Title: ISOPROTERENOL IS A SAFE AND EFFECTIVE INTRAVENOUS MARKER IN LABORING WOMEN

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Introduction. Epinephrine (EPI) 15 mcg, which is widely used as a test of i.v. injection during epidural anesthesia, causes a brief tachycardia followed by more prolonged bradycardia when given i.v. to laboring women (1). Fetal distress may occur. We postulate that this bradycardia and fetal distress are alpha adrenergic effects of EPI, a mixed alpha and beta agonist, that should not be present following isoproterenol (ISO), a pure beta agonist. This randomized, double-blind study tested the safety and efficacy of ISO 5 mcg as an i.v. marker in laboring women.

Methods. 10 consenting, unanesthetized, healthy unmedicated term parturients in active labor and with no evidence of fetal distress participated in this IRB-approved study. We maintained left uterine displacement and continuously recorded maternal heart rate (MHR), fetal heart rate (FHR), and uterine contractions (UC) with an HP8040A monitor. 30 sec after a UC, we randomly injected either 5 ml normal saline (NS group; n=5) or ISO 5 mcg in 5 ml NS (ISO group; n=5) i.v. We measured maternal blood pressure (BP) every minute for 5 minutes after the injection. A blinded labor floor nurse palpated the patient's radial artery for two minutes after the injection and guessed the patient's group.

We determined MHR at 10 sec intervals for 120 sec after the injection. We normalized all MHR and BP values to that patient's control values before computing group means. A blinded obstetrician analyzed the postinjection FHR tracings for signs of fetal distress (short-term FHR variability $\leq$ 5 beats/min, $\geq$1 late deceleration, or baseline FHR <120 or >160 beats/min). We analyzed the MHR data using peak-to-peak and baseline-to-peak criteria for i.v. injection (1). Fisher's exact test analyzed the ability of each method to differentiate between the groups. ANOVA with Duncan's multiple range test determined the significance of MHR and BP differences between the groups. $P<0.05$ indicated significance.

Results. The peak-to-peak criterion identified 0/5 NS group and 5/5 ISO group patients as receiving ISO ($p<0.01$). The nurse palpating the patient's radial artery identified 1/5 NS group and 5/5 ISO group patients as receiving ISO ($p<0.05$). The baseline-to-peak criterion identified 0/5 NS group and 2/5 ISO group patients as receiving ISO (p=NS). ISO group MHR was significantly greater than NS group MHR 20 sec ($p<0.05$), 30 sec ($p<0.01$), and 40 sec ($p<0.05$) after the injection (see fig. 1). BP did not differ significantly between the groups. We saw no fetal distress.

Discussion. Moore and Batra (2) found that EPI 15 mcg i.v. produced a 32±7 beats/min tachycardia that lasted >3 min in nonpregnant men and women. In contrast, EPI 15 mcg i.v. produces a less profound tachycardia lasting 70 sec followed by bradycardia lasting 140 sec in laboring women (1). We postulated that ISO, a pure beta agonist, should produce a more profound tachycardia (an indicator of i.v. injection) with fewer undesireable side effects than EPI 15 mcg in laboring women. ISO 5 mcg produced a predictable tachycardia uncomplicated by subsequent bradycardia, maternal hypotension or hypertension, or fetal distress. However, this tachycardia was brief, and continuous electronic MHR monitoring may be necessary to detect this tachycardia reliably. We feel that, with continuous electronic MHR monitoring, ISO 5 mcg is a safer and more efficacious marker of i.v. injection than EPI 15 mcg in laboring women.

References.

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2. Moore DC, Batra MS: The components of an effective test dose prior to epidural block. Anesthesiology 55:693-696, 1981