TITLE: THE INFLUENCE OF DOBUTAMINE ON THE RELATIONSHIP BETWEEN O2 DELIVERY (DO2) AND O2 CONSUMPTION (VO2) DURING ANESTHESIA AND HEMODILUTION.

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Hemodilution and anesthesia reduce the DO2 and the VO2. In the event of an unexpected stressful situation (septic shock, respiratory distress syndrom, heart insufficiency), may the prescription of dobutamine modify the VO2-DO2 relationship and in what way ?

To answer this question an intraoperative normovolemic acute hemodilution was carried out on 19 anesthetised, paralysed, ventilated patients who were to undergo aortic surgery (informed consent and approval by the ethic committee of Pellegrin Hosp., Bordeaux, France).

Eleven of these patients were submitted to dobutamine tests before and after hemodilution (doses of 3 to 6 µg.kg-1.min-1 in order to increase CI by 30 %). The other 8 patients acted as controls. All 19 patients underwent a series of measurements on MAP, MPAP, PcwP, CI, HR, T°. Hemodynamic measures were coupled with arterial and venous blood withdrawals for O2 Sat, O2 content, O2 capacity, lactic acid and Hte. The calculation of the VO2 and DO2 were corrected by the Moreno Statistical Method in order to limit any effect on common variables by errors. The 8 controls had measurements (1 before anesthesia, 1, 10 min. after anesthesia and twice during hemodilution). The 11 patients underwent dobutamine tests (1 before anesthesia, 1, 10 min. after anesthesia, 1 dobutamine test before and after hemodilution and twice during hemodilution). The blood volume withdrawn was 12 ml.kg-1 over 30 min. Volume substitution was composed of 4 % albumin.

The results are presented as the mean ± SD and the means are compared using a Student (t) test and an Anova (one way, repeated measures associated with Scheffe F-test). A p value < 0.05 is considered statistically significant. The results are summarised in table 1 (1).

Dobutamine test was accompanied by a moderate increase of the heart rate, associated with a rise of MAP and CI (2). On the other hand, hemodilution induced a decrease of CI with a consequent drop in DO2. This state was associated with a decrease of VO2 and a moderate increase of O2 Ext. Dobutamine made the DO2 increase considerably. The DO2 was associated with a moderate rise of the VO2 (before and after hemodilution) and a moderate decrease of O2 Ext.

There seemed to be a state of VO2-DO2 independance in which hemodilution did not interfere. This signifies that in certain pathologic states such as heart insufficiency, hemodiluted patients may be treated by dobutamine without any negative effects on the cellular metabolisms because dobutamine increases the DO2 without seriously modifying the VO2 (2).

References
1. Crit Care Med 14 : 1032-1037, 1986.
2. Chest 94 : 7F, 1988.

Table 1

	Before Indu.	Ind. + 10 min	Dobu.	Dobu. Stop	Half Hemo.	End Hemo.	Dobu+Hemo
HR H	64 ± 06	60 ± 09			60 ± 13	59 ± 11	
Hd	75 ±15 *	*67 ±11 *	*75 ± 16 *	* 68 ±11	62 ±12	59 ± 10	74 ± 18
MAP H	93 ±14 *	*68 ±11			•• 68 ±20	•• 74 ± 13	
Hd	99 ±17 *	*64 ±14 *	* 93 ±21 *	* 70 ±18	54 ±10 *	*61 ±11	93 ± 17
CI H	3.2 ± .8 *	*2.5 ± .6			2.0 ± .4	2.5 ± .5	
Hd	3.2 ± .8 *	*2.4 ± .5 *	*3.4 ± .8 *	*2.6 ± 0.5	1.9 ± .8 *	*2.4 ± .7	3.6 ± .7
VO2 H	127 ±38 *	*87 ±20			81 ±14	92 ±25	
Hd	120 ±31 *	*91 ±17	100 ±18 *	* 89 ±14	72 ±12	93 ± 18	109 ±28
DO2 H	536 ± 158 *	•• *414±113	* *		310±88	345±108	
Hd	605 ± 140 *	*456±130 *	*634±162 *	*454±102 *	*306±80	349±85 *	*541±129
O2 Ext. H	. 24 ± . 07	. 22 ± . 05			. 27 ± . 05	. 28 ± . 06	
Hd	. 20 ± . 04	. 21 ± . 05	.17 ± . 04	.21 ± . 05	. 25 ± . 06	. 27 ± . 06	. 21 ± . 06
Lact. Ac H	2.9 ± 1.1	3.2 ± 1.2			3.2 ± 1.4	3.2 ± 1.4	
Hd	2.7 ± 1.1	3.4 ± 1.2	3.1 ± 1.0	3.0 ± 0.8	2.9 ± 0.9	3.0 ± 0.9	2.8 ± 1.0

H : hemodilution group
Hd: hemodilution and dobutamine group
•• beween groups p <.05 (Student t test)
* * within groups p <.05 (Anova)

TITLE: INDICATIONS FOR THE USE OF PACING PULMONARY ARTERY CATHETERS

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Several pulmonary artery catheters (PACs) with pacing capabilities (PACs-PC) are now available.[1,2,3] To clarify specific indications for the use of pacing prior to cardiopulmonary bypass (CPB), we prospectively examined our use of PACs-PC in cardiac surgical patients.

In 600 consecutive adult patients with PACs placed prior to CPB, the attending anesthesiologist recorded if a PAC-PC was placed, the indications for placing the catheter and whether the PAC was used to pace. If a PAC-PC was not chosen, the anesthesiologist indicated at the end of the case whether a PAC-PC should have been used. In all patients, the presence and specifics of the following five possible indications were documented: (1) sinus node dysfunction, (2) heart block, (3) fasicular or bundle branch block, (4) redo cardiac operation, (5) valvular heart disease.

PACs-PC were placed in 180 of the 600 patients (30.0%), and used in 34 patients (5.7%). In 4 of 420 patients (0.95%) without PACs-PC, the anesthesiologist would have prefered to have a PAC-PC prior to CPB. Sinus node dysfunction was an indication for a PAC-PC in 20 patients, and the catheter was used to pace in 5 patients (25.0%). In 1 of 52 patients (2.0%) with 1° AV block a PAC-PC was used. A PAC-PC was used in 2 of 11 patients (18.0%) with 3° AV block and a functioning permanent pacer in place, and 3 of 4 patients with a history of 3° AV block but no pacer present. Pacing was used pre-CPB in 4 of 41 patients (10.2%) with left bundle branch block (LBBB), but none of these patients developed complete heart block. Pacing was not used pre-CPB in any patients with right bundle branch block (RBBB) (n=27) or patients with RBBB and left anterior hemiblock (n=5). A PAC-PC was used in 13 of 112 patients (11.6%) undergoing redo cardiac surgery. In patients undergoing redo coronary artery bypass surgery (CABG) without other indications present, a PAC-PC was used in 1 of 56 (1.8%). The use of PACs-PC in patients with valvular disease was as follows: aortic stenosis - 11 of 88 (12.5%), mitral regurgitation - 7 of 65 (10.8%), aortic insufficiency - 8 of 40 (20.0%), mitral stenosis - 1 of 17 (5.9%).

Only 5.7% of adult patients undergoing cardiac surgery required the use of a pacing PAC prior to CPB. However, a PAC-PC should be strongly considered in patients undergoing cardiac surgery with sinus node dysfunction, 3° AV block, LBBB, aortic insufficiency, and/or reoperation.

References:
1. Ann Thorac Surg 35:633-636, 1983
2. J Cardiothorac Anesth 2(3):303-308, 1988
3. J Cardiothorac Anesth 3(2):154-162, 1989