

Abstract 1

**Pulmonary Hypertension Is an Important Predictor of Perioperative Outcomes in Patients Undergoing Noncardiac Surgery**

Roop Kaw, MD; Esteban Walker, PhD; Vinay Pasupuleti, MD, PhD;  
Abhishek Deshpande, MD, PhD; Tarek Hamieh, MD; and Omar A. Minai, MD  
*Cleveland Clinic, Cleveland, OH*

**Rationale:** Pulmonary hypertension (PH), although considered high risk, is not currently recognized as an independent risk factor for perioperative outcomes after noncardiac surgery (NCS).

**Objectives:** We report perioperative complications and their associated risk factors from a large cohort of patients with angiographically proven PH.

**Methods:** Patients undergoing NCS between January 2002 and December 2006 were cross-matched with a pulmonary artery catheterization (PAC) database for the same period. Patients were excluded if they were < 18 years old or if they underwent cardiac surgery prior to NCS or minor procedures using local anesthesia/sedation. A comparable number of controls with mean pulmonary arterial pressure (MPAP) < 25 mm Hg who underwent similar surgeries were used for analysis. Multivariate logistic regression was used to identify clinical, echocardiographic, and angiographic characteristics associated with perioperative morbidity and mortality (**Table, next page**).

**Results:** Out of a total of 5,445 patients who underwent PAC, 526 underwent NCS during the specified period. Of these, 96 patients had PH. MPAP ( $P = .001$ ), American Society of Anesthesiologists (ASA) class ( $P = .02$ ), and chronic renal insufficiency ( $P = .03$ ) were determined as independent risk factors for postoperative morbidity. Of the 27 patients with significant perioperative complications, which included 1 death, 25 (92.6%) had underlying PH. Patients with PH were more likely to develop congestive heart failure ( $P < .001$ ; OR: 11.9), hemodynamic instability ( $P < .002$ ), sepsis ( $P < .0005$ ), and respiratory failure ( $P < .004$ ). Patients with PH needed longer ventilatory support ( $P < .002$ ), stayed longer in the ICU ( $P < .04$ ), and were more frequently readmitted to the hospital within 30 days ( $P < .008$ ; OR: 2.4).

**Conclusions:** Underlying PH can have a significant impact on perioperative outcomes after NCS. Patients with pulmonary arterial hypertension and “mixed PH” had a higher likelihood of such complications when compared to patients with pure pulmonary venous hypertension.

**TABLE**  
**Multiple logistic regression for morbidity/mortality for all patients**

Characteristic	Odds ratio*	P value
Cardiac risk index (with vs without)	3.9	.01
ASA class (> 2 vs ≤ 2)	3.2	.04
Surgical risk class	7.5 (3 vs 1) 1.5 (2 vs 1)	.03
MPAP	5.9	.02
Pulmonary vascular resistance	—	.06

\*Area under the receiver operator characteristic curve: .81