Validity of lung ultrasound score and inferior vena cava diameter compared to pulse pressure variation predicting fluid responsiveness in mechanically ventilated critically ill patients: a comparative study

Thesis

Submitted for partial fulfillment of

MD degree in Anesthesia, pain and ICU

By

Hazem Ali Abd El-aal Thabet

(M.B.B. Ch, M.Sc. Anesthesia)

Faculty of medicine-Fayoum University

Anesthesiology Department

Faculty of Medicine-Fayoum University

Fayoum University

2024

Validity of lung ultrasound score and inferior vena cava diameter compared to pulse pressure variation predicting fluid responsiveness in mechanically ventilated critically ill patients: a comparative study

By

Hazem Ali Abd El-aal Thabet

(M.B.B. Ch, M.Sc. Anesthesia)

Supervised By

Dr. Joseph Makram Botros Boktor

Associate professor of anesthesiology

Faculty of Medicine, Fayoum University

Dr. Mohamed Ahmed Hamed Ismail

Associate professor of anesthesiology

Faculty of Medicine, Fayoum University

Dr. Omar Sayed Farghaly Mahmoud

Lecturer of anesthesiology

Faculty of medicine, Fayoum University

Fayoum University

2024

Abstract

Background: lung ultrasound examination is gaining popularity in patient assessment and guiding patient management. We intend to evaluate fluid responsiveness in mechanically ventilated patients by measuring IVC distensibility index and lung B-lines by sonography comparing their accuracy with PPV as a noninvasive parameter.

Methods Minimal sample size of patients was 118 patients with 59 responsive cases and 59 non-responsive cases. Calculation is guided by AUC of 0.915 obtained from a study in comparison to a null value of 0.8, with alpha of 0.05 and power of 90%. Sample size was increased to 150 patients to increase precision and ensure that at least 59 responsive and 59 non-responsive cases are included.

Results: In our study, the best cut off value for PPV was >13 with best sensitivity 94% and specificity 93% for fluid responsiveness, dIVC cut off value was > 18.5 with 90 % sensitivity and 96% specificity and delta b line sensitivity was 77% and specificity was 100%.

Conclusion: Pulse pressure variation, inferior vena cava distensibility index and lung Ultrasound have a predictive value for fluid responsiveness with high sensitivity and specificity**.**

Keywords: lung ultrasound, IVC distensibility index, pulse pressure variation, central venous pressure, fluid responsiveness.