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ANESTHETIC MANAGEMENT FOR CARDIAC SURGERY IN CARCINOID HEART DISEASE – A REVIEW OF 84 PATIENTS

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Introduction: Carcinoid syndrome results from excess production of serotonin and other active substances produced by enterochromaffin cell containing tumors that typically arise from the bowel. Symptoms such as flushing, abdominal cramping, diarrhea, and bronchospasm are features of the carcinoid syndrome. Carcinoid tumors that metastasize to the liver may result in carcinoid valvular heart disease and eventual right heart failure. This study was designed to evaluate the anesthetic management of patients with carcinoid heart disease undergoing cardiac surgery.

Methods: From 1985 to 2001 patients with symptomatic carcinoid heart disease who underwent cardiac surgery were entered in a database designed to track clinical outcomes (IRB approved). Anesthetic management involved high dose narcotic with volatile anesthetic. Somatostatin was given for patient flushing, hemodynamic lability, or sudden volume loss during cardiopulmonary bypass. Prospectively, several aspects of anesthetic management were identified and contemporaneous data collected. We attempted to correlate urinary 5-HIAA levels (a measure of carcinoid activity), NYHA class, and the preparation and dose of preoperative somatostatin to the drop in systolic blood pressure (SBP) with induction, and intraoperative somatostatin and vasopressor use. Statistical analysis included the use of the two-sample t-test and Pearson correlation analysis, with two-tailed p-values ≤ 0.05 considered statistically significant.

Results: In the 16-year study period, 84 patients underwent 86 cardiac operations for carcinoid heart disease. The mean SBP drop from baseline with induction of anesthesia was 36 +/- 21 mmHg (26 +/- 12% with drop expressed as percentage of baseline). The SBP drop correlated with preinduction SBP ($r = 0.58$, $p < 0.01$) and 5-HIAA ($r = 0.33$, $p < 0.01$). The SBP drop did not correlate with NYHA class or preoperative somatostatin dose or preparation. The mean dose of intraoperative somatostatin was 2.6 mg +/- 3.4 mg. Patients treated preoperatively with the long-acting (LA) preparation of the somatostatin required a higher mean intraoperative dose than those patients treated with the short-acting (SA) somatostatin chronically (4.4 +/- 4.4 mg versus 2.2 +/- 2.8 mg, $p = 0.01$). There was no significant correlation between intraoperative dose of somatostatin and preoperative 5-HIAA, or NYHA class. Almost all the patients (78 of 86 cases) required vasopressor medications during anesthesia (55 patients received calcium, 43 dopamine, 42 phenylephrine, 13 ephedrine, 10 epinephrine and 2 dobutamine). The group that received epinephrine had a higher mean preoperative 5-HIAA (279 +/- 122 mg/24 hours versus 153 +/- 115 mg/24 hours, $p = 0.002$), mean preoperative SA dose of somatostatin (1.1 +/- 0.9 mg versus 0.7 +/- 0.5 mg, $p = 0.05$), mean NYHA classification (3.7 +/- 0.5 versus 3.0 +/- 0.8, $p = 0.04$), and mean SBP drop (51 +/- 23mmHg versus 35 +/- 20 mmHg, $p = 0.03$) compared to patients that did not receive epinephrine. Otherwise there were no significant differences detected between patients that did or did not receive particular vasoactive medications.

Discussion: This is the first comprehensive review of the anesthetic management of a large group of patients undergoing cardiac surgery for carcinoid heart disease. Our study shows that patients with active carcinoid disease (high 5-HIAA levels) can be expected to have labile hemodynamics as evidenced by the larger drop in SBP with induction of anesthesia compared to patients with less active carcinoid disease. The finding that intraoperative somatostatin dosage was greater in patients taking the LA preparation preoperatively was surprising. It would be expected that patients on LA somatostatin would be more stable and require less somatostatin intraoperatively. An analysis of the relationship between the last dose of LA somatostatin and the timing of surgery may yield further information about the influence of LA somatostatin on intraoperative hemodynamic stability and outcome. Intraoperative use of somatostatin did not correlate with other markers of disease severity. Most patients received intraoperative vasoactive medications. In contrast to what has been published regarding the relative contraindication of vasoactive medications in carcinoid patients, we did not see deleterious effects from the use of these medications. Although definitive conclusions are difficult due to the small sample-size, the lack of deleterious effects is noteworthy given that the group of patients that had the highest 5-HIAA levels, worst NYHA classification, the highest preoperative somatostatin use, and largest drop in systolic blood pressure were more likely to require epinephrine.