

CORRESPONDENCE

Anesthesiology

1998; 89:1601

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No Evidence of Ischemic Preconditioning during Coronary Revascularization

To the Editor:—As an anesthesiologist who cares for patients with severe heart disease, I am attentive to potential clinical intraoperative applications of myocardial ischemic preconditioning. With this technique, the myocardium is protected from ischemic injury by a brief, preceding period of ischemia. There have been experimental, as well as clinical, reports of the benefits of this ischemic preconditioning.¹ Therefore, I read with great interest the recent case report by Latham *et al.* regarding the intraoperative use of this technique.² However, because there was no evidence of myocardial ischemia during the preconditioning interval, there was no evidence that ischemic preconditioning was actually used! Although ischemic preconditioning before bypass grafting was attempted by occlusion of a branch of the circumflex coronary artery, the authors state that "there was no evidence of myocardial ischemia as determined by ST-segment and T-wave changes, and the patient was hemodynamically stable." Myocardial ischemia may also be inferred from other types of monitoring (*e.g.*, transesophageal echocardiography), but the authors present no data to this effect. Administration of adenosine may confer beneficial effects similar to that of ischemic preconditioning, but the authors' use of adenosine was limited to the interval during, rather than before, coronary bypass grafting. Ischemic preconditioning also was attempted later by occluding a diagonal branch of the left anterior descending

coronary artery, but monitoring data during this latter maneuver are not reported. The patient described in the case report received appropriate clinical care. However, there is no evidence that his care included ischemic preconditioning.

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(Accepted for publication July 30, 1998.)

Anesthesiology

1998; 89:1601-2

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In Reply:—Drs. Borges and Coulson suggest that perfusion to the myocardium is preferable to ischemic preconditioning. Although the technique of perfusion during surgical anastomosis seems to be an excellent option for many patients, it may not be appropriate for some patients. According to their case report, they had prophylactically cannulated the femoral artery in case cardiopulmonary bypass was required.¹ Therefore, they were effectively able to manage arrhythmias and hypotension after occlusion of the right coronary artery using a perfusing cannula connected from the side port of a femoral artery DLP cannula.¹ On the other hand, in our patient, cardiopulmonary bypass with cross-clamping of the aorta was planned. Only after median sternotomy and harvesting of the right and left internal mammary arteries was completed was it clear that the patient had a "porcelain" aorta and that aortic cross-clamping would not be feasible. Because this patient had significant atherosclerosis of his major arteries including femoral and axillary arteries, an appropriate arterial cannulation site was not available. Had we been able to cannulate the femoral arteries, we would have opted for femoral artery bypass.

Dr. Lennon suggests that the phenomenon of ischemic preconditioning did not occur because there was no electrocardiographic

evidence of myocardial ischemia during the preconditioning interval. However, absence of ST-segment or T-wave changes during the preconditioning interval does not indicate that transient ischemic episodes did not occur. Furthermore, transesophageal echocardiography is a more sensitive monitor for myocardial ischemia and perhaps may have demonstrated regional wall motion abnormalities in the absence of electrocardiographic changes, although we do not routinely use transesophageal echocardiographic monitoring. Importantly, myocardial ischemia that is sufficient to induce preconditioning may not be detectable with the currently available clinical monitors (*i.e.*, electrocardiography and transesophageal echocardiography). It has been shown that ischemic preconditioning in humans does occur after brief periods of coronary artery occlusion, despite the absence of electrocardiographic changes during the occlusion period.² Jacobsohn *et al.*² did not observe any ST-segment or T-wave changes during ischemic preconditioning but documented beneficial effects of preconditioning such as improved myocardial contractility. Although it cannot be concluded with certainty that ischemic preconditioning in our patient preserved the myocardial function, the absence of perioperative myocardial infarction, as suggested by serial electrocardiographic and car-