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Title : THE HEMODYNAMIC EFFECTS OF DOPAMINE AND DOBUTAMINE

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Introduction. Dopamine (DOP) and dobutamine (DUB) are effective inotropic agents, however direct comparisons between these agents in man remain limited. The present study compares the hemodynamic effects of DOP and DOB in patients who have undergone open cardiac operations, and analyzes optimum utilization of these agents.

Methods and Materials. Informed consent was obtained from 12 patients scheduled for open cardiac operations. Consent procedures and study techniques conformed to appropriate ethical standards and had institutional approval. Hemodynamics values were measured (and calculated) using standard techniques within 24 hrs of surgery after patients were completely rewarmed and stabilized. Cardiac output was measured in duplicate by indocyanine green. Pulmonary capillary wedge pressure by Swan-Ganz catheter. DOP and DOB were each studied at three dose levels, 2.5, 5.0 and 7.5 µg/kg/min. The order of drug administration was alternated, and 25 minutes were allowed for equilibration before hemodynamic measurements were performed. Data were evaluated by paired t-test.

Results. Both drugs caused a progressive, significant rise in cardiac index (CI) as the infusion rate was increased from 2.5 to 5.0 µg/kg/min ($p<0.01$), the increases in CI observed from 5.0 to 7.5 µg/kg/min were of borderline significance ($p<0.05$). DOP also caused a progressive rise in left ventricular stroke work index (LVSWI), significant with each increment in infusion rate. By contrast, DOB caused a moderate rise in LVSWI, significant only from 2.5 to 5.0 µg/kg/min. DOP administration also caused a progressive, significant, rise in mean arterial pressure, which was accompanied by small, not significant, increases in pulmonary capillary wedge pressure and systemic and pulmonic vascular resistance indices. With DOB arterial pressure remained unchanged, while wedge pressure and resistance indices fell slightly.

Discussion. Both drugs increased cardiac index to a similar extent, however the decline in systemic resistance with DOB, although not statistically significant, was sufficient to allow the improvement in cardiac index to occur without an increase in MAP, and with a decline in pulmonary capillary wedge pressure. With DOP a slight increase in resistance occurred, and the increase in cardiac index was accompanied by an elevation in pulmonary capillary wedge pressure and an increase in average arterial pressure to over 100 torr. It is clear from our data that optimum utilization of the increase in LVSWI achieved with DOP requires concurrent utilization of a readily controllable vasodilator, such as sodium nitroprusside, to avoid the undesirable increases in preload and afterload observed, and to maximize the increase in cardiac index. These data suggest that DOP is the superior inotropic agent for patients with left ventricular dysfunction following cardiac surgery, or in whom hypotension accompanies ventricular dysfunction. In individual patients, particularly those with an underlying cardiomyopathy, DOB is the drug of choice.

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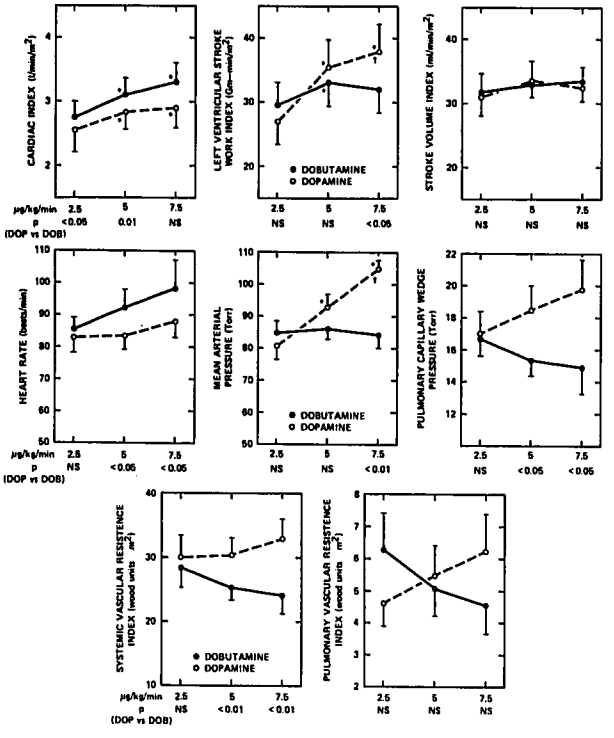
Figure Legend. Data are plotted as mean values ± SEM. The symbols * and † indicate a difference in the variable from that obtained on the same drug at 2.5 and 5.0 µg/kg/min, respectively. The probability figures below the approximate infusion rates represent the comparison between dopamine and dobutamine at that infusion rate. p values below 0.01 are considered significant, while $0.01<p<0.05$ represents borderline significance.






Reference. 1. Steen PA, Tinker JH, Pluth JR et al: Efficacy of dopamine, dobutamine, and epinephrine during emergence from cardiopulmonary bypass in man. Circulation 57:378-384, 1978