Acute Hemodynamic Effects of Methoxamine in Man

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The circulatory effects of single intravenous injections of 0.055 mg./kg. methoxamine were investigated in 5 healthy volunteer subjects. Ninety minutes after the first injection, atropine 1–2 mg. was administered intravenously and the injection of methoxamine repeated. Cardiovascular parameters were evaluated by ballistocardiographic and dye-dilution methods, the former data continuously calculated by an analog computer. Methoxamine briefly, but markedly, depressed heart rate, cardiac output, and left ventricular work. Stroke volume decreased moderately, while mean arterial pressure increased moderately, and total peripheral resistance increased markedly. A preliminary partial vagal block with atropine permitted a greater increase in mean arterial pressure, with lesser changes in all other parameters except stroke volume, thus making methoxamine a "better" vasopressor.

It is suggested that some of the depressant effects of methoxamine are related to intense arteriolar constriction, venous pooling of blood, reflex vagal depression of the atria and ventricles, and direct beta-adrenergic blocking and excitation-contraction uncoupling actions.

Methoxamine (Vasoxyl) is customarily administered by single intravenous or intramuscular injection. Nevertheless, because of limitations in the measurement of cardiac output, its effects have been studied during continuous intravenous infusion.1,7 By the time steady-state conditions necessary for measurement of cardiac output have been achieved, circulatory homeostatic mechanisms may have masked much of the drug effects. A new method for continual computation of stroke volume has enabled the investigation of the hemodynamic effects of methoxamine after single intravenous injection.

Methods

Five healthy conscious volunteers, age 22–36, 4 men and one woman, served as subjects, informed consent having been obtained in each instance. Studies were performed in the morning, with the subject unpremedicated and in a fasting state. Three catheters were inserted percutaneously: a no. 1514R (24 inch) Intracath into the superior vena cava via an antecubital vein; a no. 1617R Intracath into a forearm vein for injection of drugs; and a no. 18 B-D Teflon catheter into a brachial artery. After a thirty-minute rest period, each subject received 0.065 mg./kg. methoxamine intravenously over twenty seconds. Seventy-five minutes later, atropine 1–2 mg. was injected intravenously. Ten to fifteen minutes after the administration of atropine, methoxamine 0.065 mg./kg. was injected a second time.

Lead 2 of the electrocardiogram was recorded. A Beckman no. 957 Heart Rate Compler recorded heart rate from the ECG. Arterial pressure was transduced with a Statham P23Gb strain gauge. Mean arterial pressure was obtained by electrical damping.

![Fig. 1. Sketch of an ultra-low frequency ballistocardiogram, showing the area under the I- and J-waves to be computed by the integrating amplifiers. The electrocardiogram is for time reference. mG = milli G.](image)