

TITLE : PREVENTION OF MYOCARDIAL ISCHEMIA BY NITROGLYCERIN IN PATIENTS WITH SEVERE CORONARY ARTERY DISEASE UNDERGOING NON-CARDIAC SURGERY.

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INTRODUCTION : Non cardiac surgery is often required in patients suffering from coronary artery disease. It appears thus necessary to determine if drugs decreasing myocardial oxygen consumption are of interest in preventing perioperative myocardial ischemia in such patients. The aim of this work is to assess the possible beneficial effects of intra and postoperative nitroglycerin infusion in patients at high risk of myocardial ischemia, namely patients with disabling angina pectoris (class III of the New-York Heart Association). We thus compared occurrence of myocardial ischemia detected by means of continuous electrocardiographic recording of lead V5, in such patients undergoing non-cardiac surgery under conventional balance anesthesia, with and without perioperative nitroglycerin infusion.

METHOD : Thirty one patients with disabling angina pectoris were selected on the basis of a clear history of an effort related angina pectoris. The criteria of severity for inclusion in the study was the occurrence of the chest discomfort following even usual effort (class III of the N.Y.H.A.). None of these patients had congestive heart failure with dyspnea class III of the N.Y.H.A., and cardiac thoracic ratio was ≤ 0.5 . All the patients were chronically treated for their angina pectoris. Treatment was discontinued 12 hours before surgery. Patients were divided into two groups. The control group (group I) included 10 patients undergoing peripheral vascular surgery, group II included 15 patients undergoing similar surgical procedures, given a permanent nitroglycerin infusion. Both groups were identical for age, preoperative treatment, preinduction blood pressure, intraoperative bleeding and duration of surgical procedure.

Anesthetic procedure was identical in both groups. Hydroxyzine and Atropine for premedication, Pentothal for induction, maintenance with 50% nitrous-oxide - oxygen, Fentanyl and Pancuronium. Intravenous nitroglycerin infusion was started twenty minutes before induction and continued up to one hour after extubation. The infusion was started at the concentration of 0.25 μ g/kg/min and increased at a rate of 0.25 μ g/kg/min every five minutes up to 1 μ g/kg/min unless systolic blood pressure decreased more than 25mm Hg. Mean dose of nitroglycerin was 0.91 \pm 0.18 μ g/kg/min.

Lead V5 was continuously recorded by the Holter monitor from 30 minutes before the induction up to the eighteenth postoperative hour. An ischemic episode was said to occur when an ischemic-type ST segment depression greater than 1mm was present for more than three beats. The reviewer of the recorded material did not know if the patient was given nitroglycerin or not. Informed was obtained in each patient.

RESULTS : In group I (control), an ischemic-type ST segment depression occurred in 15 out of 16 patients. It was observed more than once in 6 patients. Depression of ST segment lasted more than 5 minutes in all

cases. It followed induction and intubation (7 times) skin incision (7 times), intraoperative increase in systolic blood pressure of more than 30% (5 times) or extubation (4 times).

In group II, ischemic ST segment depression was observed in only 3 out of 15 patients. Multiple ischemic episodes were observed in only one of these 3 patients. The occurrence of ischemia was significantly lower in the nitroglycerin group than in the control group ($p < 0.001$). Depression of ST segment occurred immediately after an increase in systolic blood pressure in two patients and following extubation in one. No ST depression occurred following decrease in blood pressure, despite a fall of more than 30% in 10 patients mainly at the time of induction; these hypotensive episodes were easily corrected by decrease of the nitroglycerin infusion rate associated with a rapid blood volume expansion (250ml of saline). No postoperative myocardial infarction or death occurred in either groups.

DISCUSSION : The very high incidence of intraoperative myocardial ischemia in control group demonstrates the severity of the coronary disease in the observed patients. Intraoperative myocardial ischemia has been shown to occur in less than 40% of all the patients with demonstrated coronary disease mild or severe undergoing non cardiac surgery (3). The significantly lower frequency of ischemic ST segment depression observed in the patients given nitroglycerin infusion, suggests that this drug is highly effective in preventive myocardial ischemia in patients with severe coronary artery disease. The administration of nitroglycerin in our patients had been easy to control, blood pressure reaching normal values within a few minutes after decrease of the rate of drug infusion when needed. These results suggest that nitroglycerin could be as useful in preventing from myocardial ischemia patients with coronary artery insufficiency undergoing non-cardiac surgery, as it is during coronary artery surgery (2) or following myocardial infarction (1).

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