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# Left Atrial Enlargement is Associated with Postoperative Respiratory Failure and Mortality

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## Objective:

To determine if left atrial enlargement is associated with post operative respiratory failure and mortality in patients undergoing high risk vascular surgery.

# Background:

Post operative respiratory failure (PRF) following vascular surgery is associated with an increased risk of in hospital death. Identifying those patients at risk for PRF during the initial preoperative risk assessment is valuable. We hypothesized that left atrial enlargement (LAE), a marker of patients with chronic heart failure, would be associated with the development of PRF in patients undergoing high risk vascular surgery. We also assessed the value of a previously validated respiratory failure risk assessment score (RAS) for this group of patients.

## Methods:

This retrospective study evaluated patients undergoing high risk vascular surgery at Lehigh Valley Hospital between 2004 – 2008. High risk vascular surgery was defined as non-cardiac, intra-thoracic or intra-abdominal vascular surgery. We identified a group of 121patients who had undergone pre operative cardiac imaging with an echocardiogram within six months of surgery. The RAS and left atrial volume index was recorded for each patient. LAE was defined as a left atrial volume index (LAVI) > 28 mL/m². A high RAS was defined as 40 or greater. PRF was defined as an inability to be extubated 48 hours after surgery or re-intubation following initial extubation. The relationship between LAE and the RAS with PRF and mortality was assessed using Pearson's chi square test and an odds ratio.

## Results:

PRF occurred in 29 (24%) of the 121 patients studied. In the 43 patients with left atrial enlargement, PRF occurred in 15 (35%) patients. In contrast, PRF was observed in 14 (18%) of the 78 patients with normal left atrial size (Pearson's  $X^2 = 4.36$ , p = 0.037). Among 43 patients with high RAS, 19 (44%) had PRF. In comparison 10 (13%) of the patients with lower RAS scores experienced PRF (Pearson's  $X^2 = 14.97$ , p < 0.001). The in-hospital mortality in the total study group was 5% (6 patients). Among the subgroup with LAE (43 patients) the in hospital mortality was 12% (5 patients). In the group of patients who died, 83.3% had LAE (OR = 10.13; 95% CI – 1.1-89.8; p = 0.021).

#### Left Atrial (LA) Enlargement is Associated with Postoperative Respiratory Failure (PRF) and Mortality Mortality\*\* LAVI < 28 ml/m<sup>2</sup> 14 (18%) 1 (1.2%) (78 patients) LAVI > 28 ml/m<sup>2</sup>15 (35%) 5 (11.6%) (43 patients) 29 (24%) 6 (4.9%) (121 patients) \*OR = 2.45; 95% CI [1.04, 5.75] \*Pearson's $\chi^2 = 4.36$ , p < 0.037 \*\*Pearson's $\chi^2 = 6.30 p = 0.021$ \*\*OR = 10.1; 95% CI [1.1, 89.8] A High Risk Assessment Score (RAS) is Associated with Postoperative Respiratory Failure (PRF) and Mortality PRF\* Mortality\*\* LOW (<40) 10 (12.8%) 2 (2.6%) (78 patients) High (≥40) 19 (44.2%) 4 (9.3%) (43 patients) 29 (24%) 6 (5.0%) (121 patients) \*Pearson's $\chi^2 = 14.97$ , p < 0.001 \*OR = 5.38; 95% CI [2.2, 13.2] \*\*Pearson's $\chi^2 = 2.67 p = 0.184$ \*\*OR = 3.90; 95% CI [.684, 22.22]

## Conclusion:

In patients undergoing high risk vascular surgery, LAE on a preoperative echocardiogram is associated with postoperative respiratory failure. Importantly, LAE is also associated with inhospital mortality. A high RAS was also associated with PRF. The relationship between LAE and PRF due to heart failure, as opposed to other causes of respiratory failure, was not analyzed in this study. Additional research will be required to determine if LAE is an independent risk factor for PRF due to heart failure. An evaluation of patients with normal ejection fraction and LAE undergoing high risk vascular surgery may be particularly valuable. Finally, additional analysis will be required to determine if the identification of LAE guides treatment to reduce the risk of PRF.

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