THE PROBLEM OF PEPTIC ULCER FOLLOWING PANCREATECTOMY*

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MANN AND WILLIAM IN 1923 demonstrated, in dogs, that after an operation short-circuiting the alkaline duodenal contents, bile and pancreatic juice into the lower small bowel, a marginal jejunal ulcer forms at the gastrojejunostomy site, due to the action of unneutralized gastric juice. This operation consisted of transecting the duodenum at its proximal and distal ends, leaving the bile and pancreatic ducts attached in normal position to the duodenum. The proximal end of the duodenum was closed and the distal end was anastomosed to the side of the lower ileum. The open end of the jejunum was then sutured to the pylorus. (Fig. 1). Fourteen dogs out of a group of 16 thus treated and followed over a period of time developed typical peptic ulcers in the jejunum adjacent to the site of the anastomosis with the stomach. Repetition of this experiment by others has consistently confirmed the results.

In another series of experiments the bile and pancreatic ducts were transplanted to the lower ileum. The majority of animals so treated developed ulcers in the duodenum. Peptic ulcers likewise form in the intestine distal to the pylorus in dogs in which the bile and pancreatic ducts are transplanted into the ileum and in addition the duodenum is resected. On the other hand those dogs in which the duodenum was resected and the bile and pancreatic ducts were implanted into the jejunum at about the same distance from the pylorus as they were originally, remained in good condition for long periods.

Exalto[2] in 1911 and Matthews and Dragstedt[3] in 1932 in similar experiments demonstrated the importance of neutralizing duodenal content in the prevention of peptic ulcer.

Peptic ulcers may form in like manner in man following pancreatoduodenectomy in which the bile duct is anastomosed to the jejunum distal to the gastroenterostomy, and the pancreatic duct, in case of subtotal pancreatectomy, is ligated. One of these procedures was done in each of the following cases.

A man of 59 years was operated upon for suspected carcinoma of the pancreas. At operation the pancreas was hard except for two large cystic areas. It was impossible to determine whether this was carcinoma or pancreatitis or both; therefore, because of the severity of symptoms, total resection of the pancreas was carried out. Pathologic study revealed a severe chronic pancreatitis with an intraductile papilloma obstructing the main pancreatic duct near the ampulla of Vater. The patient made a very satisfactory postoperative recovery except for the development of a postoperative hernia in one portion of the wound.

In restoring the bowel continuity, a proximal anterior gastrojejunostomy and a distal cholecystenterostomy were made. An enteroenterostomy was made

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between the two previous anastomoses (Fig. 2). The patient was well until four months after operation when he was prostrated by sudden severe abdominal pain which came on without warning while he was at work hanging a new window in his home. When seen 24 hours after the onset of symptoms the patient was moribund. Exploration revealed a two centimeter sized perforation of the anterior wall of the jejunum at the site of the gastrojejunostomy. The perforation was closed but the patient died of peritonitis in spite of intensive supportive therapy. Autopsy revealed the surgically closed ulcer and another superficial ulcer adjacent to it at the line of junction of the jejunum and stomach. The entero-anastomosis designed to protect the biliary system from gastric and intestinal content had diverted the bile from the gastroenterostomy stoma leaving the jejunal mucosa to the direct action of unneutralized gastric juice.

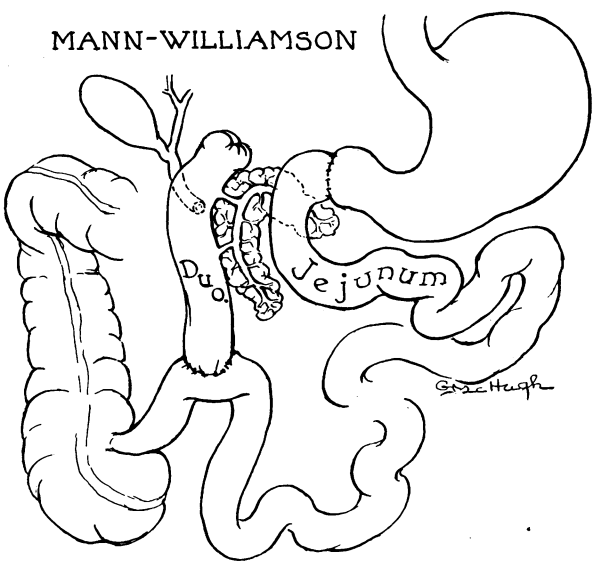

FIG. 1.—Mann-Williamson procedure carried out in first group of animals.

A second man died of carcinomatosis six weeks after resection of the head and neck of the pancreas and at autopsy a benign ulcer with a sinus was found on the lesser curvature of the stomach. The reconstruction in this case consisted of a proximal posterior gastrojejunostomy, distal choledochojejunostomy and intermediate jejuno-jejunostomy. The transected stump of pancreas was ligated. There was failure of neutralization of gastric juice because of diversion of the bile and the absence of pancreatic juice.

The third patient had a resection of the head and neck of the pancreas for carcinoma of the head of the pancreas. A proximal gastroenterostomy, a distal cholecystenterostomy and choledochoenterostomy and an intermediate entero-enterostomy were performed. Closure of the pancreatic ducts was effected by

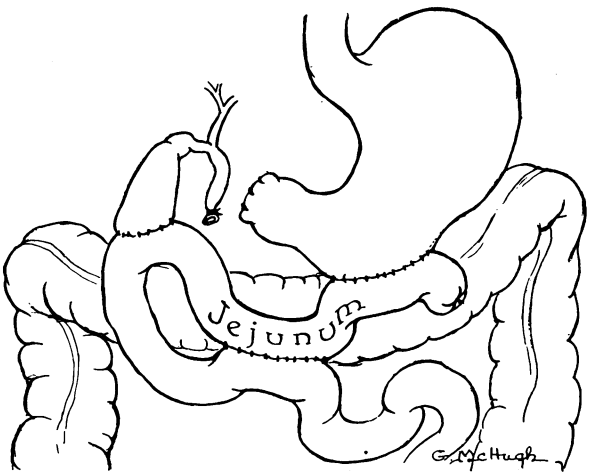

FIG. 2.—Reconstruction of gastro-intestinal tract following total pancreatoduodenectomy in Case No. 1.

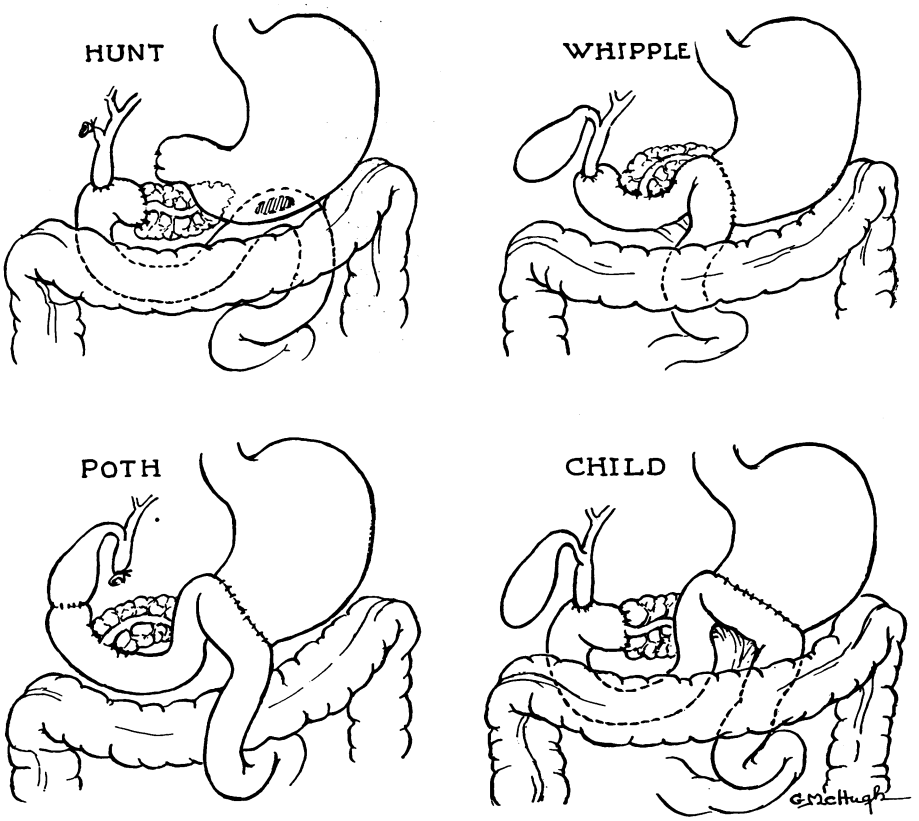

FIG. 3.—Methods of reconstruction which are founded on sound physiologic principles.

ligation and suture of the transected end of the pancreas. The patient made a satisfactory recovery from operation but returned a month later complaining of recurrent epigastric pain coming on about two or three hours after meals. Roentgen-ray examination of the upper gastro-intestinal tract failed to reveal any evidence of ulcer in the gastroenterostomy stoma, but there was a persistent collection of barium present along the lesser curvature of the stomach which was suspicious, but not a typical ulcer pattern. However, this patient responded well to a modified ulcer diet with the addition of magnesium and calcium carbonate powders. He has remained asymptomatic on a modified ulcer diet. The type of reconstruction in this instance resembled that employed in the other cases.

The methods of reconstructing the intestinal tract following the resection of the duodenum and pancreas are so numerous and varied that no attempt will be made to enumerate them. Many of these repairs tend to deprive the patient of the maximum neutralizing effect of the bile, pancreatic juice and duodenal secretions. So much attention has been paid to protecting the biliary passages against the reflux of intestinal content that the problem of protecting the gastroenterostomy has been largely ovelooked. The importance of implanting the pancreatic duct into the jejunum in case of partial pancreatectomy can be appreciated when one considers the strongle alkaline reaction of pancreatic juice.

The plan of repair published by Hunt[4] in 1941 has the advantage of affording the maximum protection to the gastroenterostomy stoma and at the same time reducing to a minimum the reflux of gastric and intestinal content into the bile ducts. Hunt (Fig. 3) anastomosed the pancreatic duct with the proximal end of the jejunum and implanted the common duct into the jejunum just distal to the pancreatodochojejunostomy. (Fig. 3). Somewhat farther distal was performed the gastroenterostomy. In this patient all of the bile and pancreatic juice passed the gastrojejunostomy site and maximum utilization of the neutralizing effect of these juices was obtained where it was most needed. Whipple[5] in 1943 and Child[6] and Poth[7] in 1944 have used methods similar to that described by Hunt. Child and Poth each removed the antrum of the stomach and made a Polya type of anastomosis. This avoided the blind pouch of stomach left by Hunt and Whipple and slightly reduced the acid secreting area of the stomach. The long jejunal loop made by Poth and Child affords protection to the biliary tree from reflux of gastric content. Waugh and Priestly have recently demonstrated a similar repair. Other methods of reconstruction fail to take full advantage of the protective action of bile and pancreatic juice.

Depriving the body of duodenal secretions by the resection of the duodenum reduces the neutralizing power of the alkaline secretions of the gastrointestinal tract. Undoubtedly this is a factor of less importance in cases of carcinoma of the pancreas than in benign lesions of the pancreas, for the gastric acidity tends to be reduced in those patients with carcinoma. However,

reconstruction after total or subtotal pancreatoduodenectomy in man should be done in such a manner as to neutralize the gastric juice as fully as possible. The ideal reconstruction operation consists of a choledochojejunostomy and, when a portion of the pancreas remains, a pancreatodochojejunostomy, both performed proximal to the gastrojejunostomy.

Pearse[8] has recently suggested standardizing the reconstruction following pancreatoduodenectomy. He considers the principles of repair to be:

1. The use of retrocolic end to side gastrojejunostomy.
2. The implantation of the common bile duct into the intestine.
3. The reconnection of the pancreas with the intestine.
4. The diversion of the gastro-intestinal contents away from the liver and pancreas by antiperistalsis.

We are in accord with his principles, but emphasize the fact that all bile and pancreatic juice should pass the gastrojejunostomy stoma.

The use of vagotomy in this operation to prevent the formation of ulcer has been considered. There are several objections. First, we feel that the basic repair, if properly done, should not require the added procedure of vagotomy. Second, experimental work done by Dragstedt and co-workers[9] with Mann-Williamson type of dogs reveals that vagotomy protects these dogs only slightly against the formation of ulcers. (46% of dogs with vagotomy developed ulcers, whereas 63% of dogs without vagotomy developed ulcers). Thus we feel that vagotomy is not indicated as an adjunct to pancreatoduodenectomy which in itself is a formidable operation.

SUMMARY

1. The importance of the neutralizing effect of bile and pancreatic juice in the prevention of peptic ulcer is emphasized.

2. The development of peptic ulcers following improper reconstruction of the gastro-intestinal tract after pancreatoduodenectomy is cited. Three cases are reported.

3. Recommendations are made for methods of repair after pancreatoduodenectomy which make the greatest use of bile and prancreatic juice in the neutralization of acid gastric juice.

4. Vagotomy is not a substitute for the proper type of reconstructive procedure.

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