

Evaluation of the daily change in PaO₂/FiO₂ ratio in ICU patients' mechanical ventilation weaning

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Background/Aims: The routine daily chest x-ray (CXR) strategy is no longer recommended in intensive care unit (ICU) patients at this time. However, it is difficult for intensivists to collectively accept the on-demand CXR strategy because of the ambiguous clinical status required to conduct CXRs. The present study aimed to evaluate the predictive value of the change in PaO₂/FiO₂ (PF ratio) for abnormal CXR findings in ICU patients after mechanical ventilation (MV).

Methods: A retrospective cohort study was conducted from January 2016 to March 2021. ICU patients with MV who had greater than or equal to 48 hours MV and greater than or equal to 72 hours post-MV ICU stay were eligible. Routine daily CXRs and daily change in PF ratios were investigated during the three days post-mechanical ventilation.

Results: Overall, 144 patients were included, with a median age of 76 years (interquartile range: 65-82), and 84 (58.3%) were males. Seventy-seven (53.5%) patients had abnormal CXR findings (one or more abnormal CXRs on 3-day daily CXRs post-extubation), and reintubation was more frequent in the abnormal CXR group ($p = 0.02$). In the analysis of 432 CXRs and PF ratios, the daily change in PF ratio showed a significant predictive accuracy for abnormal CXR findings (AUROC: 0.685, $p < 0.01$), and a cut-off of $-23 \leq$ the change in PF ratio (the Youden index point) had a sensitivity of 61.5% and specificity of 74.8%.

Conclusions: The daily change in the PF ratio could be used as a predictive indicator of abnormal CXR changes in ICU patients after MV.

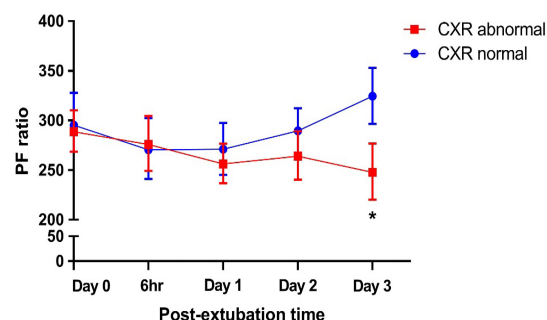


Table 2. Comparison according to CXR findings on the extubation day and the post-extubation period[⊖]

Variables [⊖]	CXR normal [⊖] (n = 67) [⊖]	CXR abnormal [⊖] (n = 77) [⊖]	P value [⊖]
Extubation day (pre-extubation state) [⊖]			
WBC, $\times 10^3/\mu\text{L}$ [⊖]	9.89 ± 0.41 [⊖]	11.36 ± 0.53 [⊖]	0.30 [⊖]
Hemoglobin, g/dL [⊖]	10.00 ± 0.22 [⊖]	9.83 ± 0.19 [⊖]	0.55 [⊖]
Creatinine, mg/dL [⊖]	1.19 ± 0.17 [⊖]	1.19 ± 0.16 [⊖]	0.99 [⊖]
CRP, mg/dL [⊖]	6.91 ± 0.80 [⊖]	7.75 ± 0.77 [⊖]	0.45 [⊖]
O ₂ supply, FiO ₂ [⊖]	0.32 ± 0.01 [⊖]	0.33 ± 0.01 [⊖]	0.53 [⊖]
PaO ₂ /FiO ₂ [⊖]	295.36 ± 14.90 [⊖]	288.65 ± 11.48 [⊖]	0.72 [⊖]
PaCO ₂ , mmHg [⊖]	38.23 ± 1.00 [⊖]	36.45 ± 0.85 [⊖]	0.17 [⊖]
pH [⊖]	7.46 ± 0.01 [⊖]	7.46 ± 0.01 [⊖]	0.48 [⊖]
Duration of MV, days [⊖]	8.82 ± 0.88 [⊖]	8.25 ± 0.82 [⊖]	0.64 [⊖]
Post-extubation O ₂ supply [⊖]	[⊖]	[⊖]	[⊖]
High flow nasal cannula [⊖]	32 (47.8) [⊖]	26 (33.8) [⊖]	0.09 [⊖]
Simple nasal prong [⊖]	28 (41.8) [⊖]	40 (51.9) [⊖]	0.22 [⊖]
Mask [⊖]	7 (10.4) [⊖]	11 (14.3) [⊖]	0.49 [⊖]
Post-extubation sedative use [⊖]	12 (18.2) [⊖]	13 (16.9) [⊖]	0.84 [⊖]
Reintubation [⊖]	5 (7.5) [⊖]	16 (20.8) [⊖]	0.02 [⊖]
Post-extubation ICU stay, days [⊖]	10.06 ± 1.33 [⊖]	10.72 ± 1.35 [⊖]	0.73 [⊖]
Total length of ICU stay, days [⊖]	18.79 ± 1.76 [⊖]	18.94 ± 1.59 [⊖]	0.95 [⊖]
ICU mortality [⊖]	4 (6.0) [⊖]	11 (14.3) [⊖]	0.09 [⊖]
Hospital stay [⊖]	46.03 ± 4.86 [⊖]	44.77 ± 3.95 [⊖]	0.84 [⊖]

Values are presented as mean \pm SE or number (%). Reintubation is defined as the case were reintubated after 72hr from extubation. CRP C-reactive protein, CXR chest x-ray, FiO₂ fraction of inspired oxygen, ICU intensive care unit, MV mechanical ventilation, PaO₂ partial pressure of oxygen in arterial blood, PaCO₂ partial pressure of carbon dioxide in arterial blood, WBC white blood cell. [⊖]