Correspondence

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Hypotensive Actions of Nitroprusside and Verapamil Compared

To the Editor:—Sodium nitroprusside, though widely used as a hypotensive drug during general anesthesia, is not free from adverse effects, including tachyphylaxis, cyanide toxicity and death.[1] Thus, the search for an effective and safe substitute continues. We have recently completed a comparative study of the hypotensive actions of verapamil (a vasodilator drug structurally related to papaverine) and nitroprusside in anesthetized rats. Wistar rats (n = 74) were anesthetized with 5-sec-butyl-5-ethyl-2-thiobarbitone sodium 100 mg/kg intraperitoneally, a jugular vein was catheterized for drug injections, and the right common carotid artery was catheterized for connection to a Statham pressure transducer and Sanborn polygraph for continuous monitoring of arterial blood pressure and heart rate. Examination of the dose–response relationships obtained for the two agents, administered in single bolus doses of 0.1, 0.25, and 0.5 mg/kg for verapamil and 0.001, 0.003, and 0.01 mg/kg for nitroprusside (fig. 1), revealed that, on a weight

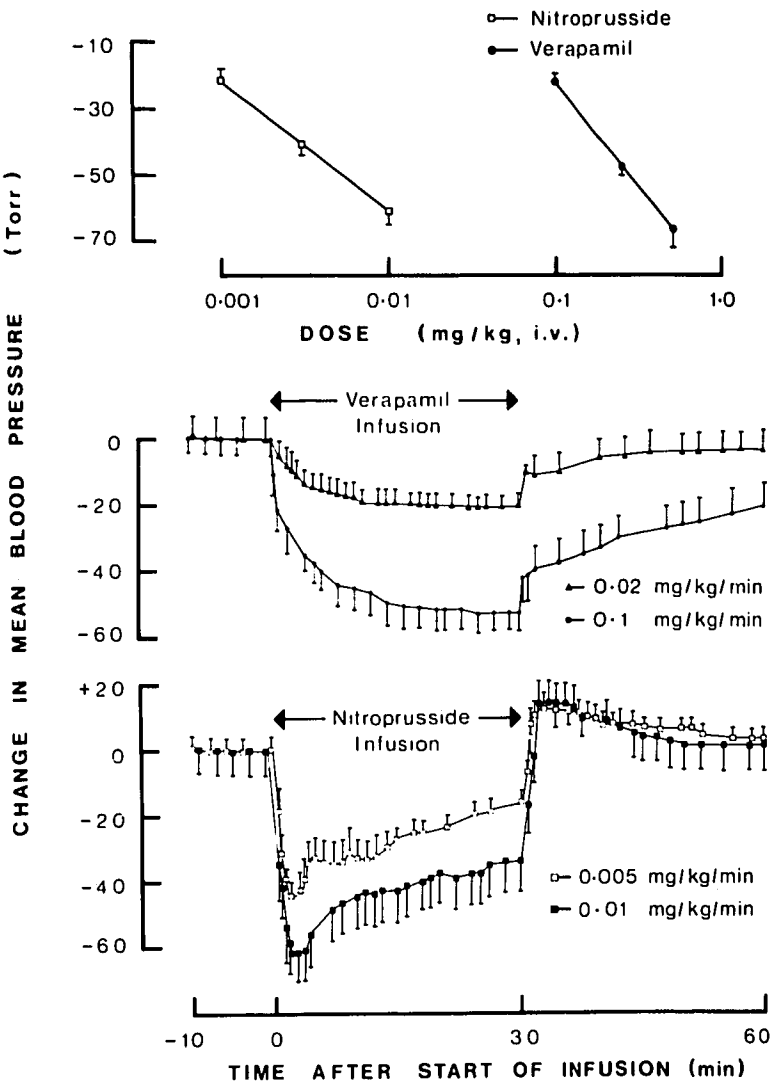

FIG. 1. Mean arterial blood pressure responses (±SEM) of groups of anesthetized rats to single intravenous doses of sodium nitroprusside or verapamil (*top panel*), or to 30-min intravenous infusions of verapamil (*middle panel*) or nitroprusside (*bottom panel*), each dose or infusion rate being tested in five to seven rats. Blood pressure was monitored for 30 min after cessation of each infusion.

basis, verapamil is 1/50 as potent as nitroprusside in producing hypotension. Like nitroprusside, verapamil had a very short duration of action. Hypotensive responses to single injections of nitroprusside had largely dissipated within 2–3 min of injection, and those to verapamil, within 4 min. When the two agents were compared after 30-min infusions, using three different infusion rates of each, the hypotensive potency of nitroprusside relative to verapamil was found to be greatly decreased, nitroprusside being only four to five times more potent than verapamil. This was due to the fact that nitroprusside, but not verapamil, caused tachyphylaxis. Hypotensive responses to both agents were still rapid in onset, commencing within 30 sec of starting the infusion. However, the effects of nitroprusside (0.005–0.01 mg/kg/min) became maximal within 2 min, and thereafter showed a progressive and significant diminution throughout the course of infusion, while verapamil (0.02–0.1 mg/kg/min) took approximately 10 min to exert a full hypotensive effect, and thereafter blood pressure values remained remarkably stable (fig. 1).

In all experiments using nitroprusside, the hypotensive effects demonstrable after 20–30 min of constant infusion were significantly less ($P < 0.001$) than those recorded shortly after commencing. Thus, for example, nitroprusside infused at 0.01 mg/kg/min produced an initial decrease in blood pressure of 62 ± 9 (SEM) torr, but despite the maintenance of a constant infusion rate of the drug, this dwindled within 30 min, to 34 ± 10 torr. In contrast, verapamil 0.1 mg/kg/min, maintained the 60-torr decrease in blood pressure throughout the duration of the infusion. In our study, verapamil proved to be a potent and effective hypotensive agent, with a rapid onset and offset of action. When administered by intravenous infusion, its hypotensive effects were dose-related ($r = 0.99$, $P < 0.02$), well-maintained, unaccompanied by tachycardia, and had a somewhat less precipitous onset and offset than did those of nitroprusside. Verapamil appears to offer a possible advantage over nitroprusside in that it does not cause tachyphylaxis.

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A Simple Pressure-infusion System for Blood

To the Editor:—Drs. Waldman and Rebane[1] suggest a Condflow regulator and high-pressure tubing to facilitate rapid, constant-pressure blood infusion using the Fenwal pressure-infusion system. May I suggest a readily available alternative? Our operating room uses the orthopedic tourniquet system driven by oxygen "E" cylinders. When massive, rapid infusion of blood is necessary, I simply ask for the tourniquet and connect it to the Fenwal pressure bag line with a double male luer adaptor. This provides the same advantage as the Condflow regulator, plus pressure indication, an on-off valve, and most importantly, no additional equipment expense.

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Difficulty in Endotracheal Intubation Associated with Obstetric Anesthesia

To the Editor:—Although our several sources of information and statistical data cannot be disclosed at present, there has been an alarmingly high incidence in the greater New York metropolitan area of difficulty performing endotracheal intubation, with consequent maternal and fetal complications, in women