Title : DISSOCIATION BETWEEN CORONARY BYPASS GRAFT FLOW AND REGIONAL MYOCARDIAL CONTRACTION DURING DOBUTAMINE AFTER CARDIAC SURGERY

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INTRODUCTION : Shortly after coronary bypass surgery, an adequate adaptative response of coronary bypass graft flow (CBGF) has been observed in response to myocardial oxygen demand variations induced by dobutamine infusion[1]. Therefore an increase in myocardial contraction can be expected. This study was designed to test this hypothesis.

MATERIAL AND METHODS : 13 patients (53 ± 12 SD yrs) were studied after their written informed consent and the approval of the local Ethical Committee. All of them had an angiographically proven proximal left anterior descending (LAD) coronary artery stenosis (> 85%) and pre-operative ejection fraction over 45 %. Anesthesia (high dose fentanyl), cardio pulmonary bypass management (partial hemodilution, moderate hypothermia, cardioplegic arrest) and LAD bypass (internal mammary artery) were similar for all patients.
The following parameters were measured or calculated:

- **Coronary bypass parameters** :an implantable flow probe was sutured on the adventitia of the graft at the end of the surgical procedure : the probe was connected to a 8 MHz pulsed Doppler, which permits to measure vessel diameter (D) and mean cross sectionnal blood velocity (Vm) ; CBGF was calculated as : $CBGF = \pi D^2/4 \times 60 \times Vm^2$.

- **Regional myocardial contraction parameters**[3] : a single epicardial transducer connected to a 10 MHz pulsed Doppler was sutured on the left ventricular wall in the LAD reperfused territory. Wall thickening was evaluated by electronic integration of the velocity of myocardial layers moving through the sample volume located at a selected depth : thickening fraction (TF) was calculated by dividing the systolic excursion by the sample volume depth.

- **Hemodynamic parameters** : systolic (SAP), diastolic (DAP) and mean (MAP) arterial pressures via a radial catheter, cardiac output (CO, thermodilution), pulmonary wedge pressure (PWP, Swan-Ganz catheter), heart rate (HR, EKG), stroke volume (SV), systemic vascular resistances (SVR) and rate pressure product (RPP = SAP x HR) as an index of myocardial oxygen consumption.

Protocol : The patients were studied in normothermic, normocapnic and normoxic conditions, in stable hemodynamic status, without any drug support. Measurements were performed 6 hours after surgery, before (C) and 30 mn after infusion of 3 successive doses (3, 6, 9 mcg/kg/mn) of dobutamine (central venous catheter).

Statistical study was performed using a two way analysis of variance followed by a Newman-Keuls test.

RESULTS : are expressed as means ± SD.

	C	3	6	9
HR bpm	80±11	85±12#	89±13*	96±15*
CO l/mn	5.6±1.1	6.1±1.4#	6.8±1.6*	7.5±1.6*
CBGF ml/mn	51±35	57±35	63±38#	72±37*
TF %	19.9±9.2	21±9.8	21.6±10	21.4±11
SAP mmHg	121±33	127±35	134±37#	137±33#
DAP mmHg	59±10	60±11	60±10	60±10
MAP mmHg	80±17	83±19	85±19	86±17#
PWP mmHg	13±3	13±2	13±2	12±3
SV ml	71±17	73±17	77±18#	79±15*
SVR IU	13±5	12±6	11±5#	11±4*
RPP 10^3IU	10±2	11±3	13±4*	13±5*

: $p < .01$ Vs C ; * : $p < .001$ Vs C

Morover, TF appeared to be correlated negatively to SAP ($r = -.43$, $p < .01$), and positively to SV ($r = .66$, $p < .001$).

DISCUSSION : This study confirms that CBGF and CO increased simultaneously and this, in a dose-dependent manner during dobutamine infusion. The coronary effect is concomittant to the increase in myocardial oxygen consumption as reflected by the RPP elevation. Surprisingly, the regional myocardial contraction in the reperfused territory was not significantly increased but only maintained. A left ventricular wall stress increase induced by the SAP elevation could account for such an effect, reflected by the negative correlation between TF and SAP.

REFERENCES :
1. Beloucif et al: Anesthesiology, 67 : A40, 1987.
2. Payen et al : Circulation 74, III, 61, 1986.
3. Hartley : Am J Physiol 251, H1045, 1986.