TITLE: IS DOBUTAMINE LESS CHRONOTROPIC THAN EPINEPHRINE AFTER CORONARY BYPASS SURGERY?

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Introduction. Standard pharmacology (1) and anesthesia (2) textbooks, and numerous review articles (3) claim that dobutamine is superior to epinephrine because it causes less tachycardia for a given degree of cardiac stimulation. Despite this apparent uniformity of opinion, there are few data to support it. We compared the actions of standard doses of epinephrine (E) and dobutamine (D) in patients recovering from coronary surgery.

Materials and Methods. After IRB approval, 44 patients with preoperative left ventricular (LV) ejection fractions >0.45 gave informed consent to participate in our study. Patients were studied on the day following their surgery, after tracheal extubation, when all vasoactive infusions had been discontinued. Standard hemodynamic monitoring was employed. Either D (n=16) (2.5 & 5 mcg/kg/min) or E (n=28) (10 & 30 ng/kg/min) were infused. Every patient received 2 doses (Low & High) for 8 min each of either E or D. Data are reported as means + SEM. Statistical analysis included repeated measures ANOVA, Scheffé's test, and unpaired t test.

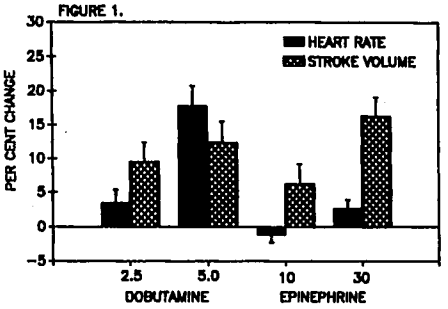
Results. Both drugs significantly (p<.01) increased heart rate, stroke volume (SV), and cardiac index (Fig.1). High dose D raised heart rate significantly (p<.01) more than high dose E, despite producing a comparable (but smaller) increase in SV.

Discussion. These data, collected in stable patients with good (preoperative) LV function, may not apply to other categories of patients (e.g., unstable patients). However, a previous study (4) has reported similar findings using higher epinephrine doses. In any case, our data contradict the contention that D produces less tachycardia than E in coronary surgery patients.

References.

1. *Goodman and Gilman's Pharmacological Basis of Therapeutics*, ch 8, pp 14-180, 1988
2. *Introduction to Anesthesia*, 1988, p 400.
3. J Card Surg 2:385, 1987
4. Thorac Cardiovasc Surgeon 27:378, 1979

FIGURE 1.



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TITLE: CARDIAC OUTPUT DETERMINATION: TRANSESOPHAGEAL ECHOCARDIOGRAPHY VERSUS THERMODILUTION

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Two dimensional imaging of the main pulmonary artery with transesophageal echocardiography (TEE) allows measurement of pulmonary artery diameter. TEE in the pulsed Doppler mode provides analysis of pulmonary artery blood velocity. The product of these measurements and heart rate allow for the determination of pulmonary artery blood flow, which is equivalent to cardiac output. The purpose of this study was to evaluate the feasibility of Doppler derived cardiac output and compare its precision with that of thermodilution cardiac output.

With approval of our Investigational Review Board, 29 cardiac surgical patients monitored with a pulmonary artery catheter and TEE (Hewlett-Packard Sonos 1000) were studied prospectively. Patients with an irregular cardiac rhythm or evidence of tricuspid or pulmonic valve regurgitation were excluded. The TEE probe was positioned to image the main pulmonary artery (PA) at the level of the aortic root. Maximum diameter of the PA was measured during systole at end-expiration. Pulse Doppler was used to identify the locus of maximal Doppler shift and laminar blood flow in the main PA and the local blood velocity profile was recorded on VHS tape. The PA blood velocity profiles (cm/sec) for three cardiac beats were integrated with respect to time. Doppler derived cardiac output (DCO) was calculated as the product of the integral velocity (cm/beat), heart rate (beats/min), and cross-sectional area (cm^2) of the main pulmonary artery. Simultaneously, three serial determinations of thermodilution cardiac output (TdCO) were made by an independent observer.

Pulmonary blood flow could be measured in 22 of the 29 patients. The anatomic relationship between the esophagus, the left main stem bronchus and the PA did not allow adequate imaging of the PA in 7 (24%) of the patients. A total of 40 sets of measurements were made. By linear regression analysis, the relationship between the two methods of determining cardiac output was found to be:

$$DCO = (1.076 \times TdCO) - 0.276 \quad (r = 0.92) \quad \text{(Figure).}$$

The standard error of prediction was $\pm$ 0.490 L/min. The coefficient of variation among the triplicate measurements for DCO was 3.7% and for TdCO was 6.7% (p<0.001).

These data suggest that in a majority of patients, cardiac output can be determined by TEE pulsed Doppler analysis of pulmonary artery blood flow with better repeatability than by thermodilution.