Title: ANESTHETIC TECHNIQUE AND CARDIOVASCULAR RESPONSES DURING TRANSPORT TO THE INTENSIVE CARE UNIT

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Introduction: Patients with coronary artery disease who require major surgery do not tolerate large increases in heart rate (HR) and mean arterial pressure (MAP) in response to anesthetic or surgical stimulation. During transport to the Intensive Care Unit (ICU), immedately following surgery, these cardiovascular changes may also become significant when inhalation anesthesia is discontinued (1). The purpose of this study was to compare two anesthetic techniques with respect to their ability to blunt this cardiovascular overactivity during and immediately after transport to the ICU.

Methods. Ten patients requiring laparotomy for major vascular reconstruction were studied with informed consent and Institutional Review Board approval. All were premedicated 90 min before surgery with morphine sulfate 0.1 mg/kg and scopolamine 0.4 mg im. Each patient was randomly assigned to one of two groups. Those in Group 1 (n=5) received thiopental (4 mg/kg iv), metubine iodide (2 mg iv), lidocaine (1 mg/kg iv), and succinylcholine (1.5 mg/kg iv) for induction and intubation. Anesthesia and mechanical ventilation were maintained with 50% N_2O/50% O_2, enflurane 0.75-1% and metubine iodide (0.3 mg/kg iv). Thirty min before the end of surgery, the enflurane was discontinued and sufentanil (4 ug/kg iv) was infused slowly until the completion of surgery. Those in Group 2 (n=5) received sufentanil (20 ug/kg iv), diazepam (0.15 mg/kg iv) and metubine iodide (0.3 mg/kg iv) for induction and 100% O_2, sufentanil (1 ug/kg/hr), and metubine iodide for maintenance. In both groups, radial artery and pulmonary artery catheters were inserted for monitoring and transported to the ICU intubated after surgery. The ECG, HR, MAP, PCWP, cardiac index (CI) and core body temperature were recorded: (1) 5 min after insertion of indwelling catheters; (2) 90 min before end of surgery; (3) just before move to litter; (4) after 15 min trip to ICU; (5) after transfer to ICU bed; (6) 60 min in ICU; and (7) 120 min in ICU. Crystalloid solutions and blood were administered in amounts necessary to maintain urine output and keep central venous pressure (CVP) and pulmonary capillary wedge pressure (PCWP) slightly above baseline. Sodium nitroprusside (SNP) was infused as needed to keep the MAP between 70-90 mmHg. Data were compared by analysis of variance and considered significant if $p<0.05$.

Results. The demographic characteristics for both groups were similar. Hemodynamic variables for the two groups are shown in Table 1. Group 1 demonstrated greater fluctuations in MAP, PCWP and CI during the transport period (periods 3, 4, 5) and in the ICU (periods 6 and 7) compared to Group 2 who showed a more stable hemodynamic pattern. For MAP and CI, Group 1 varied significantly ($p<0.3$) than Group 2. No patient in Group 1 required SNP during either transport or in the ICU; but SNP was necessary in 20% of the cases in Group 2. Additional narcotics were required in 60% of the patients in both groups when they reached the ICU. No postoperative ECG ischemic changes were detected in any patient.

Discussion. An effective anesthetic technique for patients with coronary artery disease should prevent hypertension and tachycardia throughout its entire course. Emergence from anesthesia, reaction to an endotracheal tube, pain and shivering make the immediate postoperative period difficult. During transport to the ICU and for the few hours thereafter, the high dose narcotic technique used in Group 2 provided more stable cardiovascular conditions than that used in Group 1. It appears that a continuous, uninterrupted level of anesthesia achieves a smoother transition from the operating room to ICU.

Reference.

1. Insel J, Weissman C, Kemper M, et al: Cardiovascular changes during transport of critically ill and postoperative patients. Crit Care Med 14:539-41, 1986

Table 1. Cardiovascular Response during Surgery, Transport and ICU (Mean ± SD)

Period	MAP (mmHg)	HR (b/min)	PCWP (mmHg)	CI (L/min/m^2)
1. Group 1	100	70	19.0	3.0
SD ±	23	10	7.0	0.4
Group 2	101	80	14.0	3.0
SD ±	20	12	8.0	0.8
2. Group 1	87	88	11.0	3.0
SD ±	16	14	5.0	0.3
Group 2	83	68	14.0	2.0
SD ±	10	16	3.0	0.1
3. Group 1	70	70 (a)	6.0	3.0
SD ±	9	10	3.0	0.5
Group 2	78	80	12.0	3.0
SD ±	11	12	4.0	1.0
4. Group 1	100	70		
SD ±	21	13		
Group 2	70	75		
SD ±	20	10		
5. Group 1	90	70		
SD ±	22	14		
Group 2	70	75		
SD ±	20	10		
6. Group 1	96 (b)	83	13.0	4.0 (c)
SD ±	34	10	5.0	0.4
Group 2	84	82	11.0	3.0
SD ±	12	13	8.0	0.7
7. Group 1	99 (b)	80	10.0	4.0 (c)
SD ±	16	17	7.0	0.3
Group 2	80	80	8.0	2.0
SD ±	7	11	6.0	0.5

Significantly different than (p .05)
a. period 2; b. period 3;c. significantly different (p .05) than Group 2.