Title : PULMONARY ARTERY MONITORING DURING CARDIAC SURGERY

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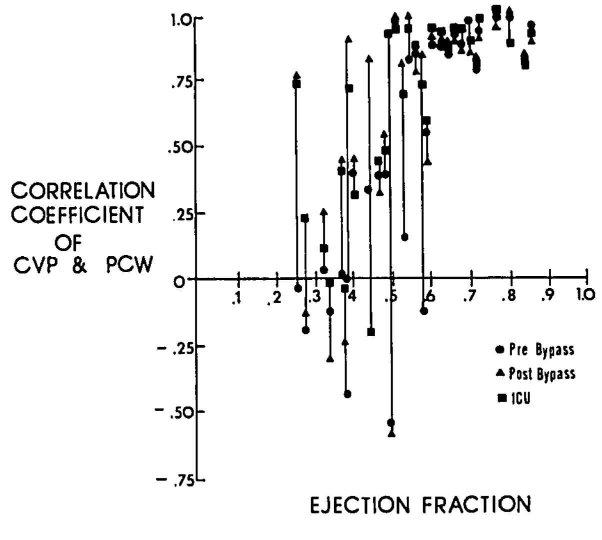
Introduction: Most studies of the relationship between central venous pressure (CVP) and pulmonary capillary wedge pressure (PCW) have concluded that the CVP is an unreliable estimate of the PCW. However, these analyses focused on the biologic variability between CVP and PCW across patient populations and failed to examine the relationship between CVP and PCW in individual patients over prolonged periods of time, during stress, or during varying degrees of hemodynamic change. One recent study[1] of individual patients without significant myocardial depression did find the CVP to be a reliable indicator of PCW. In the present study, we examined the relationship between CVP and PCW over a 36 hour perioperative period in patients with and without significant myocardial depression undergoing myocardial revascularization.

Methods: Thirty patients with a history of myocardial infarction (1-12 months prior to admission) and intractable angina were studied (with approval by the Human Research Committee, UCSF). No patient had valvular disease or significant pulmonary disease. Five had left ventricular failure. Preoperative ejection fractions (EF) ranged from .26 to .84. Eight patients displayed left ventricular dyssynergy. A triple lumen thermodilution catheter, placed before induction of anesthesia, permitted simultaneous measurements of right atrial and pulmonary artery pressures via transducers referenced 5 cm posterior to the sternal angle. Anesthesia consisted of morphine sulfate (1.5 to 3 mg/kg I.V.), and diazepam (.25 to .50 mg/kg I.V.). Pancuronium (.05 to .15 mg/kg I.V.) provided muscle relaxation, and ventilation was controlled. Prior to induction of anesthesia, simultaneous measurement of the end-expiratory CVP and PCW were made at three levels of CVP and PCW obtained by altering body position from horizontal to 30 degrees Trendelenburg to 30 degrees reverse-Trendelenburg. These measurements were repeated before incision, sternotomy, and pericardotomy; at five minutes and one hour post-bypass; and at one, four, eight, and 24 hours post-surgery. Thus, 30 simultaneous measurements per patient were made during the twenty-four hour perioperative period.

Results: For each patient we obtained separate correlation coefficients for the CVP and PCW relationship for the pre-bypass, post-bypass, and post-surgery (ICU) periods (Figure). In the fifteen patients who had ejection fractions greater than .50 and who did not have dyssynergy, PCW and CVP were highly correlated (average correlation coefficient = .89) over the entire perioperative period. The fifteen patients with ejection fractions ranging from .26 to .40 or with dyssynergy demonstrated a poor correlation prior to bypass. In nine of these patients, the correlation remained poor over the post-bypass and ICU periods. However, in the remaining six patients, improvements in correlation occurred following bypass or surgery. Examination of right and left ventricular function curves revealed that these improvements corresponded with the onset of biventricular failure.

Discussion: CVP monitoring may be sufficient and PCW monitoring unnecessary in patients with reasonable myocardial function (EF>.50, no dyssynergy). In contrast, PCW monitoring would appear to be important and CVP monitoring of little value in patients with significant left ventricular dysfunction.



References:
1. Mangano DT: Perioperative correlation of central venous pressure and pulmonary artery occluded pressure in patients undergoing coronary artery surgery. ASA Abstracts: 575-576, 1978.