Comparative evaluation of vessel size on the radiographs was difficult but in 46 patients larger vessels were observed on the second radiograph. In the other 54 cases, the two radiographs were essentially alike. The radiograph after procaine was never poorer than the first. Four patients with central embolism or thrombosis, or both, have been treated in similar manner with what appeared clinically to be better than usual recovery.

We conclude that procaine in 200 mg. doses can be injected into the carotid artery without serious consequences. Theoretically it should prevent or relieve vessel spasm and we believe it did this, but if it has no other value, it is a nearly perfect test for correct placement of the needle before radiopaque media are injected.

The Evaluation of a New and Inexpensive Carbon Dioxide Analyzer. John P. Bunker, M.D., Henrik H. Bendixen, M.D., Anna Murphy, and William M. Rand, Department of Anesthesia, Harvard Medical School, Boston, Massachusetts.

The need for a simple clinical method for the measurement of alveolar carbon dioxide tension is obvious. Currently available methods have serious disadvantages (cost, need for repeated calibration) and are largely restricted to use in the research laboratory.

Recently we have had the opportunity of working with a new carbon dioxide analyzer, designed and built by the Dewey and Almy Chemical Company of Cambridge, Massachusetts. This instrument was designed to provide rapid, reasonably accurate measurement of the carbon dioxide concentrations of gas mixtures. It is a nonelectric, mechanical device and should be safe for use with flammable anesthetics. It is of simple design and easy to operate.

In principle a mechanically operated pump draws a 25 ml. sample of expired air through a tube of saturated ammonium sulfate, then forces the gas sample through a tube of soda lime. The ammonium sulfate brings the sample to approximately the same humidity as the soda lime. The soda lime then removes the carbon dioxide. Since there is no moisture exchange, the difference in pressure exerted by the sample before and after passing through the soda lime is a direct measurement of the carbon dioxide tension in the sample. Ammonium sulfate is important in reducing errors that would otherwise be contributed by moisture absorption or release by the soda lime. The ammonium sulfate will contribute moisture if the gas sample is dry and remove it if the gas sample is wetter than the soda lime.

The instrument has been calibrated with known carbon dioxide-oxygen mixtures analyzed by standard Haldane, and a linear response is obtained. The reproducibility is good and for routine use recalibration should not be necessary. With the simple precaution of preliminary washout of the machine to achieve a steady state, accuracy of ±0.2 volume per cent has been achieved.

The presence of anesthetic gases increases the opportunity for error, but if precaution is taken to reach a steady state, the error does not appear greater than with carbon dioxide-oxygen mixtures.

The presence of ether introduces a special problem, for ether appears to be absorbed in considerable amounts onto soda lime, thus giving a false high reading; however, saturation is essentially complete after three to four samples. Thereafter, accuracy of carbon dioxide measurement in the presence of ether appears to be as good as with other anesthetics, provided ether levels remain reasonably constant.

Samples were obtained by a syringe technique (modified from Inkster and Reese) [Brit. J. Anaesth. 28: 37, 1956]. A comparison of the alveolar carbon dioxide tension obtained in this manner and as calculated from arterial pH and carbon dioxide has shown close correlation (difference 2 to 6 mm. Hg) unless there is marked depression of respiration or in the presence of pulmonary pathology.

Our experiences with alveolar sampling suggest that reasonably accurate information can be obtained. The instrument may have its greatest value in checking the efficiency
of soda lime or the rebreathing of carbon dioxide from other causes, such as faulty valves. It should be of value in the measurement of carbon dioxide in oxygen tents and in the estimation of the adequacy of ventilation in patients with bulbar poliomyelitis and other acute disturbances in ventilation.

**Lumbar Sympathetic Nerve Block for Obstetrical Analgesia; Preliminary Report of Over 1,200 Cases.** Mary Lou Byrd, M.D., Edward Y. Postma, M.D., and Glenn M. Van Dommelen, M.D., Department of Anesthesia and Obstetrics, Butterworth Hospital, Grand Rapids, Michigan.

Since November 1953 bilateral lumbar sympathetic nerve block has been used at Butterworth Hospital for obstetrical analgesia in about one third of the patients admitted in labor. The nerve block was achieved by the obstetrician, or obstetrical resident in most instances, blocking the third lumbar sympathetic ganglia, usually after labor was well established and when the cervix of the primipara was 5 to 8 cm. dilated and the multipara's cervix 3 to 6 cm. dilated. After a reasonable trial with 1 per cent cyclaine, the local anesthetic of choice was 1 per cent lidocaine, or lidocaine 1 per cent with 1 to 200,000 epinephrine. Length of action of the drugs used was one and one-half hour with 1 per cent lidocaine and about two hours with the lidocaine-epinephrine mixture. Anesthesia for delivery was most frequently pudendal nerve block supplemented by analgesia with inhalation agents.

Over 1,200 records of patients so treated were analyzed.

The advantages of the lumbar sympathetic block observed were: comfort of the patient during the first stage of labor, lack of depressant effect on the newborn, shortening of labor, complications of nerve block occurred within initial ten minutes—thus requiring less special observation of the patient as far as analgesia is concerned.

The complication most frequently observed was moderate hypotension. Blood pressure was taken frequently for twenty minutes after the nerve block was completed. Generalized convulsions occurred in three patients when 1 per cent cyclaine was used for the block. These patients promptly responded to oxygen and intravenous barbiturates. Epidural block occurred in 6.6 per cent of the patients and subarachnoid block in two patients.

Fifty-nine per cent of the multiparas were delivered in the first hour, 76.7 per cent within one and one-half hours, and 87.4 per cent within two hours. In the primiparas 28 per cent were delivered in the first hour, 45 per cent within one and one-half hours, and 62.5 per cent within two hours.

**The Effect of Volatile Agents and Muscle Relaxants on Evoked Central Nervous System Responses in the Cat.** Hamilton S. Davis, M.D., William H. DeLon, M.D., William F. Collins, M.D., and Clark T. Randt, M.D., Department of Surgery (Divisions of Anesthesiology and Neurosurgery) and Department of Medicine (Division of Neurology), Western Reserve University School of Medicine, Cleveland, Ohio.

In a previous paper, we described the effect of gaseous anesthetic agents on electrically evoked potentials in the central nervous system of the cat. [Anesthesiology 18: 634, 1957]. Cyclopropane, ethylene and nitrous oxide were shown to depress evoked potentials in the midbrain reticular formation and, to a lesser extent, the posteroventrolateral nucleus of the thalamus. The present study represents an extension of that work and concerns the effect of muscle relaxants and volatile anesthetic agents. The muscle relaxant group included d-tubocurarine chloride in a dose range of 0.5–20.0 mg. kg.; gallamine triethiodide (Flaxedil), dose range 2.0–32.0 mg. kg.; succinylcholine chloride (Anectine), dose range 0.5–32.0 mg. kg.; and decamethonium bromide (Syncurine), dose range 0.4–4.0 mg. kg. The intravenous route of administration was used. The volatile anesthetic group included ethyl ether in a concentration range of 5–15 per cent in