Impact of regulatory pressure balloons on VAP

Nosocomial pneumonia (NP) is defined as a pulmonary infection acquired after 48 hours or more of hospitalization (1).

Acquired Pneumonia while under mechanical ventilation (VAP) affects patients requiring invasive mechanical ventilation for more than 48 hours. VAP in the ICU represents 47% of infections (2).

Nosocomial pneumonia has a 21% greater chance of occurrence in patients requiring ventilation. VAP in the ICU occurs in 10-30% and is dependent on the type of resuscitation needed with an additional 25% increase in mortality and morbidity and a prolonged length of hospitalization of 9 days (3). The average time required to process nosocomial pneumonia is 7 to 10 days for susceptible organisms and 14-21 days for resistant organisms (4).

The VAP effected patients differ in two distinct groups: early VAP those in who the condition is manifest on or before the 5th day of ventilation and late manifestations of the condition (i.e.,VAP occurring after the 5th day). The risk of VAP increases daily with ventilation and declines the 8th day of ventilation. The mortality rate of late-onset VAP is 47% (5).

The development of VAP comes in two forms (6):

- the most common method, endogenously (inhalation liquid colonized around the balloon and hematogenous route)
- endogenous method: colonization of the oropharynx and antibiotics.

The shape and material of the balloon of the endotracheal tube utilized has an obvious impact on the limitation of micro-aspiration (7).
Pressure regulators balloons can reduce the leakage of oropharyngeal secretions (8), this suggests that the secretions are better blocked by the balloon and do not descend into the lungs.

Medical literature recognizes that the pulmonary condition is improved by reducing the stagnation of oropharyngeal secretions in the lungs.
Hence the advantage of using balloons as being a more appropriate probe.

However balloons having a pressure less than 20 cm of water do not have the necessary sealing to prevent the passage of secretions. These secretions have the likelihood of increasing the risk of VAP by 2.5 (2). Another study concluded that the leakage of secretions by balloons is the leading cause of pneumonia during the first 8 days of ventilation (9).

However, a clinical study published in 2006 shows that the pressure in balloons can vary within the same patient over 24 hours despite the use of a manometer according to the frequency recommended resuscitation (10). It has been proven that the cuff pressure was less than 15 cm of water 11% of the time. Another study shows that the pressure drops below 20 CM water in 41% of ventilated patients (11).

Conclusion: It seems that the shape and material make up of the balloon when it is properly inflated can have a direct impact on the reduction of micro-aspiration but only 11% of the time, these balloons are typically not inflated enough to be sealed and in 41%, patients undergo a period or periods of sub-inflations.

The shape and material, and use of a pressure regulator balloon removes these periods of

under-inflation and thus can reduce the number of VAP.

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