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# Pulse amplitude ratio under noninvasive ventilation as a new method in the diagnosis of left heart failure in patients with acute exacerbation of chronic obstructive pulmonary disease

Khaoula Bel Haj Ali <sup>1 2</sup>, Adel Sekma <sup>1 2</sup>, Ikram Chamtouri <sup>3</sup>, Kaouthar Beltaief <sup>1 2</sup>, Mohamed Amine Msolli <sup>1 2</sup>, Zied Mezgar <sup>4</sup>, Wahid Bouida <sup>1 2</sup>, Riadh Boukef <sup>2 5</sup>, Hamdi Boubaker <sup>1 2</sup>, Mohamed Habib Grissa <sup>1 2</sup>, Semir Nouira <sup>6 7</sup>

Affiliations

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## Abstract

**Background:** Left heart failure (LHF) is commonly associated with acute exacerbation of chronic obstructive pulmonary disease (AECOPD) but its role is often underestimated.

**Aim of study:** To evaluate the performance of a new diagnostic technique based on the measurement of the pulse amplitude ratio (PAR) using non-invasive ventilation (NIV) for the early identification LHF in patients admitted to the emergency department (ED) for AECOPD.

**Results:** 73 patients were included in this study: 32 in LHF group and 41 in non LHF- group. The two groups had comparable demographic and clinical characteristics at admission. The mean values of PAR<sub>NIV</sub> was significantly higher among LHF patients (0.86 vs. 0.71;  $p < 0.01$ ). The area under the receiver operating characteristic curve of PAR<sub>NIV</sub> was 0.75. Using the best cut-off (0.6), the sensitivity of PAR<sub>NIV</sub> was 93% with a specificity 21%, a positive predictive value of 48%, and a negative predictive value of 81%. Correlation between PAR<sub>NIV</sub> and BNP was significant ( $r = 0.52$ ;  $p = 0.002$ ).

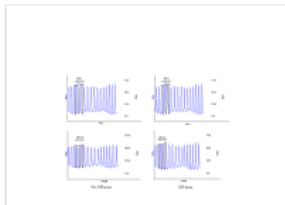
**Conclusion:** Measurement of PAR<sub>NIV</sub> in patients presenting to the ED with AECOPD had a good diagnostic performance for the detection of LHF and could represent an interesting alternative for the currently available methods. Trial registration The study was registered in the Clinical Trial Registration System ([clinicaltrials.gov](#)) under the study number [NCT05189119](#), <https://register>.

**Clinicaltrials:** [gov/prs/app/action/SelectProtocol?sid=S000B004&selectaction=Edit&uid=U0000QAM&ts=2&cx=qmluh](https://clinicaltrials.gov/prs/app/action/SelectProtocol?sid=S000B004&selectaction=Edit&uid=U0000QAM&ts=2&cx=qmluh) .

**Keywords:** Chronic obstructive pulmonary disease; Heart failure; Non-invasive ventilation; Pulse amplitude ratio.

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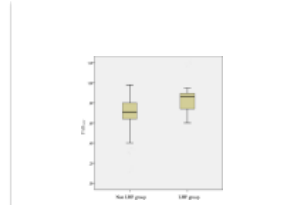
## Figures



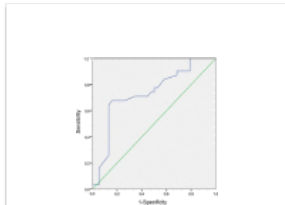
**Fig. 1** Measurement of pulse amplitude ratio...



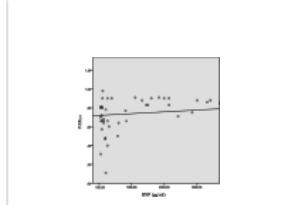
**Fig. 2** Flow chart



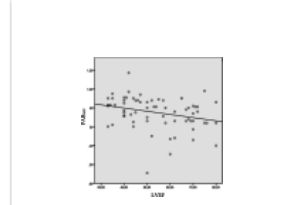
**Fig. 3** Pulse amplitude ratio under non-invasive...



**Fig. 4** Area under the ROC curve...



**Fig. 5** Correlation between pulse amplitude ratio...



**Fig. 6** Correlation between Pulse amplitude ratio...

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