

Title : MODE OF VENTILATION AND PULMONARY BAROTRAUMA

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**Introduction.** Increased airway pressure secondary to mechanical ventilation with positive and expiratory pressure makes pulmonary barotrauma an increasing cause of morbidity in the critically ill patients. Fewer inspiratory peaks during the use of intermittent mandatory ventilation might reduce the incidence of pulmonary barotrauma. In this report, the relative frequency of pulmonary barotrauma is compared between the patients ventilated with controlled mechanical ventilation with PEEP (CMV with PEEP) and the patients ventilated with intermittent mandatory ventilation with PEEP (IMV with PEEP).

**Methods.** A total of 292 patients who were admitted to the intensive care unit were included in the study. Group 1 (n=156) patients were ventilated by CMV with PEEP. The PEEP ranged from 5 to 20 cms of H<sub>2</sub>O with a mean of 15.2 cms of H<sub>2</sub>O. Group 2 (n=136) patients were ventilated by IMV with PEEP. In this group, the PEEP ranged from 5 to 35 cms of H<sub>2</sub>O with a mean of 27.4 cms of H<sub>2</sub>O. The mean ages, types of surgical procedures and indications for mechanical ventilation and PEEP were comparable in both groups. Cardiac filling pressures were monitored in both groups either by central venous pressure or by pulmonary capillary wedge pressure whenever available. Optimum PEEP was obtained in both groups by monitoring inspired O<sub>2</sub> concentration, arterial PO<sub>2</sub> mixed venous PO<sub>2</sub>, and cardiac output whenever available. Pulmonary barotrauma was diagnosed from chest roentgenograms which were obtained every day, and also when the clinical situation warranted.

**Results.** In Group 1 patients right atrial filling pressure via internal jugular or subclavian vein was monitored

in 73 patients (47%) while pulmonary capillary wedge pressure was monitored in 8 patients (5%). However, in Group 2 patients, right atrial filling pressure was monitored in 45 patients (33%) while pulmonary capillary wedge pressure was monitored in 65 patients (48%). Peak inspiratory airway pressure in Group 1 ranged from 20 to 60 cms of H<sub>2</sub>O (34 + 8.6) while in Group 2, it ranged from 20 to 70 cms of H<sub>2</sub>O (51 + 13.8) which was significantly higher compared to Group 1 (P<0.05). However, the incidence of pulmonary barotrauma was 23% in Group 1 who were ventilated by CMV with PEEP compared to 7% in Group 2 who were ventilated by IMV with PEEP which was significantly low compared to Group 1 (P<0.01).

**Discussion.** This investigation shows that the incidence of pulmonary barotrauma is decreased if patients are ventilated by IMV with PEEP mode. There was no relation between the incidence of pulmonary barotrauma and high peak inspiratory airway pressure since patients in Group 2 had higher airway pressures compared to Group 1. The decreased frequency of pulmonary barotrauma with the use of IMV with PEEP may be because of the fewer mechanical inspiratory peaks which results in a lower mean airway pressure compared to CMV with PEEP. Also more patients in Group 2 were invasively monitored with regards to their intravascular volume. Thus, optimal intravascular volume in Group 2 patients also might have contributed to the decreased incidence of pulmonary barotrauma. In conclusion, incidence of pulmonary barotrauma is reduced by the use of IMV with PEEP mode of ventilation in presence of optimal intravascular volume status.