New York Meeting.

Presbyterian Hospital, February 15, 1928.

3843

Duodenal and Gastric Ulcers in Dogs With Biliary Fistulas.

BENJAMIN N. BERG, ALEXANDER JOHNSTON AND JAS. W. JOBLING.

From the Department of Pathology and Surgery, College of Physicians and Surgeons, Columbia University.

Although numerous methods have been employed to produce peptic ulcers experimentally,[1] the frequent occurrence of ulcers of the duodenum in dogs with bile fistulas has not been described. Bickel,[2] Exalto[3] and Mann[4] found ulcers in the jejunum after diverting the duodenal, biliary and pancreatic secretions away from the stomach and performing a gastro-jejunosotomy. Mann also found ulcers in the duodenum by transplanting the pancreatic and bile ducts into the lower ileum. It was considered that an important factor in the development of these ulcers was the loss of the neutralizing effect of the alkaline secretions upon gastric acidity. According to Boldyreff,[5] the alkalinity of the pancreatic secretions was greater than that of all the others combined and was the chief element in the neutralization of the gastric juice.

In a series of dogs with bile fistulas, we noted at autopsy the prevalence of duodenal ulcers. The fistulas were made according to the method of choledochostomy described by Rous and McMaster[6] which permitted the collection of the total output of hepatic bile and deprived the animals completely of their biliary secretions. The dogs could not lick the fistulous openings, and accessory communications between the common duct and the intestine were ruled out at autopsy.

The series consisted of 9 dogs which lived for periods extending from 12 days to 46 days. There were 8 males and one female. The ages varied. The diet consisted of combinations of biscuit, bread,

meat, oatmeal, cod liver oil and bones, with water *ad lib.* Fat was removed as completely as possible from the food. Two dogs received liver, in addition to the other food. The appetites of the dogs were capricious and it was found necessary to vary the constituents of the diet frequently. All of the dogs lost weight, the average loss being approximately 25% of the original weight. The stools were clay colored and well formed.

In 7 dogs duodenal ulcers were found 13, 14, 16, 24, 26, 29 and 46 days respectively after the establishment of the bile fistulas; in one of these dogs (26 days) a pyloric ulcer was also present; in another (46 days) 2 gastric ulcers were found in addition to a duodenal ulcer. In 2 dogs which were examined 12 and 15 days respectively after operation, no ulcers were found.

The characteristic features of the duodenal ulcers were as follows: they were single and were situated usually on the ventral surface of the duodenum between the pyloric sphincter and the ampulla of Vater, never encroaching upon the latter, however. The acute ulcers were irregularly oval and were found in 3 dogs (13, 14 and 16 days). The subacute or chronic ulcers were round and occurred in 4 dogs (24, 26, 29 and 46 days). The size varied from 25 mm. x 15 mm. to 5 mm. x 4 mm. The ulcers had a punched-out appearance and penetrated the muscularis of the intestinal wall. In the acute type, the base of the ulcer was shaggy and friable. In the subacute and chronic types, the margins were indurated and the bases were firm and hard; these ulcers were easily palpated before the intestine was opened. The microscopic appearance of the ulcers corresponded to the gross findings. There were no evidences of vascular changes in the region of the lesions. No histological alterations were observed in the pancreas. In 2 dogs death was due to suppurative peritonitis following perforated duodenal ulcers.

The gastric ulcers were found on the lesser curvature and measured 17 mm. x 10 mm. and 17 mm. x 5 mm. respectively. They were of the chronic indurated type and the margins were undermined. One of the ulcers was perforated. The pyloric ulcer was a shallow lesion measuring 10 mm. x 5 mm.

Duodenal ulcers occurred in a high percentage of dogs with bile fistulas. Gastric ulcers were also encountered. The lesions were similar to those found in man. Although no definite analogy can be made between the experimental findings and human ulcers at the present time, the isolation of a single controllable factor, such as the bile, in the experimental production of ulcers may be of value in further investigations. A control series of 50 dogs were examined

for the spontaneous occurrence of duodenal or gastric ulcers, but none were found.

[1] Hauser, G., Henke-Lubarsch, *Handbuch der Speziellen Pathologischen Anatomie und Histologie, Berlin,* Julius Springer, 1926, iv, 339.

[2] Bickel, A., *Berl. Klin. Wchnschr.,* 1909, xlvi, 1201.

[3] Exalto, J., *Muench. Med. Wchnschr.,* 1911, lviii, 1144; 1911, lviii, 1792.

[4] Mann, F. C., and Williamson, C. S., *Ann. Surg.,* 1923, lxxvii, 409.

[5] Boldyreff, W. N., *Quar. J. Exp. Physiol.,* 1914-15, viii, 1.

[6] Rous, P., and McMaster, P. D., *J. Exp. Med.,* 1923, xxxvii, 11.

3844

Effect of Hardening and Fixation on Gram Reaction.

JOHN W. CHURCHMAN.

From the Laboratory of Experimental Therapeutics, Cornell University Medical School.

In a recent study of sections of the livers and spleens removed from mice, dead of experimentally produced anthrax, we were surprised to find that although the young culture used to induce the disease had been sharply gram-positive, the majority of the organisms with which the tissues teemed, were either completely or partially decolorized by gram. The experiment was repeated with *Saccharomyces cerevisiae,* a sharply gram-positive organism, more stable in this respect than *B. anthracis.* A heavy suspension of this organism was injected into the anterior abdominal vein of an etherized frog after the other vessels of the liver had been ligated. The liver thus impregnated with yeasts was immediately removed, and pieces of it were put into Zenker's fluid and into formalin. These were run through in the usual manner and cut in paraffine. The sections were stained by gram. (Burke's Modification). A large majority of the organisms were found to be completely or partially decolorized. This reversal of the gram reaction (similar to that recently described as following exposure of *B. anthracis* to acriviolet[1]) might be thought of as occasioned by the contact of the organisms with the animal body, or as resulting from exposure of the organisms to the various chemicals used in hardening and fixation.

An inquiry was therefore instituted as to the effect of these processes on gram reaction. On account of the danger of this kind of experiment if done with *B. anthracis, Saccharomyces cerevisiae*