Liberal or conservative oxygen therapy for acute respiratory distress syndrome

SUMMARY:
- Over the past few years, several articles have demonstrated that more conservative approaches to oxygen delivery are generally better, provided that the oxygen saturation never becomes dangerously low. This conclusion has been demonstrated in various conditions including neonatal resuscitation and myocardial infarction. In 2016, the OXYGEN ICU trial showed that patients in the ICU with acute respiratory distress syndrome (ARDS) who were treated with a conservative oxygen management strategy had better outcomes than controls. In this trial, the oxygen saturation was set to 94% to 94% for the conservative approach and to 97% to 100% for the liberal approach. The net treatment effect was 20% vs 12% ICU: the mortality results favored the conservative approach.

- This study reports on the Liberal Oxygenation Versus Conservative Oxygenation in ARDS (LOCO2) trial. In this trial, the authors attempt first to replicate the findings from OXYGEN ICU and second to extend the meaning of conservative and liberal oxygen therapy.

- This was an open-label study of people intubated for ARDS for at least 12 hours (ie, anyone intubated for a pulmonary problem that was not congestive heart failure or volume overload) in 13 publicly funded ICUs in France. The main exclusion criteria were cardiac arrest or brain injury as the main cause of respiratory failure. Participants were randomly assigned to a liberal oxygen group with a partial pressure of arterial oxygen (PaO\textsubscript{2}) of 90 to 105 mm Hg (approximately ≥96% saturation) and conservative oxygen group with a PaO\textsubscript{2} of 55 to 70 mm Hg (approximately 88%-92% saturation) over the first 7 days of intubation. The primary outcome was death at 28 days. Multiple secondary outcomes, including death at 90 days, and vent-free and vasopressor-free days were assessed.

- A total of 205 patients were randomized, and the groups were highly balanced after randomization. The mortality was 34.3% in the conservative group and 26.5% in the liberal group. By 90 days, the mortality difference was significant and was higher in the conservative group (44%) than the liberal group (30%).

- Mesenteric ischemia occurred in 5 patients in the conservative group and no patients in the liberal group. The data safety monitoring board stopped the trial early.

- This study tempers enthusiasm for highly conservative oxygen management. The authors note that the problem with conservative therapy may be that trying to keep oxygen saturation at 90% to 92% could result in accidental undershooting, which is more dangerous than temporarily overshooting to a saturation of 100%. The authors argue that keeping the saturation at 90% to 92% but never lower might be optimal, but doing so might never be completely feasible: because such control was not feasible in a controlled trial environment, it is unlikely to be consistently possible in the real world. This conclusion does not invalidate previous work suggesting that a slightly more conservative strategy is better; instead, it indicates that targeting 90% is too conservative and/or difficult to manage.

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EDITOR’S COMMENTARY: In this moderately sized trial of patients with early ARDS, a very conservative oxygen strategy appeared to cause more harm than a more liberal oxygen approach. Remember that neither strategy targeted oxygen saturations of 100%. The best available evidence now seems to show that a target oxygen saturation of 94% to 97% is optimal in patients with ARDS.