High flow oxygen therapy after extubation

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Oxygenation and ventilation impairment after planned extubation is frequent. Post-extubation respiratory management aims to decrease the risk of early acute respiratory failure and reintubation, which is associated with a poor prognosis (1).

Take away messages

- Two multicenter randomized controlled trials compared the use of high flow oxygen therapy after planned extubation with conventional oxygen therapy and noninvasive ventilation (NIV) respectively.
- Reintubation within 72 hours and post-extubation respiratory failure were significantly less common in the high flow than in the conventional oxygen therapy group.
- High flow oxygen therapy was not inferior to NIV for preventing reintubation and resulted in a lower rate of post-extubation respiratory failure.
- Systematic use of high flow oxygen therapy after planned extubation improves the clinical outcome for all ICU patients in terms of acute respiratory failure and reintubation within 72 hours.

Oxygenation and ventilation impairment after planned extubation is frequent. Post-extubation respiratory management aims to decrease the risk of early acute respiratory failure and reintubation, which is associated with a poor prognosis (1). In addition to mobilization and physiotherapy, three non-invasive oxygenation and ventilation support methods may be used in this situation: Conventional oxygen therapy, high flow oxygen therapy, and noninvasive ventilation (NIV) including CPAP and bi-level positive airway pressure. In subgroups of patients with a high risk of post-extubation respiratory failure, preventive use of NIV for 24 hours after planned extubation was associated with a lower reintubation rate (2, 3, 4). High flow oxygen therapy combines several features, including constant FiO2, washout of upper-airway anatomical dead space, optimal gas conditioning, continuous treatment, and the comfort of a nasal cannula, with positive physiological effects such as a low level of PEEP with increased end-expiratory lung volume, lower work of breathing, improved drainage of respiratory secretions, and decreased dyspnea (5, 6). Given that planned extubation is a daily occurrence in the ICU, it is important to establish the role of high flow oxygen therapy in post-extubation respiratory management.

In a multicenter randomized controlled trial, Hernández et al. compared high flow oxygen therapy and conventional oxygen therapy after planned extubation for 527 ICU patients considered at low risk of reintubation (7). Treatment was applied for 24 hours after extubation, and the primary outcome of the study was reintubation within 72 hours. High flow was used at 31±8 l/min with FiO2 set at 32±8%. The rates for reintubation within 72 hours and post-extubation respiratory failure were significantly lower with high flow oxygen therapy than with conventional oxygen therapy (4.9% versus 12.2%, p=.004 and 8.3% versus 14.4%, p=.03 respectively). The time to reintubation, length of the ICU stay and mortality rates did not differ significantly between the two groups.

In a second multicenter randomized controlled trial, the same group of researchers performed a noninferiority study comparing high flow oxygen therapy and NIV after planned extubation for
604 patients considered at high risk of reintubation (8). Treatment was applied for 24 hours after extubation, and the primary outcome of the study was post-extubation respiratory failure and reintubation within 72 hours. High flow was used at 50±5 l/min with FiO2 set at 35% (30%-40%). The rate of post-extubation respiratory failure was significantly lower with high flow oxygen therapy than with NIV (26.9% versus 39.8% respectively; risk difference 12.9%; 95%CI=6.6% to ∞). High flow oxygen therapy was not inferior to NIV in terms of reintubation within 72 hours (22.8% versus 19.1% respectively; risk difference -3.7%; 95%CI=-9.1% to ∞). The time to reintubation was not significantly different between the two groups.

These studies add to the mounting evidence that post-extubation respiratory management may positively impact the clinical outcome in terms of post-extubation respiratory failure and reintubation within 72 hours. High flow oxygen therapy after planned extubation has been shown to benefit all patients mechanically ventilated for more than 12 hours in the ICU, regardless of the risk for reintubation. For patients at high risk, and particularly for those suffering from COPD or obesity who benefit from PEEP or pressure support, high flow oxygen therapy may be alternated with NIV sessions. However, cautious clinical assessment is required for patients still being treated with high flow oxygen therapy 48 hours after extubation, to avoid risking delayed reintubation.

The systematic use of high flow oxygen therapy after planned extubation decreases the risk of acute respiratory failure and reintubation within 72 hours for all ICU patients.

References: