

Brief Communications**How to Manage Persistent Hiccups in Patients undergoing Mechanical Ventilation?**Firouzian A¹, Darvishi Khezri H², Emami Zeydi A³

Hiccup is an involuntary spasm of the diaphragm and respiratory muscles that can cause respiratory depression. This problem usually resolves spontaneously or with simple measures¹. The incidence of hiccup in hospitalized patients is unknown. Hiccups that last more than 48 hours called persistent hiccups, which may be a sign of a serious underlying disease¹. Also, severe cases of hiccups can lead to physical exhaustion, anxiety, depression, cardiac arrhythmias, wound dehiscence, aspiration pneumonia, pulmonary edema, and even death²⁻⁵. Occurrence of hiccups can easily be overlooked in mechanically ventilated patients in the intensive care units (ICUs)¹. Although, no accurate estimates of the prevalence of persistent hiccups in patients who receiving mechanical ventilation have been reported. Occurrence of hiccups during mechanical ventilation could lead to patient-ventilator fighting and become a cause of difficult weaning⁶. Persistent hiccups in these patients can cause delaying weaning from the ventilator due to increasing doses of sedations and side effects of these medications. Also, this problem can increase susceptibility of these patients to an augmented risk of aspiration and ventilator associated pneumonia (VAP)^{5, 7}. Considering that the risk of developing VAP increases with the need for mechanical ventilation, therefore persistent hiccups necessitate therapeutic intervention in mechanically ventilated ICU patients. The etiology of persistent hiccups in patients admitted to ICU includes head injury that involves the brain stem, electrolyte imbalance (hyponatremia, hyperkalemia), inflammation, seizure, bronchoscopy and various medications (eg. psychiatric medications,

inhalational anesthetic, dexamethasone, morphine, etc.)^{8, 9}. The main purpose of treatment of persistent hiccups is to stop involuntary spasms of the diaphragm. Unfortunately, there are no guidelines available to help effectively treatment of this serious disorder⁹. Treatment of persistent hiccups during mechanical ventilation involves five parts. The first line of management is to remedy any underlying cause, and eliminate or change factors that can increase likelihood of developing persistent hiccups. The second is the pharmacologic treatment which includes carvedilol, olanzapine, chlorpromazine, midazolam, haloperidol, amantadine, prokinetics (eg. metoclopramide), baclofen, amitriptyline, valproic acid, nifedipine, gabapentin and lidocaine. Besides, 5-HT agonist, like tandospirone due to its direct inhibition of phrenic nerve activity, has been used to treat hiccup^{2, 4, 9}. The third, nonpharmacologic strategies that includes transcutaneous nerve stimulator, phrenic nerve blockades and trans-esophageal diaphragmatic pacing^{7, 9}. Surgical phrenic nerve ablation has been supported for persistent cases that are insensitive to other treatment. This approach may be associated with considerable morbidity and is not commonly successful². A Cochrane review stated that the available evidence was inadequate to guide treatment of persistent hiccups by either pharmacologic or nonpharmacologic means². In this systematic review demonstrated that acupuncture may be effective in the treatment of persistent and intractable hiccups. The fourth involves selecting the appropriate modes of ventilator and adjusting it correctly (ventilator management). It has been shown that the pressure modes of mechanical ventilation are responsible for the cessation of the persistent

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hiccup. Continuous positive airway pressure (CPAP) and pressure support ventilation (PSV) are used as appropriate modes for stopping hiccup in patients undergoing mechanical ventilation^{4, 5}. Byun et al. reported a case of a patient who had persistent hiccups and did not respond to pharmacological treatment and phrenic nerve block. After 8 hours of NPO (nothing by mouth), propofol 2.0 mg/kg was administered. Then, succinylcholine 70 mg was administered, and ventilation was continued via a facial mask with 50% oxygen and no inhalational anesthetic. A tidal volume of 650 ml was supplied at a rate of 8 breaths per minute, and peak inspiratory pressure (PIP) was 25 cm H₂O. Ten minutes after injection of propofol, the patient recovered full consciousness, and the hiccups did not reappear. This patient was successfully treated through positive pressure ventilation using a short-acting muscle relaxant⁴. In another study, Baraka A. showed that when the PIP was increased up to 30-40 cm H₂O, hiccup developing during surgery immediately stopped¹⁰. Therefore, positive pressure ventilation

and muscle relaxants could be effective in the treatment of persistent hiccups. Nevertheless, further researches are still needed to assess the impact of ventilator management and use other medications on persistent hiccups. The fifth part involves preventing pulmonary micro aspiration via stop enteral feeding and even, continuous aspiration with the naso-gastric tube⁶. Furthermore, the cuff of the endotracheal tube should also be completely inflated for the prevention of aspiration.

In sum, based on the current evidence, it seems that the persistent hiccups as a risk factor for ventilator associated pneumonia in patients undergoing mechanical ventilation should be given due attention. Therefore, clinical studies in this field are warranted. Also, the nonpharmacologic treatment, non-sedative drugs and appropriate ventilator setting could be considered to manage patients with persistent hiccups in the ICU.

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