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TITLE: RESPIRATORY DISTRESS TREATED BY POSITIVE PRESSURE VENTILATION THROUGH A NASAL MASK IN HEMATOLOGIC PATIENTS

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Patients with hematologic disease need sometimes respiratory support (RS) for acute respiratory failure (ARF). Unfortunately the mortality rate of patients requiring endotracheal intubation and mechanical ventilation is from 50 to 80% in relation to the nosocomial complications and to the degree of aplasia. In those patients, both endotracheal intubation and mechanical ventilation induce numerous complications including nosocomial pneumonia, barotrauma and upper respiratory tract injury. Therefore, there is a need for methods of ventilatory assistance that could obviate the necessity for intubation in hematologic patients. Ventilation has been assisted non invasively by means of positive pressure ventilation administered through a facial mask. Inspiratory-pressure support (IPS) is a new method of partial ventilatory assistance in which constant positive pressure is applied during the patient's spontaneous inspiration. This mode of RS reduces respiratory-muscle work. But this technique is difficult to use routinely because it requires numerous conditions including: cooperation from patient and ability to tolerate facial mask. In this way, nasal mask (NM) is better tolerated than traditional facial mask. The aim of this study is to test IPS through a NM in hematologic patients.

7 patients (4 females) aged 40 years and treated for acute leukemia (4) or myeloma (1) were prospectively ventilated through NM. The onset of ARF occurred in 4 cases just before the induction of chemotherapy, one during aplasia and 2 at the end of aplasia. The causes of ARF were alveolar hemorrhages (2 cases), septicemia (1), aspergillosis (1), hemodynamic edema (1) and unknown (2). At the time of admission in intensive care unit, respiratory rate was more than 32 breaths/min and PaO₂ lesser than 6 kPa while the patients were breathing air room. Physiotherapist built individual NM from patient marks. Intermittent treatment with IPS was instituted at a level of pressure from 16 to 20 cm of water (Servo ventilator type C, Siemens). The FiO₂ was adapted to the result of PaO₂ (40<FiO₂<70%). The duration of the treatment period was between 8 and 24 h per day (mean 10 h). The number of days during which treatment was administered ranged from 1 to 8.

After the beginning of RS the respiratory rate decreased to 21 b/min, PaO₂ increased to higher than 10 kPa. PaCO₂ was between 3 and 4.1 kPa. Any hemodynamic change was noticed apart from heart rate which decreased from 122 to 112 beats/min. Local tolerance of NM was excellent and better than the facial mask. In particular patients were often able to speak for a short period during treatment. Four patients underwent intubation and treatment by mechanical ventilation because: a lack of cooperation from patient at the beginning of RS (1 case), a worsening of ARF after 24 hours (1 case), a stomach distension after 48 hours of RS (1 case) and convulsion after 4 days. These later four patients died whereas the three other patients had favorable outcomes. In this later group the duration of RS was 2, 5 and 8 days.

In conclusion, our results show that inspiratory pressure support delivered by a nasal mask can obviate the need for conventional mechanical ventilation in hematologic patients with acute respiratory distress.

References

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TITLE: MANDATORY RATE VENTILATION DURING THE PERIOD OF WEANING

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Pressure support (PS) ventilation is widely used during the weaning process of mechanical ventilation. One difficulty with this mode of ventilation is choosing an appropriate level of PS. Mandatory rate ventilation (MRV) is a new mode of servo-controlled PS ventilation permitted by the Cesar ventilator (Taema/Air Liquide). It is based on the observation that respiratory rate is a good indicator of respiratory fatigue. The rationale of MRV is as follows: In a patient under MRV, when the respiratory rate increases above a preset target rate, the level of PS is automatically and gradually increased. Conversely, when the patient's respiratory rate decreases below the preset value, the level of PS is gradually decreased. Thus, MRV should keep the patient's respiratory rate close to the preset target value. The aim of this study was to examine the effect of MRV in patients who differed by their ability to be weaned from the ventilator.

Methods: After institutional approval and informed consent, 12 ICU patients were studied: 5 (Group A) met our usual criteria for extubation, 7 (Group B) were difficult-to-wean patients. Airway pressure (Paw) and respiratory rate were recorded during the last 10 minutes of 5 consecutive 30 min periods corresponding to target rates of 15, 20, 25, 30, and 35 /min. PaCO₂ was measured at the end of each period. Results (Mean±SE) were compared by analysis of variance.

Results: Throughout the study, PaCO₂ remained below 45 mmHg in both groups of patients. In group A, PS was almost zero when the target rate was set higher than 20 and actual respiratory rate remained lower than 25 (figure). In group B, PS was higher than in group A for each target rate. All group A patients were successfully extubated within 24 hrs following completion of the study. Group B patients were extubated 8 to 49 days later (20±5).

Conclusion: MRV is able to provide satisfactory ventilation during the weaning period of mechanical ventilation. The level of PS required to reach a preset target rate is higher in difficult-to-wean patients than in patients ready for extubation.

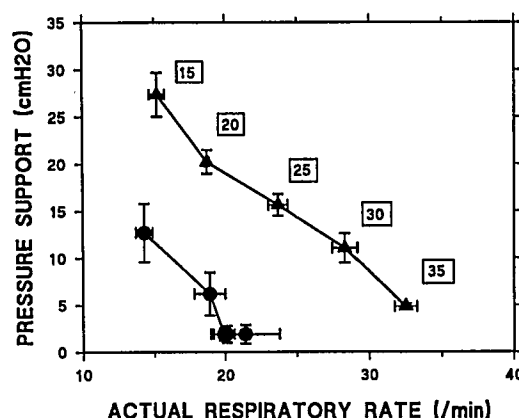


Figure: Pressure support level and actual respiratory rate during MRV with target rates set at 15, 20, 25, 30, and 35. (Circles: group A, triangles: group B).