

The latter may result as a denervation hypersensitivity since halothane produces partial sympathetic blockade. (Supported in part by USPHS Grant 5 R01 HE07946, USPHS Grant CM 12527 and USPHS Career Development Award 1-K3-GM-31757.)

**The Effect of the Concentration of Local Anesthetic during Epidural Anesthesia on the Forces of Labor.** BURTON S. EPSTEIN, M.D., SREELA BANERJEE, M.D., GEOFREY CHAMBERLAIN, F.R.C.S., M.R.C.G., and CHARLES S. COAKLEY, M.D., *Departments of Anesthesiology and Obstetrics Gynecology, George Washington University School of Medicine, Washington, D. C.* It has been stated that during epidural anesthesia for obstetrics large doses of local anesthetics may depress the myometrium (Bonica, J. J., and Hunter, C. A.: *Clinical Anesthesia* 3: 116, 1965) and that high blood concentrations of local anesthetics depress uterine activity, probably by direct action on the myometrium (Bromage, P. R.: *ANESTHESIOLOGY* 28: 610, 1967). A study was undertaken to determine if a change in dose and concentration of a local anesthetic would alter the force of uterine contractions and prolong the first stage of labor. *Method:* As the active phase of the first stage of labor was entered, a volume of 1.0, 1.5, or 2.0 per cent prilocaine (Citanest) was injected through a peridural catheter in a blind, random sequence until sensory anesthesia was obtained at T10-T11. Blood samples drawn 10, 20, and 30 minutes following the injection were analyzed for concentration with gas chromatography. The frequency and intensity of uterine contractions with time was measured by external tocography (Stanley Cox Twin Channel Guard Ring Tocograph, Rank Murphy Electronics, Hertfordshire, England) with a surface transducer placed on the abdomen. The intensity of the contraction with time (area under the curve) was determined by planimetry. The relationships between the injected concentration of the local anesthetic, its blood concentration, the change in uterine force and progress of labor were measured for a 30-minute period following the first injection. These were compared to values during an initial control period prior to anesthesia.

The effect of the local anesthetic on the rate of cervical dilatation was also compared to Friedman's curves for multigravidas and primigravidas (Friedman, E. A.: *Obstet. Gynec.* 8: 691, 1956; Friedman, E. A.: *Obstet. Gynec.* 6: 567, 1955). *Results:* Of the 18 patients studied, 13 were primigravidas; the remainder multigravidas. Labor was induced with an oxytocic in 13 patients. A volume of 8-13 cc. (mean, 10 cc.) of local anesthetic was injected. No hypotension was observed. There was a tendency for contractions to diminish slightly in frequency in all groups except those receiving 1.0 per cent prilocaine (no stat. sig.). In the first 15 minutes following anesthesia, tocographic measurements showed a decrease in uterine force in 12 patients and an increase or no change in six. In the second 15 minutes, nine patients showed a decrease, two were unchanged and seven showed increases. No difference was noted as the concentration of the local anesthetic was increased. Dilatation of the cervix occurred in 13 of the 16 patients even though the force of contraction was decreased; or no dilatation was noted as the force was increased. Of 16 patients for whom complete data were available, the tocographic measurement showed a positive correlation with the slope of the Friedman Curve in only four. Eight labors were hastened, seven unchanged, and one depressed from the normal slope. No difference was noted between concentrations of local anesthetics employed and blood concentrations measured (0.5-2.2  $\mu\text{g./ml.}$ ; mean 1.0  $\mu\text{g./ml.}$ ). *Discussion and Conclusion:* When one of three concentrations of prilocaine was used for epidural anesthesia in obstetrics, no correlation was observed between concentration of local anesthetic or its blood level on the force of uterine contractions or rate of dilatation of the cervix. No correlation was noted between the strength of uterine contractions measured by external tocography and rate of change of cervical dilatation. (Supported by Astra Pharmaceutical Products, Inc., Worcester, Mass.)

**Theoretical Analysis of the Effect of Concentration-dependent Solubility Upon the Uptake of Anesthetic Agents.** ROBERT M. EPSTEIN, M.D., *Columbia University, College*