tration among many others is one of the regulating factors of the circulatory volume. Deviation from normal on the part of the former may be attended by a disturbance of the latter. This is well exemplified in such pathological conditions as nephrosis and nutritional edema.

6101

Experimental Production and Cure of Jejunal Ulcers.

JAMES C. OWINGS AND IVAN H. SMITH. (Introduced by F. C. Lee.)

From the Surgical Hunterian Laboratory, Johns Hopkins Medical School.

Twenty-six animals were operated upon for the production of jejunal ulcers using a slight modification of the technic of Mann and Williamson[1] for depriving the jejunum of its normal alkalinity.

In each case the duodenum was transected between the pylorus and the ampulla of Vater and both ends inverted with silk. The jejunum was then divided a few inches beyond Treitz's ligament and again both ends inverted. Following this a gastro-enterostomy was performed between the distal end of the jejunum and the stomach and an enteroenterostomy performed between the closed duodenojejunal loop and the upper ileum about 24 inches below the gastroenterostomy, allowing the bile, pancreatic juice and duodenal secretions to be emptied back into the small bowel at this point. These changes were made in the original procedure because it was felt that the nutrition of the animals would be better preserved if the drainage were done higher in the small intestine, thereby eliminating this factor from the ultimate results. Also since a lateral anastomosis has a better blood supply than one made end-to-end, there would be less chance of criticism on this score as a possible source of ulcer formation.

Ten of these animals formed typical chronic ulcers varying in size from ½ to 2½ cm. in diameter. The period necessary for the formation of the ulcers varied from 42 to as long as 428 days with the average of 118 days. The ulcers were multiple in 3 cases. They always formed on the wall of the jejunum opposite the gastroenterostomy stoma and never involved the suture material which was of silk throughout, except in one instance, where the edge of a very large perforating ulcer touched it in one spot. The animals were

[1] Mann, F. C., and Williamson, C. S., *Ann. Surg.*, 1923, **77**, 409.

explored every 2 weeks up to 6 weeks and then once a month until either an ulcer was found or they died from some other cause. Sixteen of the 26 died from extraneous causes at an average of 26 days postoperative without ulcer formation.

Three of the 10 dogs that formed ulcers died before any attempt of cure could be made; one died from hemorrhage, and 2 from hemorrhage with partial biliary obstruction. In the other 7 the bile, pancreatic juice, and duodenal secretions were poured back over the area of ulcer formation as soon as it was discovered. In order to do this the lateral anastomosis was taken down and an end-to-side union made between the duodeno-jejunal loop and the stomach. In 4 cases the ulcer completely healed, in 42, 56, 61, and 83 days respectively. In 2 it was only partially healed when the dogs died, one from distemper at 19 days, and the other from partial biliary obstruction with jaundice at 153 days. The 7th dog showed no disposition to heal and died from hemorrhage on the 13th day following the second operation. In 2 of the dogs where the ulcer had healed completely, the digestive juices were again short-circuited. In the 1st dog the ulcer reformed, perforated, and caused the death of the dog from peritonitis on the 12th postoperative day. The second attempt was a failure due to a faulty suture line, causing the death of the dog on the 4th day after operation. The general condition of the dogs remained excellent until an ulcer appeared. From this time on they rapidly lost weight and became anemic, but gained weight during the healing period after the second operation.

6102

The Etiology of Duodenal Ulcers.

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Since the original work of Mann and Williamson[1] much has been written concerning the experimental production of duodenal ulcers by depriving the duodenum of its normal alkalinity. It, therefore, becomes of interest to know if any one of the 3 secretions, bile, pancreatic juice, or intestinal juices, is specifically responsible for protection against ulcer formation, or whether the presence of all of them is necessary.

[1] Mann, F. C., and Williamson, C. S., *Ann. Surg.*, 1923, **77**, 409.