TITLE: THE EPIDURAL TEST DOSE IN OBSTETRICS RECONSIDERED

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Introduction. Many clinicians add 15 µg epinephrine (EPI) to the epidural test dose (TD). Recent studies have questioned both the safety and efficacy of this practice in the laboring parturient where a positive epinephrine response can be difficult to detect.[1,2] Using a pregnant sheep model, we conducted this controlled, randomized, dose-ranging study to determine the ideal amount of either epinephrine (EPI), dopamine (DOP), terbutaline (TRB), or isoproterenol (ISO) as one component of an optimum test dose (TD) in obstetrics.

Methods. After approval of our Subcommittee on Animal Use, eight pregnant ewes and their singleton fetuses underwent preparatory surgery between 125-132 days' gestation and were allowed to recover for at least 48 hrs prior to study. After a monitored 30 min control period, animals received duplicate IV injections of each of the following: 2% Lidocaine (LID) 3ml; 0.5% Bupivacaine (BUP) 3ml; EPI 5, 10, 15, 20, 30, 60 µg; DOP 15, 30, 45, 60, 120, 240, 400 µg; TRB 15, 30, 45, 60, 120, 250 µg, and ISO 2.5, 3, 4, 5, 7.5, 10, 15 µg. Animals were permitted to return to baseline hemodynamic values between injections. To be considered both safe and effective, a TD must have increased MHR $\geq$ 30% above baseline for > 3 min in all subjects for all administrations and must have had no adverse effects on maternal ECG, UBF, or FHR pattern. TD's which met these criteria were then compared with the standard EPI 15 µg TD, alone and in combination with LID and BUP. Data were tested for significance using either Chi-square or one-way ANOVA followed by Student-Newman-Keuls test, as appropriate. Significance was accepted at $p < 0.01$.

Results. Efficacy data are summarized in Fig 1. None of the solutions containing EPI 15 µg (EPI, L + E, B + E) were effective in increasing MHR $\geq$ 30% and all were followed by significant decreases in UBF, decelerations of FHR, or diminished beat-to-beat variability (BTBV). DOP 60 µg was effective in only 30% of trials. TRB 250 µg was associated with maternal dysrhythmias and was effective in only 50% of trials. Its effects persisted for 10 min. All of the solutions containing ISO 5 µg (ISO, L + I, B + I) were effective in increasing MHR $\geq$ 30% although we observed significant attenuation of the peak maternal hemodynamic effects in the B + I and L + I groups. Adverse effects on FHR or BTBV did not occur. While neither LID nor BUP changed MHR, both were associated with decreased BTBV.

Discussion. An effective TD should rapidly signal IV or subarachnoid injection.[3] In obstetrics, evidence of IV injection must be clearly discernable from the cyclical changes of MHR during labor and must have no deleterious effects on mother or fetus.[4] Mixed α and B agonists were less effective and associated with more side effects than pure B agonists. In addition to decreasing UBF, it is possible that α-agonism blunts the B-mediated increase in MHR, limiting both the safety and efficacy of mixed agonists. Unopposed by this α affect, lower doses of pure B-agonists may be safer and more effective. Our preliminary data indicate that ISO 5 µg offers distinct advantages as one component of a safe and reliable TD in obstetrics.

References.

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Fig. 1