TITLE: LOW-DOSE THORACIC EPIDURAL ANESTHESIA(TEA) INDUCES DISCRETE THORACIC ANALGESIA WITHOUT REDUCTION IN CARDIAC OUTPUT(CO)

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TEA may favorably alter the oxygen supply/demand ratio within ischemic myocardium(1). However, involvement of thoracic segments (T1-5) by TEA will decrease sympathetic outflow to the heart, that may contribute to significant reduction in CO. We closely studied the spread of blockade and cardiovascular(CV) effects of low-dose TEA in preoperative surgical patients.

METHODS: Following informed consent, thirteen patients (aged 67± 8 yrs, weighing 55± 11kg, and 159± 8cm tall) undergoing elective thoracotomy were studied. Patients with known valvular heart deseases were excluded. Epidural catheter was inserted at T4-5 or T5-6 intervertebral space. After careful aspiration 5ml of 0.5% bupivacaine was injected through the catheter. CO was measured by suprasternal Doppler method(Lowrence, L-3000) (2) and also by thermodilution method with Swan-Ganz catheter(SGC) in 6. Measurements were made at 4 stages; I: control, II : 10 min., III : 15 min. after injection and IV : post-endotracheal intubation. Extent of hypesthesia and analgesia was evaluated at stage III. During the study fluid was infused at 6.2± 2.3ml·kg^{-1} · hr^{-1} and no vasopressors were given.

RESULTS: The CO measured by Doppler(X) and thermodilution(Y) method showed a high correlation(r =0.90, Y=0.74X+0.99, p<0.001, N=24). Table 1 summarizes CV parameters in 13 patients and Table 2 the additional data taken with SGC. Cephalad and caudad levels of hypesthesia were C8.4± 2.1 and T7.8± 2.6, and those of analgesia T1.9 ± 2.4 and T5.7± 2.6, respectively.

Table 1 (N=13)

stage	I	II	III	IV
HR	83.3	74.3***	71.5****$$	80.2
(beat/min)	± 16.0	± 14.6	± 12.6	± 14.1
MAP	97.8	91.4*	90.3*$	96.9
(torr)	± 15.2	± 17.5	± 17.0	± 22.0
CI	2.98	3.01	2.96	3.02
(L· min^{-1} · m^{-2})	± 0.68	± 0.72	± 0.78	± 0.74
CVP	3.8	4.7*$$	5.2**	6.0***
(torr)	± 1.4	± 1.6	± 1.9	± 1.8
SVR (dynes·	1760	1600	1600	1650
sec · cm^{-5})	± 560	± 460	± 430	± 420

Table 2 (N=6)

MPAP	13.7	12.8	12.2$	16.8
(torr)	± 2.9	± 2.7	± 0.8	± 3.7
PCWP	7.3	7.8	8.5	10.0
(torr)	± 3.4	± 2.7	± 2.4	± 2.8
LVSWI	49.7	48.5	48.4	43.9
(g· m· m^{-2})	± 13.3	± 6.2	± 10.8	± 16.1
RVSWI	6.0	4.9	4.0	5.7
(g · m · m^{-2})	± 2.9	± 1.6	± 0.7	± 2.8
PVR (dynes·	109	127	95*$	142
sec · cm^{-5})	± 91	± 78	± 63	± 104

*p<0.05, **p<0.01, ***p<0.005, ****p<0.001 (vs I)
$p<0.05, $$p<0.01 (vs IV) Values are mean± SD.

DISCUSSION: Low-dose TEA produced discrete band of hypesthesia and analgesia with significant decrease in heart rate, slight decrease in arterial blood pressure but without any reduction in CO. It also attenuated CV hyperactivity due to endotracheal intubation. Thus, prudentially performed low-dose TEA is safe and can be utilized perioperatively with potential benefits.

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TITLE : SHED MEDIASTINAL BLOOD AND 2,3-DIPHOSPHOGLY -CERATE AFTER CARDIAC SURGERY.

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The autotransfusion of shed mediastinal blood (SMB) is a well known technic for the reduction of bank blood transfusion in cardiac surgery (1). However, the oxygen transport capacity of the SB has not been evaluated. The fall in the red cell 2,3-diphosphoglycerate (2,3-DPG) concentration is closely correleted with the shift to the left of the oxyhemoglobin dissociation curve. The aim of this prospective study was to compare the 2,3-DPG concentrations in SB to the 2,3-DPG concentrations in the circulating blood of the patients (CB) after cardiopulmonary bypass (CPB) for cardiac surger.

Ten consecutive patients undergoing elective cardiac surgery were studied. As usual, the SMB was transfused during the first eight postoperative hours by means of a volumetric pump (Imed). The 2,3-DPG concentration was determined by an enzymatic method (Boehringer Manheim Biochemica) in the SMB and the CB. The blood samples were taken straight from the chest tubes at the first and the fourth postoperative hours (H1 and H4 respectively) and from the arterial catheter after the anesthesic induction yet before the CPB, at H1 and at H4. The values of 2,3-DPG, expressed as mean ± standard deviation, were compared and statistically analyzed by Student's paired t-test (Table).

The concentration of 2,3-DPG was normal before the CPB. It fell significantly at H1 ($p<0.05$) and at H4 ($p<0.01$) in the CB in comparison with the initial value. There was no significant difference between the 2,3 -DPG levels in the CB and in the SMB at H1 and at H4. The drop in the 2,3-DPG concentrations after CPB is a well known phenomenon (2). In this study, this decrease in the CB was 23% at H4. The maximum decrease (34%) in the 2,3-DPG concentrations was observed between the samples of CB before CPB and those of SMB at H4.

A decrease of more than 40% of the 2,3-DPG normal value is necessary to reduce the oxygen delivery(2). So, according to its 2,3-DPG levels, the SMB after CPB can ensure a right oxygen transport.

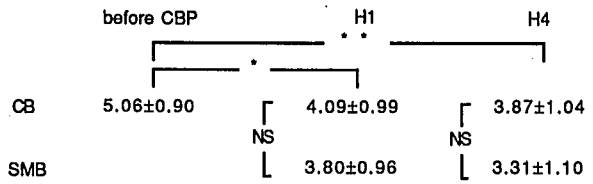

Table: 2,3 DPG (mmol/l erythrocytes ± SD)
* p<0.05, ** p<0.01, NS not significant

References
(1) J.Thorac.Cardiovasc.Surg., 75: 28-30, 1978.
(2) Anesthesia, 32: 544-553, 1977.

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