Author's response to reviews

Title: Preoperative levels of Hemoglobin and B-Type Natriuretic Peptide are associated with postoperative morbidity in heart surgery

Authors:

   Edgar - Hernandez (ehernandezl@cardioinfantil.org)
   Rodolfo José Dennis (rdennis@cardioinfantil.org)
   Daniel - Isaza (disaza@cardioinfantil.org)
   Juan Pablo Umaña (jpumana@cardioinfantil.org)

Version: 2 Date: 30 April 2013

Author's response to reviews:

Journal Editorial Office
JOURNAL OF CARDIOTHORACIC SURGERY

Dear Sirs,

I submit for your consideration the results of the research study: Hemoglobin and B-type Natriuretic Peptide preoperative values, but not inflammatory markers, are associated with postoperative morbidity in cardiac surgery: A prospective cohort analytic study, for publication in JOURNAL OF CARDIOTHORACIC SURGERY

This study evaluated the association of several preoperative biomarkers with early and late postoperative outcomes in a cohort of 554 patients undergoing cardiac surgery. Unlike most prior studies a prospective design was used, adjusting for known covariables. Patients were followed for 1 year with 1.6% losses to follow-up (9/554). Inpatient outcomes were recorded in 100% of the sample.

The results defined important risk factors that could contribute to the stratification of patients undergoing cardiac surgery. Our data show that high levels of type B natriuretic peptide (BNP) are significantly and independently associated with several adverse postoperative outcomes, especially atrial fibrillation, low cardiac output and rehospitalization within the first year. An outcome which has not been previously described in the literature is the significant interaction found between elevated preoperative BNP levels and the presence of diabetes mellitus; a combination which considerably increases postoperative risk.

The covariables which can impact postoperative outcomes were included in the analysis, and the fact that the majority of the patients lived at an elevation higher than 2,600 m above sea level was taken into consideration in the evaluation of basal hemoglobin (Hgb) levels (this variable was also incorporated in the multivariate analysis). The study results showed that low Hgb levels are independently associated with low postoperative cardiac output and that there is
a significant association between low preoperative Hgb levels and several important postoperative outcomes: length of hospital and intensive care unit stay, and number of red blood cell units transfused. Given the growing interest in avoiding blood transfusions, this information is useful, as it shows that the need for perioperative red blood cell transfusion is directly related to the preoperative Hgb level, even without anemia. Subjects with a Hgb level < 13.2 required an average transfusion of 3.1 red blood cell units, while in those with a Hgb > 15.2 that number was reduced to 0.7. These findings open the door for designing randomized studies to evaluate if optimization of preoperative Hgb levels through the use of recombinant erithropoietin and/or iron therapy, or another type of pharmacologic intervention, would permit a reduction in perioperative transfusions and the incidence of adverse events. Similarly, the identification of elevated preoperative BNP levels, especially in diabetic subjects, would allow the identification of a subgroup at high risk for complications, and could indicate the need to delay surgery and intensify pharmacologic therapy in order to better compensate the patient’s hemodynamic condition.

Our group has continued this research line in order to determine if BNP or Hgb measurements supply additional prognostic information to the existing methods, in terms of improving the prediction of adverse postoperative outcomes. The incorporation of these variables in risk stratification outlines could reduce morbidity and mortality including hospital stay and cost of care.

At the request of the editorial office, the results could be presented without some of the attached tables or graphs.

Edgar Hernandez-Leiva MD MSc