pam–N_2O anesthesia for dilatation and curettage operations nor the routine reversal of CNS depression following this or any other anesthetic technique. There are, however, some patients for whom diazepam–N_2O anesthesia does provide some advantages, and others who could benefit from rapid antagonism of postanesthetic somnolence. It is important to appreciate that in those patients, certain doses of physostigmine can effectively reverse diazepam-induced postanesthetic somnolence with a minimum of side effects.

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(Accepted for publication November 15, 1979.)

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Anesthesiology
52:373–374, 1980

Is the Rate–Pressure Product a Misleading Guide?

To the Editor:—In the study of Sonntag *et al.*,[1] poor correlation between myocardial oxygen consumption (mV_{O_2}) and heart rate–blood pressure product index (RPP) was found during halothane anesthesia in man. This finding merits special attention, since RPP is recommended as a guide to the prevention of intraoperative myocardial ischemic injury.[2] For the patient with coronary-artery disease, a proposed goal is not to exceed a RPP level of 12,000.*

The RPP was introduced as an index of mV_{O_2} by Gerola and associates in 1957, on the basis of their experiments with hypoxemic dogs.[3] Since then, this correlation was reported as valid for a number of conditions in animals and in man, including operations for coronary-artery bypass.[4] However, Sonntag and associates have shown that RPP cannot always be an adequate index of mV_{O_2}.

We would like to draw attention to the other side of this problem. In our opinion, it may be dangerous to make the seemingly logical step from RPP—*index of* mV_{O_2}—to RPP—*predictor of impending ischemia*—since the components of this index—heart rate (HR) and blood pressure (BP)—have opposite effects on myocardial blood supply which, in balance with mV_{O_2}, determine the severity of ischemia. When, for example, the BP is reduced and HR increases, it is possible to have a RPP below the suggested safe level during myocardial ischemia. Thus, a low RPP caused by low BP could lead to a false sense of security. The use of RPP as a guide for ischemia was motivated by the work of Robinson,[5] who demonstrated that exercise of various types and severity induced pain in patients with angina pectoris at similar levels of RPP. But the author also stated the following, ". . . in the experiments reported there were only small changes in arterial pressure; it might be expected that larger variations in arterial pressure would lead to changes in coronary flow and so cause alterations in the level of myocardial work required to provoke pain."

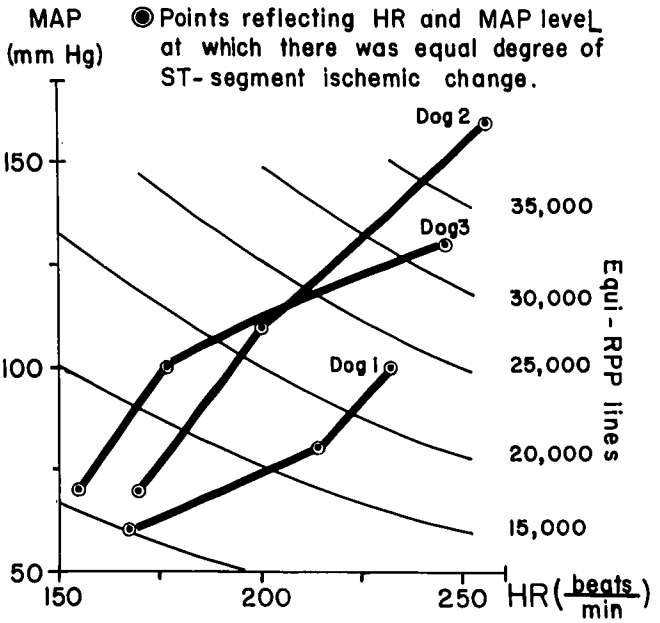

FIG. 1. Effects of heart rate and blood pressure on electrocardiographic (ECG) ischemic changes in the myocardial area perfused by the constricted coronary artery.

In pentobarbital-anesthetized open-chest dogs, the left anterior descending coronary artery was constricted until the epicardial ECG, recorded from the myocardial zone supplied by the constricted artery, was just at the verge of normal. Various levels of mean arterial pressure (MAP) were provided by constricting the descending aorta. At each level of MAP, the heart rate was increased by pacing until profound ischemic S–T segment deviations in epicardial ECG appeared in the jeopardized area.

Notice that at low MAP, ischemic changes appeared at lower HR (and RPP) than at higher MAP. As a result, RPP did not correlate with ischemia.

* Dunbar RW: Management of cardiac patients for non-cardiac surgery, Review Course Lectures. IARS 53 Congress, 1979, pp 12–19.

Figure 1 based upon our experiments with dogs, shows that there is no correlation between RPP and the appearance of electrocardiographic evidence of myocardial ischemic injury. In our opinion the RPP may be used in many conditions as a simple index of total mV_{O_2}, but at the same time, this index may be a misleading predictor of intraoperative myocardial ischemic injury.

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(Accepted for publication November 13, 1979.)

Anesthesiology
52:374–375, 1980

Hyperlactatemia during Transurethral Resection of the Prostate Using Sorbitol Solution as the Urologic Irrigant

To the Editor:—Intravascular absorption of the urologic irrigant during transurethral resections of the prostate gland (TURP) is a well-documented occurrence.[1] Sorbitol, one of the nonhemolytic irrigating solutes, has enjoyed a unique popularity with urologists because it is believed to be rapidly and nontoxically metabolized in the liver.[2] However, intravenously administered sorbitol has been shown to produce a hyperlactatemia in healthy volunteers[3] and in children during sorbitol hyperalimentation.[4] This demonstrates sorbitol's preferential metabolic pathway to lactic acid. Therefore, a study was designed to determine whether a similar hyperlactatemia would result from the absorption of the sorbitol irrigant during TURP.

Venous serum lactate levels were measured in 18 patients during elective TURP, with anesthesia provided by spinal anesthesia (table 1). Thirteen of the patients received 3 per cent sorbitol solution (Travenol Laboratories, Deerfield, Illinois) as the urologic irrigant, while five control patients received 1.5 per cent glycine solution (McGaw Laboratories, Irvine, California). The patient populations were comparable with respect to age, perfusion height of irrigation fluid, volume of irrigation fluid used, and blood loss intraoperatively. Venous serum samples for lactate determination and arterial samples for blood-gas analysis were drawn preoperatively and 30 and 60 min after resection of the gland had begun.

In all patients receiving the sorbitol irrigant, venous serum lactate increased significantly ($P < 0.005$), to a mean of 7.5 mg/dl (0.82 mmol/l) above preoperative values within the initial 30 min of resection. For those resections lasting longer than 30 min, venous serum

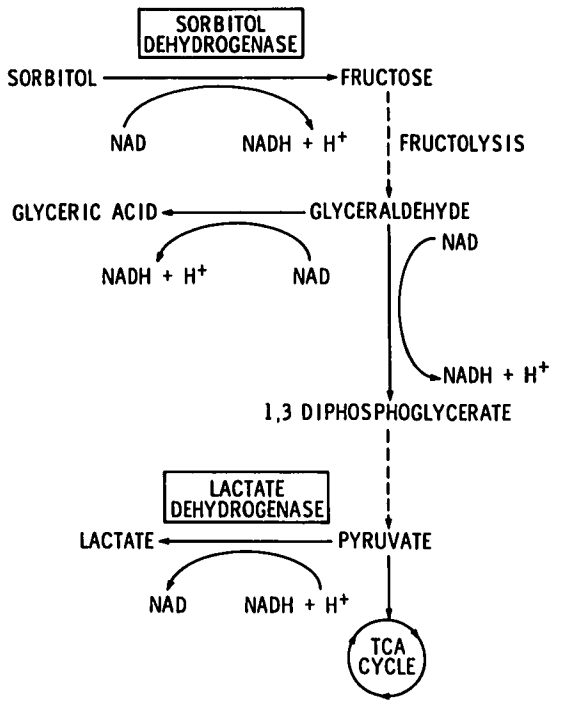

FIG. 1. Metabolic pathway of sorbitol illustrating the preferred route to lactate.

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