EDITORIAL:

WEANING FROM MECHANICAL VENTILATION

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The objective of weaning from mechanical ventilation is to decrease the level of ventilatory support provided by the ventilator, forcing the patient to assume a greater proportion of the ventilatory workload. In other words, with weaning from mechanical ventilation, the work of breathing shifts from the ventilator to the patient. Although most patients wean from mechanical ventilation with little difficulty, some patients are unable to sustain the necessary work of breathing and develop signs of fatigue. It is important to recognize when a patient is failing a weaning trial. A failed weaning trial may induce significant cardiopulmonary distress and is discomforting for the patient. When weaning failure is recognized, ventilatory support should be reestablished without delay.

Delayed weaning from mechanical ventilation is a problem in every intensive care unit (ICU). Not only is associated with an increased mortality and risk of pneumonia, pulmonary emboli and psychological disturbances but it also has implication for the cost of care and the use of resources.

Complications of mechanical ventilation can occur at any time and can prolong ventilation. Marium Moula in her article in this journal reported that in their study 68% of patients developed complications associated with mechanical ventilation with ventilator associated pneumonia occurring in 34% of patients[1].

Different factors contribute in prolongation of mechanical ventilation in intubated patients. They are decreased respiratory drive, impaired respiratory pumping (malnutrition, hypoxia, hypercapnia, acidosis, hypercalcaemia, hypophosphataemia and hypomagnesaemia), airflow obstruction, alveolar disorders (pulmonary edema and pneumonia), increased metabolic demand and cardiovascular effect (such as anemia, low cardiac output or hypoxia) [2].

During weaning a quick and direct method to assess patient's readiness is to initiate a trial of unassisted spontaneous breathing in the form of either T-piece, CPAP or pressure supported ventilation. However there are some variables which suggest patient's readiness. They are resolution of acute phase of disease, intact airway reflexes, cardiovascular stability, afebrile patient, $P_aO_2/F_iO_2 \geq 300$ and PEEP ≤ 5 cmH_2O.

In 1987, Hall and Wood suggested that weaning from mechanical ventilation implies gradual withdrawal of mechanical ventilation and concomitant resumption of spontaneous breathing as unnecessary in most patients[3]. This decision depends on assessment of different variables which are different in different studies. Evidence based weaning guidelines from American association of respiratory care noted that only eight variables had some predictive capacity: minute ventilation < 10 L/min, negative

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inspiratory force, maximum inspiratory pressure <-20 to -30 cmH_2O, tidal volume > 5ml/Kg, breathing frequency < 30 to 35 breaths/min, the ratio of breathing frequency to tidal volume (f/VT) <105 breaths/min/ml, P0.1/PI max (ratio of airway occlusion pressure 0.1 s after the onset of inspiratory effort to maximal inspiratory pressure) 0.3 and CROP (integrative index of compliance, rate, oxygenation, and pressure) > 13ml/ breaths /minute[4]. The rule of weaning trial is not to exhaust patient.

The duration of weaning trial is variable. It can be successful and can be continued if patient tolerates it but is often unsuccessful. Major factors which suggest failure are anxiety, diaphoresis, greater than 20 to 25 % increase in heart rate or blood pressure, increased use of accessory muscles and dyspnea, respiratory rate > 35 breaths/min and S_aO_2 < 90 percent or greater than 5%decrease from base line[5]. If the weaning trial fails, clinician should search for reversible causes of failure. These factors can be of respiratory origin, impaired nutritional status, electrolytes imbalance, psychological factors or technical factors.

Every intensive care unit should have and follow weaning protocols. Multidisciplinary weaning protocols are effective in reducing the duration of mechanical ventilatory support (from a median of 124 hours to 64 hours) without any adverse effect on patients outcome. They also reduce the risk of ventilator acquired pneumonia by 50% [6]. The overall medical management of patient who continue to require ventilator support should be continuously re evaluated to ensure that all factors contributing to ventilator support should be re-evaluated. Successful weaning process depends on the application of skilled judgment, decision making and combined medical and nursing interventions.

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