

Title: ASSESSMENT OF WALL MOTION BY RADIONUCLIDE ANGIOCARDIOGRAPHY DURING ENDOTRACHEAL INTUBATION

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**INTRODUCTION:** Perioperative myocardial ischemia has been identified as a significant clinical entity for patients undergoing coronary artery bypass grafting<sup>1</sup>, yet it is often unreliably diagnosed by standard electrocardiographic and hemodynamic monitoring<sup>2</sup>. The appearance of new wall motion abnormalities, however, has been investigated by various techniques and shown to be an early and specific indicator of myocardial ischemia<sup>2</sup>. In this investigation, we employed first-pass radionuclide angiocardiology to evaluate changes in left ventricular wall motion and hemodynamics associated with anesthetic induction and endotracheal intubation prior to coronary artery bypass grafting.

**METHODS:** Ten male patients scheduled for elective coronary artery bypass grafting were included in this study. The research protocol was approved by the Institutional Review Board, and informed consent was obtained from all patients on the evening prior to surgery. Patients were premedicated with diazepam .1 mg/kg PO, morphine sulfate .1 mg/kg IM and scopolamine .2 mg IM, and all cardiac medications, with the exception of organic nitrates, were continued to the time of surgery. Under local anesthesia, radial artery and thermodilution pulmonary artery catheters were inserted for hemodynamic monitoring. Radionuclide angiocardiology was performed from a direct anterior projection using 10 mCi doses of Technetium-99m diethylenetriamine-pentaacetic acid and allowed determination of left ventricular ejection fraction (EF). Cinegraphic displays of left ventricular perimeters throughout the cardiac cycle were reviewed for new, focal wall motion abnormalities. For this analysis, the left ventricle was divided into three regions: inferior, apical and anterior. Each region was then graded on the following scale of 1-10: 1 = normal, 2-4 = mild, moderate and severe akinesis, 5-7 = mild, moderate and severe dyskinesis, and 8-10 = mild, moderate and severe dyskinesis. Values were assigned by a consensus of two experienced observers, and an increase of 2 or more points in a region in consecutive studies was considered diagnostic of a new, significant wall motion abnormality. Radionuclide and standard hemodynamic measurements were made at the following times: (1) baseline breathing 100% O<sub>2</sub> by mask, (2) 2 min. after induction, (3) 1 min. after endotracheal intubation, (4) 3.5 min. after endotracheal intubation, and (5) 6 min. after endotracheal intubation. Standard electrocardiographic leads I, II and V<sub>5</sub> were monitored continuously, and ST segment depression  $\geq$  1 mm was considered diagnostic of ischemia. Arterial blood gases were obtained at the beginning and conclusion of the study to ensure satisfactory

oxygenation. Other measured and derived variables included the mean arterial pressure (MAP) and pulmonary capillary wedge pressure (PCWP). Induction was accomplished with midazolam .2 mg/kg, vecuronium .1 mg/kg and 50% N<sub>2</sub>O/O<sub>2</sub>. Data were analyzed by paired t statistics.

**RESULTS:** No electrocardiographic evidence of ischemia was detected in our study population, however, 3 patients developed significant abnormalities in regional wall motion at 1 minute following endotracheal intubation. In 2 of these patients, the onset of wall motion abnormalities was associated temporally with decreases in left ventricular EF of 15 and 18 absolute percent, respectively. The third patient developed an elevated PCWP (increase of 9 mmHg) when wall motion deteriorated. Heart rate and blood pressure parameters were not significantly different from those of the entire study group.

**DISCUSSION:** The severity of stress induced during the perioperative period may be grossly underestimated by standard monitoring techniques. Other investigators have suggested that the incidence of electrocardiographically silent myocardial ischemia in patients with coronary artery disease may range from 25<sup>3</sup> to 45%<sup>4</sup> following endotracheal intubation. In this small study group, we used a simple and non-invasive technique to detect changes in global and regional ventricular function which are suggestive of ischemic dysfunction. Our data support this technique as a sensitive method for detecting cardiac dysfunction during the perioperative period, which may be especially useful when frequent interventions induce hemodynamic changes which could be difficult to interpret by standard techniques.

**REFERENCES:**

1. Slogoff S. *Anesthesiology* 62:107-114, 1985
2. Merin RG. *Anesthesiology* 64:137-140, 1986
3. Bellows WH. *Anesthesiology* 60:155-158, 1984
4. Kleinman B. *Anesthesiology* 64:157-164, 1986