

Since this study was started the abdomens of 5 patients with acute intestinal obstruction have been auscultated before and after the administration of morphine preliminary to operation. In all instances the loud intestinal gurgling noises have persisted after the morphine was given. In the diagnosis of obstruction the concomitant occurrence of the peristaltic rushes at the height of the pain is of great importance. When the pain is assuaged the interpretation of the significance of the persistent intestinal noises, which are not silenced by morphine, is more difficult to evaluate.

Conclusions.—Morphine increases the intestinal tone and peristaltic activity of the obstructed intestine of the dog. Loud intestinal borborygmi which may be heard with the stethoscope early in intestinal obstruction are not silenced by the administration of morphine.

5353

Influence of Hyperventilation on Experimentally Produced Gastric Secretion.

J. S. L. BROWNE AND A. M. VINEBERG. (Introduced by J. B. Collip.)

From the Departments of Biochemistry and Physiology, McGill University, Montreal.

During the course of an investigation by one of us¹ of the effect of vagal stimulation on the production of gastric secretion, it was observed that artificial ventilation considerably diminished the volume of the secretion. To ascertain the factors involved in this effect the following experiments were performed on dogs anesthetized with a chloralose and urethane mixture given intravenously.

1. Gastric secretion was obtained by vagal stimulation in the neck. The right and left nerves were stimulated alternately for 10 minutes each throughout the experiment. 2. Hyperventilation was applied. 3. Hyperventilation was continued at the same rate using an artificial air-carbon-dioxide mixture.

A study was made of the gastric juice, the collecting tubes being changed every 10 minutes. Total and free acid were determined by titration, and total chlorides by the method of Wilson and Ball.²

¹ Vineberg, A. M., *Am. J. Physiol.*, in press.

² Wilson, D. W., and Ball, E. G., *J. Biol. Chem.*, 1928, **79**, 221.

The arterial (carotid) plasma carbon dioxide content was determined by the volumetric method of Van Slyke, and the plasma pH by the colorimetric method of Cullen.³

While the vagi were stimulated the volume of gastric secretion rose gradually over a period of 2 hours to a value of from 8 to 10 cc. in 10 minutes. The free and total acid also rose, the former to a concentration of 0.24 mg. %. The initial arterial CO₂ content was 34.8 vols. %, and the pH 7.27; both somewhat low, due probably to primary ether anaesthesia. After this period the CO₂ content was 43.3 and the pH 7.33. Artificial hyperventilation was then applied at the rate of 64 per minute, and later at 84 per minute, the respiratory rate up to this point having been 12. The sample immediately following this showed a large increase in volume but no appreciable change in free or total acidity. This was probably due to a mechanical expression of previously-formed secretion. Subsequently over a period of 80 minutes the volume and the free and total acid were markedly diminished, the volume to an average value of 3.5 cc. in 10 minutes, the free acid to a concentration of 0.10 mg. %. The total acid ran parallel to the free acid and the total chlorides showed no appreciable change. Blood taken during this period showed a CO₂ content of 25.4 vols. % and a pH of 7.70.

After this sample was taken, air containing 8% carbon dioxide was given, the respiration being kept constant at a rate of 84 per minute. There was a latent period of 10 minutes, after which the volume showed a distinct rise to an average value of 5.5 cc. in 10 minutes. The free acid rose to an average value of 0.27 mg. %. The total acid rose in a parallel manner and the total chlorides showed a slight increase. The blood showed a CO₂ content of 41.4 volumes % and a pH of 7.17. The changes in the gastric secretion were maintained over a period of 35 minutes, at which point the experiment was discontinued.

Similar results have been observed in a number of experiments, but on 2 occasions the gastric secretion under hyperventilation showed an initial slight fall in volume and free and total acid, rising later to control values. The CO₂ content in both these experiments was at the extremely low value of 9 volumes %, whereas in the typical experiments it was about 25 volumes %. In this preliminary communication we hesitate to venture an interpretation of these findings, but it seems to us that the parallelism between the CO₂ content of the plasma and gastric secretion may be of significance in the light of Maly's old theory of gastric secretion.

³ Cullen, G. E., *J. Biol. Chem.*, 1922, **52**, 501.