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EFFICACY OF BOLUS-DOSE PHENYLEPHRINE FOR PERI-INTUBATION HYPOTENSION

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□ **Abstract—Background: Intubation in hypotensive emergency department (ED) patients may increase the risk of life-threatening complications such as hypoperfusion and cardiovascular collapse. Peripherally administered, diluted "push-dose" phenylephrine has been advocated to treat peri-intubation hypotension, however, its effectiveness is unknown. Study Objective: To investigate the efficacy and usage patterns of bolus-dose phenylephrine for peri-intubation hypotension at an academic medical center. Methods: A retrospective chart review of all adult intubated, hypotensive patients (systolic blood pressure [SBP] < 90 mm Hg) over 12 months was conducted. During the peri-intubation period (30-min prior to/after intubation), the effect of phenylephrine was evaluated pre/post drug administration by comparing SBP, diastolic blood pressure (DBP), and heart rate (HR). Results: A total of 119 patients met eligibility criteria. Phenylephrine was given to 29/119 (24%) patients and 20 (17%) were treated during the peri-intubation period. Phenylephrine was given for many different conditions, and treatment timing varied greatly. Phenylephrine was given with other vasopressors 70% of the time (14/20), however, the timing of vasopressor infusion also varied greatly. When phenylephrine was given during the peri-intubation period, there were significant increases in SBP and DBP ($p < 0.01$) with no change in HR. Conclusion: In this academic ED, bolus-dose phenylephrine was used by practitioners without a systematic pattern. Although phenylephrine improved hemodynamics, it is possible that nonsystematic use of phenylephrine may cause inadvertent negative effects. Further studies will need to be conducted to better understand the best practices for use of phenylephrine.** © **2015 Elsevier Inc.**

□ **Keywords—phenylephrine; hypotension; peri-intubation; sepsis; vasopressors; shock**

INTRODUCTION

Postintubation hypotension can be a life-threatening complication and has been associated with hypoxemia and death (1,2). These patients have a higher mortality and longer time spent in intensive care units in comparison with patients without postintubation hypotension (3–5). The causes of postintubation hypotension can be multifactorial, with common causes being drug-mediated vasodilation or consequences of positive pressure ventilation (6). Despite this knowledge, it is unclear what is the best method of prevention and treatment of postintubation hypotension.

In the emergency department (ED), hypotensive patients often present requiring airway management. Management of hypotension in these patients is difficult and regularly requires the use of vasopressors. Recently, emergency physicians have utilized peripherally

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administered diluted phenylephrine ("push-dose") boluses to treat the hypotensive period. Several anesthesia studies have shown efficacy with bolus-dose phenylephrine for hypotension induced by spinal anesthesia (7–9). However, there are no data on the benefit of this therapy in the ED during the peri-intubation period. Furthermore, there is no evidence concerning emergency physician practice concerning the use of phenylephrine with peri-intubation hypotension.

This study examines the use and efficacy of bolus-dose phenylephrine for peri-intubation hypotension in an urban academic ED. Objectives include evaluating the practice pattern of phenylephrine use by emergency physicians and the efficacy of phenylephrine when used during peri-intubation hypotension.

MATERIALS AND METHODS

Study Setting and Population

This study is a retrospective chart review of hypotensive adult patients requiring intubation who presented to an urban, academic ED from February 2011 to February 2012. The study site is a Level I trauma center, a 487-bed hospital that treats approximately 75,000 emergency patients annually and has training programs in emergency medicine (postgraduate years 1–3) and combined pediatric emergency medicine (postgraduate years 1–5). The study was reviewed and granted approval by the university's institutional review board.

Patient Selection

All adult patients during this time period were eligible for analysis. Inclusion criteria were hypotensive patients requiring intubation. The peri-intubation time period was defined as 30 min prior to and after intubation. Hypotension was defined as at least one systolic blood pressure (SBP) reading below 90 mm Hg.

Patients were excluded if they were <18 years old, they did not receive bolus-dose phenylephrine, or they did not have clear documentation of the timing of phenylephrine dose. Bolus-dose phenylephrine at our institution is a prepackaged 10-mL syringe at a concentration of 100 μg/mL.

Data Collection

The final patient population evaluated included hypotensive adult patients requiring intubation. Key data points were collected to define the population's demographics and hemodynamics. Two authors extracted data independently, and a correlation was done on primary outcome variables to confirm that data extraction was consistent. Specific demographic data points collected include: age, gender, reason for intubation, intubation method, sedation/paralytic used, traumatic presentation and type (blunt vs. penetrating), admission diagnosis, phenylephrine given, phenylephrine dosage and time, and additional vasopressors given and times. Hemodynamic data were collected 60 min pre- and postintubation, including SBP, diastolic blood pressure (DBP), and heart rate.

Data Analysis

The efficacy of peripherally administered bolus-dose phenylephrine for peri-intubation hypotension was examined in patients treated during the peri-intubation time period. Demographic data were compared using chi-squared, Fisher's exact, and the *t*-test where appropriate. The quantitative hemodynamic effects were compared pre- and postadministration of phenylephrine using the Wilcoxon signed rank test to determine statistical significance in differences for SBP, DBP, and heart rate (HR) prior to and after first phenylephrine dose administration.

RESULTS

During the study period, 444 patients were intubated in the ED; 325 patients were excluded from the analysis because 56 patients were <18 years old and 269 patients were not hypotensive. The remaining 119 patients were eligible for inclusion (Figure 1). Only a small portion of these patients (29/119, 24%) were treated with bolus-dose phenylephrine for their hypotension. Of these,

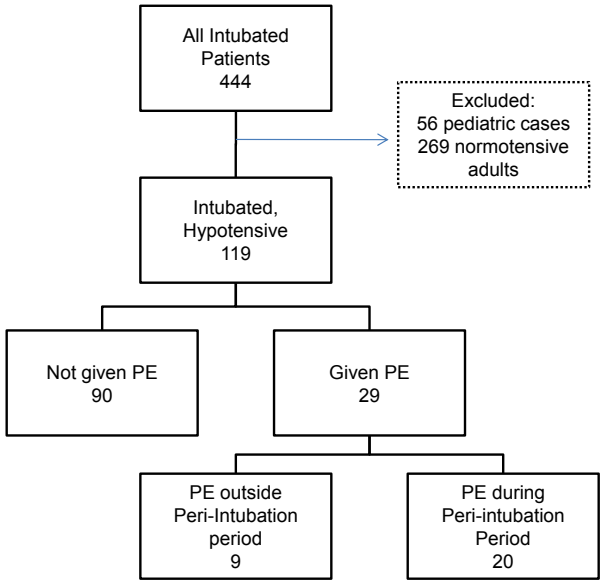

Figure 1. Schematic of patients in study population. PE = phenylephrine.