Effect of Noninvasive Ventilation on Tracheal Reintubation Among Patients With Hypoxemic Respiratory Failure Following Abdominal Surgery: A Randomized Clinical Trial.

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Abstract

IMPORTANCE: It has not been established whether noninvasive ventilation (NIV) reduces the need for invasive mechanical ventilation in patients who develop hypoxemic acute respiratory failure after abdominal surgery.

OBJECTIVE: To evaluate whether noninvasive ventilation improves outcomes among patients developing hypoxemic acute respiratory failure after abdominal surgery.

DESIGN, SETTING, AND PARTICIPANTS: Multicenter, randomized, parallel-group clinical trial conducted between May 2013 and September 2014 in 20 French intensive care units among 293 patients who had undergone abdominal surgery and developed hypoxemic respiratory failure (partial oxygen pressure <60 mm Hg or oxygen saturation [SpO2] ≤90% when breathing room air or <80 mm Hg when breathing 15 L/min of oxygen, plus either [1] a respiratory rate above 30/min or [2] clinical signs suggestive of intense respiratory muscle work and/or labored breathing) if it occurred within 7 days after surgical procedure.

INTERVENTIONS: Patients were randomly assigned to receive standard oxygen therapy (up to 15 L/min to maintain SpO2 of 94% or higher) (n = 145) or NIV delivered via facial mask (inspiratory...
pressure support level, 5-15 cm H2O; positive end-expiratory pressure, 5-10 cm H2O; fraction of inspired oxygen titrated to maintain SpO2 ≥94%) (n = 148).

**MAIN OUTCOMES AND MEASURES:** The primary outcome was **tracheal reintubation** for any cause within 7 days of randomization. Secondary outcomes were gas exchange, invasive **ventilation**-free days at day 30, health care-associated infections, and 90-day mortality.

**RESULTS:** Among the 293 **patients** (mean age, 63.4 [SD, 13.8] years; n=224 men) included in the intention-to-treat analysis, **reintubation** occurred in 49 of 148 (33.1%) in the NIV group and in 66 of 145 (45.5%) in the standard oxygen therapy group within 7 days after randomization (absolute difference, -12.4%; 95% CI, -23.5% to -1.3%; P = .03). **Noninvasive ventilation** was associated with significantly more invasive **ventilation**-free days compared with standard oxygen therapy (25.4 vs 23.2 days; absolute difference, -2.2 days; 95% CI, -0.1 to 4.6 days; P = .04), while fewer **patients** developed health care-associated infections (43/137 [31.4%] vs 63/128 [49.2%]; absolute difference, -17.8%; 95% CI, -30.2% to -5.4%; P = .003). At 90 days, 22 of 148 **patients** (14.9%) in the NIV group and 31 of 144 (21.5%) in the standard oxygen therapy group had died (absolute difference, -6.5%; 95% CI, -16.0% to 3.0%; P = .15). There were no significant differences in gas exchange.

**CONCLUSIONS AND RELEVANCE:** Among **patients** with **hypoxemic respiratory failure following abdominal surgery**, use of NIV compared with standard oxygen therapy reduced the risk of **tracheal reintubation** within 7 days. These findings support use of NIV in this setting.

**TRIAL REGISTRATION:** clinicaltrials.gov Identifier: [NCT01971892](https://clinicaltrials.gov/ct2/show/NCT01971892).

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