

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.