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Response: Pulmonary embolism and shunt in acute myocardial infarction

We thank the authors for these clinically important observations relating to the management of right ventricular (RV) failure in the ED and their discussion of several interesting cases. Pulmonary embolism (PE) should be considered in the differential diagnosis of a patient presenting to the ED with acute RV failure. Additional etiologies to consider include valvular heart disease, tamponade physiology, and cardiomyopathies [1]. Differentiation of PE and acute myocardial infarction (AMI) can be clinically challenging, as ST elevation in leads V1–V4 may be present in up to 5% of acute PE [2]. The time pressure to achieve early revascularization for AMI can lead to delays in recognizing PE [2]. Rarely, AMI and PE can present concomitantly due to paradoxical embolism from the PE across an atrial septal defect (ASD) or patent foramen ovale (PFO) causing AMI [3]. Early cardiology consultation for echocardiography and possible revascularization are critical for this patient population [4]. PE should remain on the differential diagnosis in patients with ECG changes suggestive of AMI, particularly for patients with severe hypoxemia without pulmonary edema or in those with clinical history suggestive of PE [3].

Hypoxemia should be addressed in acute RV failure to decrease RV afterload from hypoxic pulmonary vasoconstriction [1]. The authors point out that hypoxemia may be nonresponsive to supplemental oxygen due to shunt physiology from diastolic dysfunction secondary to RV infarction [5]. Increased pulmonary artery pressures and right atrial pressures may also result in the formation of a right-to-left shunt in the setting of an ASD with a baseline left-to-right shunt. Early revascularization for eligible patients is a priority in ED management [4]. Patients with refractory hypoxemia may require additional workup in the ICU setting to include transesophageal echocardiography with agitated saline contrast to evaluate for PFO [5].

Declaration of Competing Interest

None.

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Understanding the benefits of early high-flow nasal cannula therapy for adults with acute hypoxemic respiratory failure in the ED

To the Editor:

We have read with great interest the recent study published by Macé et al. [1], which described the impact of early high-flow nasal cannula oxygen therapy in adults presenting with acute hypoxemic respiratory failure in the ED; most notably observing faster recovery or regression of respiratory failure with HFNC.

However, we believe this observation necessitates a more precise analysis of the improvement in oxygenation, and the unique factors associated with regression, to better understand the faster recovery of respiratory failure described in this study.

The study population consisted mainly of patients with community-acquired pneumonia with similar PaCO2 values that did not differ in the

observation periods. However, it is very difficult to interpret reduction in terms of work of breathing and regression of respiratory failure without corresponding radiologic improvement in pulmonary infiltrates [2]. When considering the ED setting and short (1 h) period of therapy, it is especially difficult understanding the observed differences in recovery from acute respiratory failure.

Although there was no difference in this study, a similar rate of NIV initiation and endotracheal intubation were observed between the two groups while in the ED. The authors do not elaborate on their hypothesis for this observation beyond having studied patients with less severe illness and early ED management for their acute hypoxemic respiratory failure. This is surprising because in the HOT-ER study, rates of mechanical ventilation at 24 h from admission were less when HFNC was used compared to standard oxygen therapy [3]. Moreover, despite not being a statistically significant difference, the HOT-ER study also showed a trend toward decreased incidence of ED intubations when using HFNC compared with standard oxygen therapy [3]. Their findings are in discordance with prior studies looking at HFNC use in heterogenous patient populations [4], and immunocompromised patient populations [5,6].

With respect to the similar ED length of stay observed in both groups, the authors suggest the use of HFNC does not significantly impact nurse workload in terms of monitoring or organization. However, they do not consider that the cost effectiveness of using HFNC compared to standard oxygen therapy may be only marginal or limited for clinical and practical extrapolations of their study.

Finally, we critique the authors' methodology in using a non-validated scale for grading subjective dyspnea. Instead of the 5-point Likert scale used in the study, the modified Borg dyspnea scale would have served similar purpose while being a validated and widely used scoring tool in the domains of emergency and pulmonary medicine [7].

In our opinion, faster recovery from respiratory failure with HFNC could be better defined not only in terms of oxygenation (especially in hypoxemic respiratory failure associated with pulmonary infiltrates/pneumonia), but also in terms of a cost/benefit analysis in the emergency department.

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Reply to Understanding the benefits of early high-flow nasal cannula for adults with acute hypoxemic respiratory failure in the ED

We answer with pleasure the authors' comments challenging the role of high-flow oxygen therapy in rapid improvement of signs of respiratory failure as compared to standard oxygen. In this before-after study including 102 patients with acute hypoxemic respiratory failure treated by standard oxygen in the first period and then by high-flow oxygen therapy, we found that 61% of patients receiving high-flow presented improved signs of respiratory failure within the first hour as compared to 15% with standard oxygen [1]. These were defined by a decreased respiratory rate and an alleviation of signs of respiratory fatigue.

Surprisingly, the authors highlighted the lack of parallel assessment of pulmonary infiltrate evolution. However, pulmonary infiltrates are commonly used as criteria of severity, i.e. in the definition of acute respiratory distress syndrome [2], rather than criteria of response to oxygenation strategies. The improvement of signs of respiratory distress observed in our study is in accordance with previous clinical and physiological studies showing significant decrease in respiratory rate and work of breathing under high-flow oxygen in patients with acute respiratory failure [3,4]. However, improved signs of respiratory failure under high-flow oxygen therapy were not followed by decreased escalation of ventilatory support as compared to standard oxygen. This is in line with findings of previous studies conducted in the ED. Indeed, we do not share the authors' interpretation of the HOT-ER study, in which no difference between high-flow oxygen and standard oxygen was observed in terms of intubation or intensive care unit admissions [5]. This could be explained by the subsequent application of noninvasive ventilation in 8% of patients in the HOT-ER study [5]. Noninvasive ventilation has previously shown efficacy and is strongly recommended [6] in patients with cardiogenic pulmonary edema or COPD exacerbation, who represented 40% of the population in the HOT-ER study [5]. In our study, these patients were excluded and only those with acute hypoxemic respiratory failure were included. Indeed, 48% of our population were admitted in intensive care unit, where they could receive high-flow oxygen therapy, which has been reported to improve outcomes, in terms of intubation and mortality, in this setting [3]. However, the superiority of high-flow over standard oxygen should be confirmed in future studies, the reasons being: first, the lower risk of intubation was observed only in severe hypoxemic patients in the FLORALI study comparing high-flow oxygen with noninvasive ventilation and standard oxygen [3] and second, a recent study including immunocompromised patients with acute respiratory failure showed no difference between high-flow oxygen and standard oxygen [7].

The present study, like previous studies, showed parallel to improving signs of respiratory failure under high-flow oxygen, and