POSTER SESSION XIII

A105

TITLE: THE EFFECT OF FLUID LOADING ON RIGHT VENTRICULAR FUNCTION AND HEMODYNAMIC STATE WITH AORTIC UNCLAMPING DURING ABDOMINAL AORTIC SURGERY

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Aortic unclamping during abdominal aortic surgery may cause adverse hemodynamic conditions such as severe hypotension. We investigated not only right ventricular function with aortic unclamping but also whether fluid loading prior to aortic unclamping, estimated by right ventricular end-diastolic volume (RVEDV) may have a favorable hemodynamic effect after aortic unclamping during abdominal aortic surgery.

Method. This study was approved by the institutional review board. Twelve patients undergoing abdominal aortic surgery were studied. Under local anesthesia, a thermodilution ejection fraction/volumetric catheter was inserted. Anesthesia was maintained with 0.5-1% isoflurane, sufentanil and air/O_2 (FiO_2=0.5). Patients were ventilated with 10 ml/kg of tidal volume with $PaCO_2$ in the range of 35-45 mmHg. Fluid loading with Ringer's Lactate and 5% albumin was initiated 10 to 20 minutes before aortic unclamping. Cardiac output (CO) and right ventricular function (RVF) were assessed with a rapid thermodilution method using an ejection fraction/volumetric pulmonary catheter and REF-1 computer. Hemodynamic measurements were performed 5-10 minutes before and after aortic unclamping. Data were analyzed with paired t-test and $p<0.01$ was considered statistically significant.

Results. Aortic unclamping decreased RVEDV and RVESV (right ventricular end-diastolic and end-systolic volume) but increased RVEF (ejection fraction) ($p<0.01$). There were no significant changes in CVP, PAD, CI (cardiac index), SV (stroke volume) and SVR (systemic vascular resistance).

Discussion. We demonstrated that adequate fluid loading before aortic unclamping estimated by RVEDV, provided stable hemodynamic states (CI, SV and RVEF) following aortic unclamping. Volume expansion following fluid loading can be assessed by RVEDV. CVP was a poor indicator of volume status. This modified EF volumetric catheter can be a useful aid to evaluate volume status during abdominal aortic surgery.

Table 1. RVF and hemodynamics data

	HR	CI	RVEF	RVEDV	RVESV	SV	PAD	CVP
before unclamp	77 ± 11	3.5 ± 1.2	42 ± 9.2	195 ± 71	113 ± 44	82 ± 38	16 ± 3.3	13 ± 3.2
10 min after unclamp	77 ± 7.9	3.3 ± 0.7	48* ± 5.5	157* ± 57	83* ± 31	76 ± 27	16 ± 3.0	12 ± 2.5
30 min after unclamp	79 ± 10	3.2 ± 0.9	46 ± 5.1	158* ± 58	86' ± 32	74 ± 26	16 ± 4.5	11 ± 2.3

* = p <0.01 ' = p <0.05 mean ± SD

Reference.
1. Intensive Care Med 12:33, 1986

A106

TITLE: EVALUATION OF THE EFFECTS OF PREOPERATIVE NORMOVOLEMIC HEMODILUTION BY TEE IN CORONARY ARTERY DISEASE PATIENTS

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Abdominal aortic surgery (AAS) is associated with a high frequency of myocardial ischemia in CAD patients (1). Preoperative normovolemic hemodilution (PNH) has been shown to be safe in CAD patients (2). The aim of this study was to evaluate the effect of PNH on perioperative myocardial ischemia in CAD patients scheduled for AAS.

After ethical committee approval and informed consent, 20 patients were included in the study and randomized to either PNH or no PNH (control group). CAD was established by a history of angina pectoris, documented prior MI, ischemic ST segments or Q waves on ECG, or a fixed or reversable defect on thallium 201 angioscintigraphy. Patients were monitored with CM5 lead ECG, and radial and pulmonary arterial catheters. All patients received the same anesthetic : Induction with flunitrazepam (0.05mg/kg) and alfentanil (30mcg/kg), intubation and muscle relaxation with vecuronium, and maintenance with 50% N_2O in O_2 plus alfentanil infusion. PNH was performed after anesthetic induction using Dextran 40000 (Hemodex®). Intraoperative myocardial ischemia was detected by segmental wall motion abnormalities on transesophageal echocardiography (TEE) using the short axis view. Systolic wall motion (SWM) was graded as follows : normal = 1 ; mild hypokinesia = 2 ; severe hypokinesia = 3 ; akinesia = 4 ; dyskinesia = 5 (3). Criteria for ischemia were either a two grades increase or an increase from 4 to 5 in SWM score. Hemodynamic and TEE data were recorded after anesthetic induction (baseline), before and 5 min. after aortic clamping, 5 min. after aortic unclamping, and at the end of surgery in both groups, as well as 5 min. after hemodilution in PNH group. ANOVA and Fisher test were used to compare intra and inter group quantitative data, and the Fisher exact test for incidence of ischemia.

The mean intraoperative hematocrit was maintained at ≤ to 30% in the PNH group, and ≥ to 37% in the control group. Hematologic and hemodynamic data are presented in Table 1. Five SWM changes indicative of myocardial ischemia were found in the control group and one in the PNH group ($p= 0.14$).

In conclusion, preoperative normovolemic hemodilution does not worsen hemodynamics nor myocardial ischemia in CAD patients undergoing abdominal aortic surgery.

References
(1) Anesthesiology 70:19-25, 1989
(2) Ann. Fr.Anesth.reanim 5: 218-222, 1986
(3)Am. J. Cardiol.57:1232-5,1986

Table 1 : Hemodynamic data in PNH and control groups

(mean±SD)		HR bt.min-1	MAP mmHg	PCWP mmHg	CI l/min/m2
Baseline	PNH	55±8	76±12	10±4	2.2±0.5
	C	50±8	80±15	13±7	2.4±0.9
Hemodilution	PNH	57±10	76±10	12±3	2.7±0.8
XCl	PNH	60±16	85±36	13±3	2.4±1.8
	C	53±10	95*±14	12±4	1.8*±0.3
UXCl	PNH	60±17	83±14	12±5	2.5±0.5
	C	57±13	87±14	11±3	2.6*±0.9
End Surg	PNH	62±15	86±91	12±4	2.8±0.4
	C	60±12	91±10	12±4	2.5*±0.6

* < 0.05 compared to baseline