than procaine. The segments of spread for chloroprocaine and lidocaine was approximately the same, but lidocaine produced a significantly greater evenness of spread. This suggests that lidocaine is more penetrant than chloroprocaine. The duration of anesthesia was significantly greater with lidocaine than with both chloroprocaine and procaine. No serious toxic reactions occurred in the second phase of study. Procaine and chloroprocaine produced a slightly greater incidence of minimal toxic symptoms, such as tinnitus and slight nausea, than lidocaine. Further studies are planned to enlarge the samples and to include other agents.

**An Assessment of Respiratory Efficiency in the Postoperative Patient.** JOSEPH J. BUCKLEY, M.D., AND FREDERICK H. VAN BERGEN, M.D. *Department of Anesthesiology University of Minnesota Medical School, Minneapolis, Minnesota.* Hamilton and Devine (*Surg. Gynec. & Obst. 105: 229, 1957*) measured the end-expiratory carbon dioxide level of 100 routine recovery room patients and found that 25 per cent were ventilating inadequately. Hood *et al.* (*J. Thoracic Surg. 36: 729, 1958*), using respiratory volume and blood gas measurements, demonstrated that about 50 per cent of patients undergoing thoracic surgery had a significant depression of ventilation immediately after surgery. These findings caused us to re-evaluate the condition of recovery room patients in our institution; if respiratory depression was as prevalent as the previous studies suggested, it seemed likely that the somewhat empiric use of oxygen could accentuate the hypoventilation. Arterial blood *p*H, carbon dioxide tension and hemoglobin oxygen saturation were measured immediately after anesthesia and surgery in 23 patients breathing room air. No respiratory acidosis was found (mean *p*H 7.43, mean $P_{A_{CO_2}}$ 35.9). However, the arterial hemoglobin oxygen saturation was significantly depressed (93.8 per cent as compared to 97.1 per cent in a control group of 20 preoperative conscious patients).

In an attempt to identify the cause of this hypoxemia, 7 patients underwent "shunt studies" in which the amount of venous admixture was quantitated from blood oxygen data obtained during 100 per cent oxygen breathing (to eliminate uneven ventilation effect). The preoperative "shunt" value was found to be 3.6 per cent; the postoperative "shunt" amounted to 10.8 per cent. In addition, the administration of nasal oxygen to 16 patients at a flow rate of 5 l./minute failed to increase the hemoglobin oxygen saturation significantly (mean saturation breathing room air, 92.7 per cent; mean saturation breathing nasal oxygen, 94.5 per cent). It seems likely that the shunt (not actually measured) in most of these patients must have exceeded 15 per cent, since this is the maximum degree of venous admixture which can be offset by 50 per cent oxygen (nasal oxygen). Uneven ventilation seems an unlikely explanation in view of the data of Brattstrom (*Acta chir. scandinav. (supp. 195) 1954*). These data suggest that subtle venous admixture may follow anesthesia and surgery and may represent a postoperative complication which is difficult to recognize by ordinary clinical methods. [*Supported by research grant (H-1983C4), United States Public Health Service.*]

**Respiratory Obstruction in Normothermia and Hypothermia.** HAROLD F. CHASE, M.D., DAVID J. LAFIA, M.D., AND MEARL A. KILMORE, B.S. *Departments of Anesthesiology and Neurosurgery, Jefferson Medical College, Philadelphia, Pennsylvania.* This report compares physiologic responses to respiratory obstruction during normothermia and hypothermia. Dogs were anesthetized with thiopental, their tracheas intubated, and then allowed to breath a mixture of nitrous oxide and oxygen. Arterial, inferior vena caval, external jugular, endotracheal and cisternal pressures, and the electrocardiogram were recorded on a Grass polygraph. Respiration was obstructed for ten minutes by forcing the animals to breath through a 15 gauge needle. Hypothermia of 30 C. was then produced by packing the dog in ice, and the respiratory obstruction repeated. Rectal temperature was recorded by a mercury thermometer. During normothermic obstruction there was an increase in all pressures, but the elevation in endotracheal pressure was proportionately larger. The electrocardiogram showed a sinus rhythm. There was a wide fluctuation of arterial, inferior vena