

Title: RESPONSE OF LEFT VENTRICULAR EJECTION FRACTION TO RECOVERY FROM GENERAL ANESTHESIA USING GATED RADIONUCLIDE ANGIOGRAPHY

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Introduction: The increased cardiac work which characterizes the recovery from narcotic-N₂O anesthesia is well documented (1). However its effects on left ventricular function are unknown in coronary artery disease (CAD).

The purpose of this study is to test the hypothesis that after anesthesia for non cardiac surgical procedures, recovery induces wall motion and ejection fraction (EF) abnormalities in patients suffering from mild angina pectoris, using gated radionuclide angiography (GRA). In addition, we have studied the effects of prophylactic nitroglycerin (NTG) on myocardial function during recovery.

Methods: Global and regional left ventricular function was studied using GRA on recovery in patients who underwent simple cholecystectomy lasting between 2 and 3 hours (with informed consent and approval by our ethical committee).

In the first part of the study, 21 patients (aged between 45 and 75) divided into 2 groups were studied. Group I included 8 consecutive patients without history or preoperative ECG abnormalities suggesting CAD. Group II included 13 consecutive patients with mild angina pectoris. Patients with hypertension, antecedents of anterior or lateral myocardial infarction, disabling angina or treatment by drugs other than short-acting B-blockers were excluded. Three patients (Group II) were treated with small doses of B-blockers which were withheld the evening prior surgery and resumed 48 hours later.

In the second part of the study, 14 consecutive patients with mild angina pectoris were randomly assigned to NTG group (Group III) or placebo (Group IV). Patients in Group III received an i.v. infusion of 0.4 mcg/kg⁻¹/min⁻¹ of NTG, started before induction and progressively stopped 4 hours after extubation, while Group IV received the placebo in the same conditions.

Anesthesia was induced in all patients by fentanyl (3 µg/kg⁻¹), increments of thiopentone and pancuronium. Ventilation was controlled throughout anesthesia with 60% N₂O-O₂. Patients received further fentanyl or pancuronium when warranted. Temperature of the operative room was maintained between 18 and 20°C. A long-term ECG recording was used in all patients to detect myocardial ischemia.

Radionuclide ventriculography: following i.v. injection of a 15 mCi technetium 99 m in vitro labelled bolus with autologous red blood cells, data are collected over 250 heart beats in left anterior oblique projection. Regional wall motion was assessed using a cinematic display of the entire representative cycle; in addition, images reflecting the fractional count loss during systole were generated. For each image the left ventricle was divided into 12 segments. Labelled red blood cells were injected immediately at the end of the surgical procedure and the first measurements (T1) were made under controlled ventilation N₂O/O₂ while the patients remained unrespon-

sive. Then the patients breathed 100% O₂. No anti-dotes were administered. The trachea were extubated when they could open their eyes on command, when the respiratory rate reached 12/min and the tidal volume 8 ml/kg. Three minutes (T2) and 3 hours (T3) after extubation, measurements were repeated. 24 hours later a new GRA (T4) and a myocardial scintigraphy (Thallium 201) under dipyridamole were performed. Results are expressed as mean + SD and analysed using variance analysis and modified 't' test.

Results: No patient exhibited ischemic episodes on ECG recording during per and postoperative period. Thallium 201 scintigraphy were abnormal in Groups II, III and IV. Groups I and II were identical in age, duration of surgery, heart rate and blood pressure at T1,2,3 and 4. In Group I EF remained unchanged at T1, 2,3 and 4. In Group II EF responded abnormally to recovery and an obvious decrease appeared at T2. If we consider the totality of the analysed segments (12 X 13) we note that 10% of these segments present a 15% decrease and 19 % a decrease of more than 25% at T2 in relation to T1 values. Most of these wall motion abnormalities were localized in the decreased myocardial activity area on Thallium 201 dipyridamole scintigraphy. In Group IV (placebo) significant decrease in EF appeared at T2. In contrast, in Group III (NTG) EF showed no modification at T1, 2 and 3.

Discussion: Thallium 201 scintigraphy after dipyridamole confirms confirmation of myocardial perfusion abnormalities in patients included in Groups II, III and IV. The near normal value of EF at T4 in Groups II, III and IV and the lack of ischemic episodes accounts for the mild CAD of these patients. This study demonstrates that recovery from general anesthesia causes abnormalities in left ventricular function in patients suffering from CAD. These modifications occur in the absence of myocardial ischemia detected by ECG recording. These abnormalities are mitigated by prophylactic NTG.

Reference: (1) Desmots J.M., Bohm G., Couderc E. Hemodynamic Responses to Low Doses of Naloxone after Narcotic-Nitrous Oxide Anesthesia. Anesthesiology 49 : 12 - 16, 1978.

| | T1 | T2 | T3 | T4 |
|-----------|----------------------------|---------|--------|---------|
| Group I | : 60 ± 9 | 61 ± 10 | 64 ± 9 | 62 ± 6 |
| Group II | : 55 ± 7 | 45 ± 8 | 53 ± 8 | 62 ± 7 |
| | T2 vs T1 and T4 : p < .001 | | | |
| Group III | : 66 ± 6 | 67 ± 5 | 67 ± 6 | 61 ± 8 |
| Group IV | : 55 ± 7 | 45 ± 6 | 57 ± 9 | 58 ± 10 |
| | T2 vs T1 and T4 : p < .005 | | | |

Response of EF (%) at T1, T2, T3 and T4.