simple recruitment maneuvre improved gas exchange and resolved dorsal airspace collapse in moderate acute respiratory failure as well without predisposing the patient to the potential complications of invasive and non-invasive mechanical ventilation.

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