Noninvasive Ventilation using Bipap: Cardiac Surgery Care

In the previous issue of Annals, a single-center unblinded study assessing the outcomes of noninvasive bilevel positive airway pressure ventilation versus typical positive pressure ventilation through an endotracheal tube for patients with respiratory failure following initial extubation after open heart surgery provides an important reminder that traditional care requires continuous questioning. These data also contribute to the emerging literature regarding the use of noninvasive ventilation as an acceptable rescue modality for this specific patient population. Although much data exist showing that bilevel positive airway pressure (BiPAP) is a reasonable option for patients with chronic obstructive pulmonary disease and mild hypercapnia over invasive mechanical ventilation, there are little data using this modality in patients following open heart surgery. Open heart surgery remains one of the most common indications for mechanical ventilation throughout the world. Safer, noninvasive modalities to treat patients who fall off the “pathways” for spontaneous breathing and extubation in this population are important because of the large number of patients impacted and the known complications of invasive mechanical ventilation through an endotracheal tube.

In the study by Dr. Ahmed Said Elgebaly and colleagues published in the Annals, there were significant differences in vital signs, mean arterial pressure, and hypoxemia during the first 24 h following enrollment. The significant changes that are also reported in arterial blood gases also are not surprising. There is little argument regarding the ability of invasive positive pressure ventilation to easily achieve essentially normal arterial blood gases in patients without significant acute or chronic lung disease. The reasons for these differences are straightforward and have to do with the varying reliability and delivery of tidal volumes and FiO₂ using the noninvasive technology. In the present study, the majority of these differences resolved over time. BiPAP application is more cumbersome, and predictable leaks occur around the mask in many patients that does not detract from its overall success when measured by avoidance of intubation.

The more important finding revealed in these data is that patients with respiratory failure following extubation could be managed successfully without reintubation using the noninvasive technique. Although in this small sample, there were no differences in complications and a longer requirement for the use of the noninvasive technology to declare that the patient had been successfully weaned, significant experience with both techniques in literally thousands of patients would strongly advocate for the use of the noninvasive technology despite the fact that patients required it for longer periods of time.

Although it is well known that respiratory failure and the need for reintubation are low after cardiac surgery, prior studies have shown significantly decreased frequency of reintubation using noninvasive ventilation for respiratory failure post heart surgery. The present study supports this approach.

The major issue not specifically addressed in these data is the sometimes difficult and labor-intensive application of noninvasive positive pressure ventilation. It has been shown previously that the workload for both nursing and respiratory therapy goes up with noninvasive ventilation. As this modality gains widespread acceptance, better familiarity with the technique is consistent with the observation that the overall workload does increase but is manageable and does not outweigh the patient benefit. Furthermore, although mentioned in the methodology, not specifically defined or addressed is the utility of intermittent application of noninvasive ventilation. Many patients gain identical if not superior benefits from simply applying noninvasive positive pressure ventilation intermittently, i.e., hourly or greater application of (NIV) noninvasive ventilation interspersed with periods where the patient is simply receiving supplemental oxygen. This practice makes the technique more tolerable by the patient and also fulfills a very specific patient need when the patients feel that additional support is helpful.

Finally, high-flow oxygen through nasal cannula has been shown to be effective in postoperative cardiac surgical patients. Further refinement of patient selection regarding which patients are more likely to benefit from which modality of NIV may further the goal of minimizing the use of invasive mechanical ventilation for the postoperative patients similar to what has occurred for respiratory failure in medical patients.

William T. McGee
Pulmonary and Critical Care Division, Baystate Medical Center, Springfield, MA 01199, USA

Address for correspondence: Dr. William T. McGee, Pulmonary and Critical Care Division, Baystate Medical Center, Springfield, MA 01199, USA.
E-mail: William.McGee@baystatehealth.org

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