A Protocol of Bolus-Dose Nitroglycerin and Non-Invasive Ventilation to Avert Intubation in Emergency Department Acute Pulmonary Edema

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Introduction: Severe acute pulmonary edema is a common presentation in adult emergency departments (ED). Patients suffering from this condition often need emergent intubation with the consequent morbidity of mechanical ventilation and intensive care. There is a scarcity of research on the immediate management of the sickest cohort of acute pulmonary edema patients.

Hypothesis: We hypothesized that a treatment protocol using and vasodilators and non-invasive ventilation could be used to avert intubation in these patients. Methods: This was a prospective cohort study of patients with sympathetic-surge crashing acute pulmonary edema patients in whom the ED called the anesthesia service for emergent intubation. Rather than immediately perform intubation, the anesthesia service placed these patients on non-invasive positive pressure ventilation (NPPV) and then administered repeated boluses of nitroglycerin. The primary outcome was the need for intubation. Secondary outcomes included improvement in respiratory parameters (SpO2 and respiratory rate), hemodynamic stability, and the need for diuretics. Results: 41 patients were consecutively enrolled. All patients received NPPV, with initial settings of IPAP 14/EPAP 8. The mean number of nitroglycerin boluses required was 4, which corresponded to a mean dose of 1588 mcg (range 800-28,000 mcg). None (0%) of the patients required intubation (95% CI 0-7.3%). Patients had marked improvements in their respiratory parameters. Two patients had transitory dips in SBP < 100, which resolved spontaneously; both of these patients received additional nitroglycerin boluses. No patients required additional drugs or fluids for hypotension.

Conclusions: In this small, single center cohort study of hypertensive crashing acute pulmonary edema patients who were initially deemed to require immediate invasive airway management, intubation was avoided using a protocol combining NPPV and boluses of the vasodilator nitroglycerin. Adverse events were not seen with this protocol.