THE EFFECT OF INTRAVENOUSLY ADMINISTERED 2-CHLOROPROCAINE UPON UTERINE ARTERY BLOOD FLOW VELOCITY IN GRAVID GUINEA PIGS

D. H. Chestnut, M.D., C.P. Weiner, M.D.

Departments of Anesthesia and Obstetrics and Gynecology, University of Iowa College of Medicine, Iowa City, Iowa 52242

Introduction. The potential for unintentional intravenous (i.v.) or subarachnoid injection of local anesthetic during induction of epidural anesthesia mandates the administration of a test dose before injection of a therapeutic dose. An epinephrine (EPI)-containing test dose may be neither sensitive nor specific for i.v. injection in laboring women,1,2 and may decrease uterine blood flow and precipitate fetal distress.1,3 Grice et al4 reported that i.v. injection of 100 mg of 2-chloroprocaine (2-CF) without EPI was both sensitive and 100% specific for production of symptoms of i.v. injection in male volunteers. The purpose of this study was to assess the effect of i.v. 2-CF upon uterine artery blood flow velocity (UBVF) in gravid guinea pigs.

Methods. The protocol was approved by the Animal Care Committee. Mixed breed guinea pigs were obtained at 0.6 of timed gestation. Using sterile technique and general anesthesia, catheters were inserted into the external jugular vein and carotid artery. Through a midline abdominal incision, a miniaturized Doppler flow probe was fixed to the undersurface of the uterine artery using a cyanoacrylate glue. No experiments were undertaken until normal weight gain and activity had resumed, and in no case before the eighth postoperative day. Eight experiments were performed in five animals. Each animal received four solutions of 2-CF in random order, 30 min apart: 1) 2-CF, 0.67 mg/kg; 2) 2-CF, 1.34 mg/kg; 3) 2-CF, 2.0 mg/kg; 4) 2-CF, 1.34 mg/kg, with EPI, 0.0002 mg/kg. (When calculated on a mg/kg basis, 1.34 mg/kg of 2-CF and 0.0002 mg/kg of EPI approximate the recommended test dosages of 2-CF and EPI, when administered to a patient weighing 75 kg). Each solution was diluted with normal saline to a total volume of 0.2 ml. Maternal heart rate (MHR), mean arterial pressure (MMAP), and UBVF were recorded for 5 min after each injection of 2-CF. Each response to 2-CF is expressed as the mean (± S.E.M.) percent of the baseline for that solution. Statistical analysis was by repeated measures ANOVA. P < 0.05 was considered significant.

Results. The MMAP and UBVF responses to 2-CF with EPI significantly differed from the responses to each of the 2-CF solutions without EPI. 2-CF with EPI significantly decreased UBVF at 30 sec and 1 min after injection. None of the 2-CF solutions without EPI significantly decreased UBVF.

Discussion. We conclude that i.v. administration of 2-CF, 1.34 mg/kg, with EPI, 0.0002 mg/kg, significantly decreased UBVF in gravid guinea pigs. In contrast, the solutions of 2-CF without EPI did not significantly decrease UBVF. 2-Chloroprocaine without EPI may be a safe epidural test dose in obstetric patients.

References.