

Ultrasound- Guided diaphragmatic thickness assessment as an indicator of successful extubation in mechanically ventilated cancer patients



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Abstract

Introduction: Weaning of mechanically ventilated patient is a daily challenge in Intensive Care units. Several indexes have been employed to assess the patient's ability to recover efficient spontaneous breathing. Ultrasound can easily access diaphragm thickness (tdi) in its zone of apposition during, tdi can represent the contractile activity of the diaphragm and the efficiency of its function.

Aim of the work: The aim of this study is to assess the thickness of diaphragm needed as a tool for prediction of extubation and proper timing of weaning from mechanical ventilation in the ICU which is measured by B mode ultrasound in ventilated cancer patients.

Patients and Methods: Design type prospective observational (diagnostic accuracy) study had been done to assess the thickness of diaphragm as a tool for prediction of extubation and proper timing of weaning from mechanical ventilation in the intensive care unit (ICU). It had been measured using B mode ultrasound in ventilated cancer patients. The study had been conducted in the intensive care unit (ICU) - National Cancer Institute - Cairo University. Fifty patients met spontaneous breathing trial criteria at postoperative period after major elective abdominal cancer surgery with pressure support intensive care unit each patient had been assessed with the ultrasound machine using a linear multifrequency probe (6-13 MHz) and using B-mode to detect the thickness of the diaphragm at zone of apposition. After confirmation of conventional international weaning parameters and weaning protocols in our study we focused on measuring diaphragm thickness and Δ tdi% over time during mechanical ventilation as a new predictor of successful weaning and extubation for up to 7 days from time of enrolment or until extubation, which ever happened first.

Results: Diaphragm thickness (via B-mode ultrasonography) measured every 24 hours at end of inspiration and end of expiration until extubation and during timing of extubation. Among the included patients; the mean age (±SD) was 50.6 ± 7.6 . The commonest cause of ventilation among the studied patients was Sepsis in 33/50 (66%). We found that the sensitivity of Δ tdi% at 72 h with cutoff value of > 39% was 95.83 and specificity was 100 % The positive predictive value was 100%, negative predictive value was 92.9% and p-value <0.001 and diaphragm thickness (mm) with cut off value of >2.1 mm which have sensitivity 83.33% and specificity 100% The positive predictive value was100% and negative predictive value were 76.5% and p-value was significant <0.001. As we have specificity 100% for Δ tdi% and sensitivity 100% for RSBI both could be used to maximize accuracy of weaning.

Conclusion: We concluded that ultrasound is very promising new approach to study the diaphragm in critical care unit. This study proved that ultrasound of the diaphragm is a simple method useful to evaluate the thickness and delta tdi%. This technique is highly feasible, harmless, and repeatable in the same patients and sensitive accurate method for predicting weaning outcome. It represents an easy-to-obtain new weaning index that, may be introduced as a bedside method in the clinical practice and weaning protocols.

Biography

Ahmed M Soliman works in the Department of Anesthesia, ICU, and Pain Management in the National Cancer Institute of Cairo University in Egypt.

Publications

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