# LITERATURE REVIEW

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## VENTILATION STRATEGIES

### Tugrul M, Carnci E, Karadeniz H, et al: Comparison of volume-controlled with pressure-controlled ventilation during one-lung anaesthesia. Br J Anaesth 79:306-310, 1997

Hypoxemia may occur during one-lung ventilation (OLV). The authors randomized 48 thoracic surgical patients to receive either volume-controlled (VCV) or pressure-controlled ventilation (PCV) during OLV. They found that airway pressures and pulmonary shunt were significantly greater during VCV, and arterial oxygen tension was significantly greater during PCV. Implications: The benefits of PCV were most marked in those patients with reduced vital capacity.

### Clarke JP, Schuitemaker MN, Sleigh JW: The effect of intraoperative ventilation strategies on perioperative atelectasis. Anaesth Intensive Care 26:262-266, 1998

Several interventions can reduce intraoperative atelectasis. This study compared four ventilatory interventions (manual hyperinflations, large tidal volumes, positive end-expiratory pressure [PEEP], and pressure-controlled inverse-ratio ventilation) in 24 patients using a factorial design. They used the alveolar-arterial oxygen difference ($A\text{-}aDO_2$) as a measure of atelectasis. Both the application of PEEP and inverse-ratio ventilation were most effective in reducing atelectasis. No method had any effect on postoperative $A\text{-}aDO_2$. Implications: Current methods for correcting intraoperative hypoxemia should include the implementation of inverse-ratio ventilation.

### Amato MB, Barbas CS, Medeiros DM, et al: Effect of a protective-ventilation strategy on mortality in the acute respiratory distress syndrome. N Engl J Med 338:347-345, 1998

It is now considered that lung overdistension and cyclic lung reopening may perpetuate alveolar injury. Protective ventilation includes adjusted end-expiratory pressure to the inflection point of a static pressure-volume curve, low tidal volumes, low inspiratory pressure, and permissive hypercapnia. This study randomized patients to receive either conventional positive-pressure ventilation or protective ventilation. The authors showed a significant reduction in early mortality (71% *v* 38%; $p < 0.05$) using protective ventilation. Implications: This study is the first to show improved survival at 28 days (mostly in the first 3 days) in patients with acute respiratory distress syndrome.

### Leon MA, Lorini FL: Ventilation mode recognition using artificial neural networks. Comput Biomed Res 30:373-378, 1997

Artificial neural networks have been investigated for their potential superior diagnostic capabilities (Lancet 346:1075-1079, 1995). These authors recorded flow and pressure waveforms from 13 patients ventilated during general anesthesia. Computerized neural networks were configured to input flow and pressure waveforms and to output the ventilatory mode (pressure-support ventilation or spontaneous breathing). Neural network training was performed with the first seven patients and then tested on the other six patients (433 breaths tested). Networks correctly recognized the ventilatory mode in 78% using flow, in 97% using pressure, and in 100% using both. Implications: This study supports the role of neural networks to recognize breathing patterns and could easily be integrated into future respiratory monitors.

## OUTCOMES

### Spiess BD, Ley C, Body SC, et al: Hematocrit value on intensive care unit entry influences the frequency of Q-wave myocardial infarction after coronary artery bypass grafting. The Institutions of the Multicenter Study of Perioperative Ischemia (McSPI) Research Group. J Thorac Cardiovasc Surg 116:460-467, 1998

In a multicenter observational study, 2,202 coronary artery bypass patients were evaluated for the relationship between hematocrit on admission to the intensive care unit (IHCT) and adverse outcomes. Patients were divided into groups based on IHCT (low, ≤24%; normal, 25% to 33%; and high, ≥34%), and statistical associations with outcome were evaluated for each group. Rates of myocardial infarction and severe left ventricular failure were lowest in patients with low IHCTs and significantly higher in those with high IHCTs. After adjustment for single variables, multivariate analysis showed that elevated IHCT was the most important predictor of postoperative myocardial infarction (odds ratio, 2.22; 95% confidence interval, 1.04 to 4.76) and that this was not confounded by patient variables or site differences. Implications: Elevated hematocrit values after coronary artery surgery may increase the risk for adverse myocardial outcomes by impairing oxygen delivery. Arbitrary transfusions to increase the oxygen-carrying capacity of the blood should be reevaluated.

### Birkmeyer NJ, Charlesworth DC, Hernandez F, et al: Obesity and risk of adverse outcomes associated with coronary artery bypass surgery. Northern New England Cardiovascular Disease Study Group. Circulation 97:1689-1694, 1998

More than 11,000 consecutive patients undergoing coronary artery bypass grafting were prospectively followed up for adverse outcomes, including postoperative bleeding, stroke, death, and infection. Patients were divided into three weight classes based on body mass index, and logistic regression analysis was performed to look for an association of weight class with adverse outcome. Obesity conferred an independent risk for wound infection: odds ratio (OR) = 2.1; confidence interval (CI), 1.45 to 3.06; $p < 0.001$ for obese and OR = 2.74; CI, 1.49 to 5.02; $p = 0.001$ for severely obese. Obese patients had a significantly lower adjusted risk for postoperative bleeding. Implications: Although obesity did not confer an increased risk for mortality, sternal wound infection