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CPAP: more harm than good?

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Keywords

CPAP, respiratory failure

Comments

In this randomized, controlled study, continuous positive air pressure (CPAP) by face mask was found not to be of benefit to patients with acute hypoxemic nonhypercapnic respiratory failure (most of whom had acute lung injury). Worringly, the use of CPAP was associated with a higher level of adverse events (including four cardiac arrests) than use of oxygen alone. The widespread practice of using CPAP to prevent deterioration and avoid intubation - at least in this patient subgroup - is now clearly questionable. Some studies have suggested benefits from noninvasive ventilation (NIV) (eg pressure support plus positive end-expiratory pressure) in hypoxemic respiratory failure, which might be accounted for by the difference in technique but patient selection may also be important. More information is needed on the efficacy of NIV (including CPAP) in different clinical situations, but this study is important in demonstrating that CPAP cannot necessarily be applied safely in all types of respiratory failure.

Introduction

NIV has been clearly demonstrated to benefit patients with exacerbations of chronic obstructive pulmonary disease (COPD), particularly if hypercapnic, but its effectiveness in other types of respiratory failure has been uncertain. CPAP is frequently used in acute hypoxemic respiratory failure in an attempt to avoid endotracheal intubation and its associated morbidity, but the effectiveness of this strategy has not been clearly determined.

Methods

- A prospective study of 123 patients admitted to six medical ICU's with respiratory failure, defined as a PaO_2/FiO_2 ratio of 300 mmHg or less, due to pulmonary edema (bilateral infiltrates on chest X-ray). Various exclusion criteria included a history of COPD

- Patients were randomized to standard treatment - oxygen alone - or standard treatment plus CPAP
- Randomization was stratified according to the underlying cardiac disease. Of the 123 patients, 83% had acute lung injury and 17% pure cardiac decompensation as the cause of their pulmonary edema
- CPAP (5-10 cm H_2O) was applied continuously for at least the first 6-12 h and then as needed for at least 6 h per day until the cessation criteria were met (PaO_2/FiO_2 ratio greater than 300 mmHg or SaO_2 95%-100% with FiO_2 40% or less without CPAP or CPAP needed less than 6 h/day), endotracheal intubation or death
- The primary endpoint was intubation

Results

Patients in the CPAP group had a greater PaO_2/FiO_2 ratio increase ($P = 0.02$), greater subjective response to treatment ($P < 0.001$) and, compared to baseline values, greater reduction in respiratory rate ($P < 0.001$) and increase in pH level ($P = 0.01$) than the oxygen only group. This was true, however, only at the end of the first hour of treatment and during the rest of the trial there were no significant differences in these parameters. Of the CPAP group, 14% were unable to tolerate this treatment. There were no significant differences for rate of intubation, length of hospital stay or hospital mortality between the two groups. There were significantly more adverse events in the CPAP group ($P = 0.01$).

Additional information

See also the corresponding editorial

Keenan SP: **Noninvasive positive pressure ventilation in acute respiratory failure.** *JAMA* 2000, **284**:2376-2378. **And a paper on NIV and nosocomial infections in same issue.**

Girou E, Schortgen F, Delclaux C, Brun-Buisson C, Blot F, Lefort Y, Lemaire F, Brochard L: **Association of noninvasive ventilation with nosocomial infections and survival in critically ill patients.** *JAMA* 2000, **284**:2361-2367.

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1. Delclaux C, L'Her E, Alberti C, Mancebo J, Abroug F, Conti G, Guerin C, Schortgen F, Lefort Y, Antonelli M, Lepage E, Lemaire F, Brochard L: Treatment of acute hypoxemic nonhypercapnic respiratory insufficiency with continuous positive airway pressure by face mask. JAMA. 2000, 284: 2352-2360.