Treatment of severe cardiogenic pulmonary edema with continuous positive airway pressure delivered by face mask.

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BACKGROUND. Severe cardiogenic pulmonary edema is a frequent cause of respiratory failure, and many patients with this condition require endotracheal intubation and mechanical ventilation. We investigated whether continuous positive airway pressure delivered by means of a face mask had physiologic benefit and would reduce the need for intubation and mechanical ventilation. METHODS. We randomly assigned 39 consecutive patients with respiratory failure due to severe cardiogenic pulmonary edema to receive either oxygen alone or oxygen plus continuous positive airway pressure delivered through a face mask. It was not possible to blind the investigators to the assigned treatment. Physiologic measurements were made over the subsequent 24 hours, and the patients were followed to hospital discharge. RESULTS. After 30 minutes, both respiratory rate and arterial carbon dioxide tension had decreased more in the patients who received oxygen plus continuous positive airway pressure. The mean (+/- SD) respiratory rate at 30 minutes decreased from 32 +/- 6 to 33 +/- 9 breaths per minute in the patients receiving oxygen alone and from 35 +/- 8 to 27 +/- 6 breaths per minute in those receiving oxygen plus continuous positive airway pressure (P = 0.008); the arterial carbon dioxide tension decreased from 64 +/- 17 to 62 +/- 14 mm Hg in those receiving oxygen alone and from 58 +/- 8 to 46 +/- 4 mm Hg in those receiving oxygen plus continuous positive airway pressure (P less than 0.001). The patients receiving continuous positive airway pressure also had a greater increase in the arterial pH (oxygen alone, from 7.15 +/- 0.11 to 7.18 +/- 0.18; oxygen plus continuous positive airway pressure, from 7.18 +/- 0.08 to 7.28 +/- 0.06; P less than 0.001) and in the ratio of arterial oxygen tension to the fraction of inspired oxygen (oxygen alone, from 136 +/- 44 to 126 +/- 47; oxygen plus continuous positive airway pressure, from 138 +/- 32 to 206 +/- 126; P = 0.01). After 24 hours, however, there were no significant differences between the two treatment groups in any of these respiratory indexes. Seven (35 percent) of the patients who received oxygen alone but none who received oxygen plus continuous positive airway pressure required intubation and mechanical ventilation (P = 0.005). However, no significant difference was found in in-hospital mortality (oxygen alone, 4 of 20 patients; oxygen plus continuous positive airway pressure, 2 of 19; P = 0.36) or the length of the hospital stay. CONCLUSIONS. Continuous positive airway pressure delivered by face mask in patients with severe cardiogenic pulmonary edema can result in early physiologic improvement and reduce the need for intubation and mechanical ventilation. This short-term study could not establish whether continuous positive airway pressure has any long-term benefit or whether a larger study would have shown a difference in mortality between the treatment groups.

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- Clinical Trial
- Randomized Controlled Trial

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