

ABSTRAK

PERBANDINGAN ANTARA ULTRASONOGRAFI DIAFRAGMA (DE, DTF) DAN *RAPID SHALLOW BREATHING INDEX* (RSBI) TERHADAP KEBERHASILAN *WEANING* PADA PASIEN DENGAN VENTILASI MEKANIK ≥ 48 JAM DI ICU RS SARDJITO YOGYAKARTA

Latar Belakang : *Weaning* adalah transisi bertahap dari ventilasi mekanik menuju pernapasan mandiri, membutuhkan evaluasi ketat atas kesiapan fisiologis pasien untuk mengurangi risiko komplikasi seperti reintubasi. Penilaian kesiapan untuk *weaning* sering kali mengandalkan parameter tradisional seperti indeks napas cepat dangkal/ *Rapid Shallow Breathing Index* (RSBI), yang meskipun telah digunakan secara luas, masih memiliki keterbatasan dalam akurasi prediktifnya. Oleh karena itu, DE dan DTF telah dikembangkan sebagai parameter tambahan untuk mengevaluasi fungsi diafragma dan mengatasi keterbatasan RSBI

Tujuan : Mengetahui Apakah Ultrasonografi diafragma memiliki angka keberhasilan *weaning* lebih tinggi pada pasien *terventilasi mekanik > 48 jam* dibandingkan dengan *Rapid Shallow Breathing Index* (RSBI) di ICU RS Sardjito Yogyakarta.

Metode: Penelitian ini dilaksanakan dengan metode cohort prospektif di *Intensive Care Unit* (ICU) Yogyakarta. Dilakukan *Spontaneous Breathing Trial* (SBT) pada pasien yang akan dilakukan *weaning*, pasien dengan toleransi baik selama SBT, dilakukan *pengukuran Rapid Shallow Breathing Index* (RSBI), dan dilakukan ultrasonografi diafragma dengan menghitung *Diaphragmatic Excursion* (DE) dan *Diaphragmatic Thickening Fraction* (DTF). Data dianalisis berdasarkan luaran berhasil *weaning* dan gagal *weaning*. Sensitivitas, spesifisitas, nilai prediksi positif (PPV) dan nilai prediksi negatif (NPV) dihitung untuk ekskursi dan tdi untuk memprediksi keberhasilan *weaning*. Kurva *Receiver Operating Characteristics* (ROC) digunakan untuk mengevaluasi dan membandingkan utilitas klinis ekskursi diafragma, DTF ($\Delta tdi\%$), serta RSBI untuk keberhasilan *weaning*.

Hasil: Terdapat perbedaan signifikan DE secara statistik ($p= 0.0$) antara kelompok berhasil *weaning* dan gagal *weaning*. Dengan rata-rata DE yang lebih tinggi (1,54 mm) pada pasien berhasil dibandingkan kelompok yang gagal (0,98 mm). Tidak terdapat perbedaan signifikan secara statistik ($P = 0.869$) antara kedua kelompok pada DT ekspirasi, DT inspirasi dan DTF. Rata-rata DTF pada kelompok berhasil (41,18%) dan gagal (47,62%). Dengan cut off RSBI < 105, RSBI memiliki sensitivitas 90.7% spesifisitas yang rendah 7.7% dan PPV 76.5 %, dan NPV 20%, dengan AUC 0.616. DTF memiliki cut off <18.29, dengan sensitivitas 88.4%, spesifisitas 23,1% dengan AUC 0.485. DE dengan cut off 1.44 cm memiliki sensitifitas 65,1%, spesifisitas 100% dan AUC 0.878. RSBI-DE menunjukkan hasil sensitifitas 62.8%, spesifisitas 100% dan AUC 0.859.

Kesimpulan: DE lebih efektif dibanding RSBI dalam memprediksi keberhasilan *weaning* pada pasien *terventilasi mekanik > 48 jam* di ICU RS Sardjito Yogyakarta. DTF tidak lebih baik dibanding RSBI dalam memprediksi keberhasilan *weaning* pada pasien *terventilasi mekanik > 48 jam* di ICU RS Sardjito Yogyakarta.

Kata kunci: *Weaning*, *Rapid Shallow Breathing Index* (RSBI), *Diaphragmatic Excursion* (DE), *Diaphragmatic Thickening Fracting* (DTF)

ABSTRACT

COMPARISON BETWEEN DIAPHRAGMATIC ULTRASONOGRAPHY (DE, DTF) AND THE RAPID SHALLOW BREATHING INDEX (RSBI) IN PREDICTING WEANING SUCCESS AMONG PATIENTS RECEIVING MECHANICAL VENTILATION FOR > 48 HOURS IN INTENSIVE CARE UNIT OF DR. SARDJITO GENERAL HOSPITAL YOGYAKARTA

Background: Weaning is the gradual transition from mechanical ventilation to spontaneous breathing, which requires thorough evaluation of the patient's physiological readiness in order to reduce the risk of complications such as reintubation. Readiness for weaning is often assessed using traditional parameters such as the Rapid Shallow Breathing Index (RSBI), which, despite its widespread use, still has limitations in predictive accuracy. Therefore, Diaphragmatic Excursion (DE) and Diaphragmatic Thickening Fraction (DTF) have been developed as additional parameters to evaluate diaphragm function and address the limitations of RSBI.

Objective: To determine whether diaphragm ultrasonography has a higher rate of extubation success in patients with prolonged mechanical ventilation compared to the Rapid Shallow Breathing Index (RSBI) in the ICU of RS Sardjito Yogyakarta.

Method: This study was conducted using a prospective cohort method in the Intensive Care Unit (ICU) of RS Sardjito, Yogyakarta. A Spontaneous Breathing Trial (SBT) was performed on patients eligible for extubation. For patients who tolerated the SBT well, RSBI was measured, followed by diaphragm ultrasonography to assess Diaphragmatic Excursion (DE) and Diaphragmatic Thickening Fraction (DTF). Data were analyzed based on weaning outcomes (success vs. failure). Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated for DE and DTF in predicting weaning success. Receiver Operating Characteristic (ROC) curves were used to evaluate and compare the clinical utility of diaphragmatic excursion, DTF ($\Delta tdi\%$), and RSBI in predicting weaning success.

Results: There was a statistically significant difference in DE ($p = 0.000$) between the successful and failed weaning groups. The average DE was higher (1.54 mm) in the successful group compared to the failed group (0.98 mm). There was no statistically significant difference ($P = 0.869$) between the two groups in expiratory DT, inspiratory DT, and DTF. The average DTF in the successful group was 41.18% and the failed group was 47.62%. With a RSBI cutoff of <105, RSBI had a sensitivity (90.7%), low specificity 7.7%, PPV of 76.5%, and a NPV 20% with an AUC of 0.616. DTF had a cutoff of <18.29, with a sensitivity of 88.4%, a specificity of 23.1%, and an AUC of 0.485. DE with a cutoff of 1.44 cm had a sensitivity of 65.1%, a specificity of 100%, and an AUC of 0.878. RSBI-DE showed a sensitivity of 62.8%, a specificity of 100%, and an AUC of 0.859.

Conclusion: DE is more effective than RSBI in predicting weaning success in mechanically ventilated patients for >48 hours in the ICU of Sardjito Hospital, Yogyakarta. DTF is not better than RSBI in predicting weaning success in mechanically ventilated patients for >48 hours in the ICU of Sardjito Hospital, Yogyakarta.

Keywords: Weaning, Rapid Shallow Breathing Index (RSBI), Diaphragmatic Excursion (DE), Diaphragmatic Thickening Fracting (DTF)