

ANNALS OF SURGERY

VOL. LVIII

AUGUST, 1913

No. 2

ORIGINAL MEMOIRS.

THE SURGERY OF THE PANCREAS.*

- I. INJURIES TO THE PANCREAS IN THE COURSE OF OPERATIONS ON THE STOMACH.
- II. INJURIES TO THE PANCREAS IN THE COURSE OF OPERATIONS ON THE SPLEEN.
- III. RESECTION OF HALF THE PANCREAS FOR TUMOR.

BY WILLIAM J. MAYO, M.D.,

OF ROCHESTER, MINNESOTA.

THE deep situation of the pancreas renders it difficult to obtain correct knowledge of its diseases during life. The little knowledge which is obtained is due chiefly to the individual experience of various surgeons and to experimental investigations.

The pancreas is derived from two or three buds from the foregut and early in fetal life is an intraperitoneal organ. When rotation takes place the pancreas is turned on its right side, losing its posterior peritoneum, which becomes converted into fibrous tissue. Possibly the diffuse character of fat necrosis both within and without the peritoneal cavity from pancreatic perforation can be accounted for in this way.

The pancreas receives its blood supply from five or six different sources, the most important of which are the superior pancreaticoduodenal, the inferior pancreaticoduodenal, the inferior pancreatic and the branches that are derived from the splenic artery as it runs behind the superior border of the body of the pancreas. The lymphatics of the pancreas

* Read before the American Surgical Association, May 8, 1913.

are not collected in one group but follow the vascular supply—an important fact in connection with the causation of pancreatitis, as pointed out by Deaver.¹

The pancreas has no true capsule but, when irritated, one quickly forms from the peritoneum and those tissues derived from the peritoneum (Fig. 1).

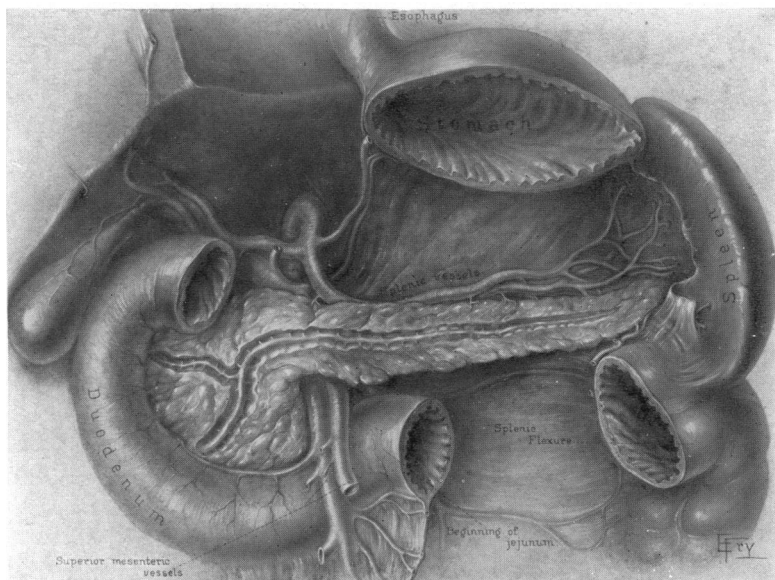
The pancreas is hidden by the liver, duodenum, transverse colon and especially by the stomach. The two latter organs vary in position to a considerable extent. Access to the pancreas for operative purposes is usually best obtained through the gastrocolic omenta, drawing the stomach upward and the transverse colon downward. The pancreas, especially the head, is usually fixed in position, but it may be more or less movable in the body and tail. During routine abdominal operations patients are occasionally seen in whom the pancreatic attachments are so loose that the pancreas as a whole can be drawn outside the abdominal cavity.

I. INJURIES TO THE PANCREAS IN THE COURSE OF OPERATIONS ON THE STOMACH.

Haberkant² reported a mortality of 76 per cent. in his cases of resection of the stomach for cancer in which there were pancreatic attachments resulting in injuries to the pancreas. Mikulicz³ found a mortality of 70 per cent. in his cases when the pancreas was injured as against 27.5 per cent. when it was not injured. In 448 resections of the stomach for benign and malignant diseases up to Dec. 31, 1912 (W. J. and C. H. Mayo) the average mortality was 10 per cent. In about 8 per cent. of these cases the pancreas was injured and the average mortality was 11 per cent.

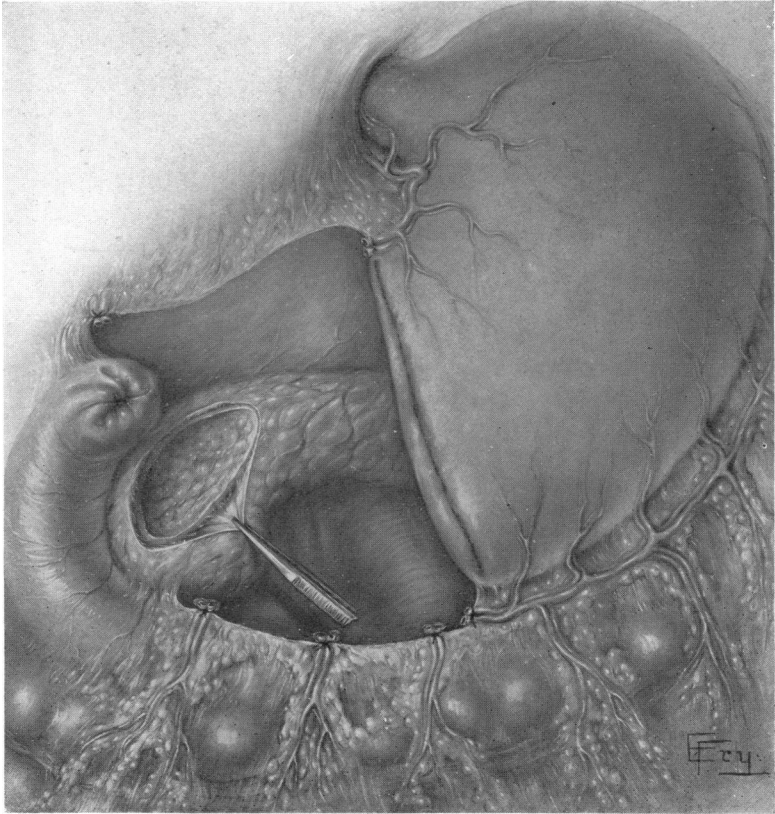
In none of these operations, however, was the main pancreatic duct reached, usually only a superficial piece was removed from the surface at a point where the pancreas was adherent to the diseased stomach. The bleeding was usually free and best controlled by catgut on a curved needle. It was noted that in these cases the pancreas had a fibrous capsule, the result of the localized peritonitis.

FIG. 1.



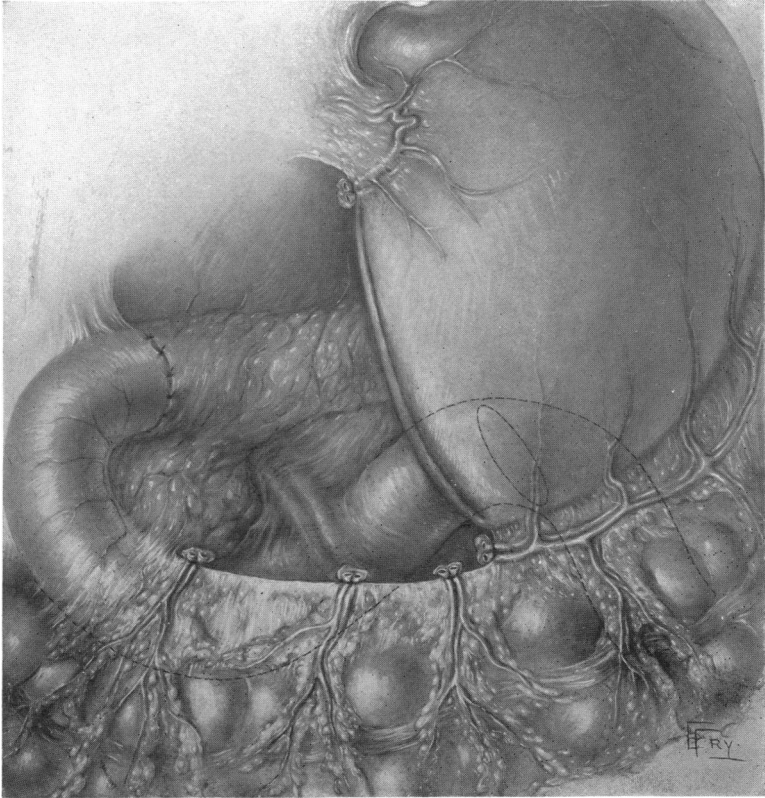
Showing anatomy of pancreas and its anatomic relations.

FIG. 2.



Showing excavation in pancreas following resection of pyloric end of stomach with pancreatic involvement. The end of stomach and end of duodenum both closed.

FIG. 3.



Showing operation completed. Closed end of duodenum buried in excavation in pancreas.

After removing the pyloric end of the stomach for cancer we close the end of the duodenum with two superimposed purse-string sutures and then apply the closed duodenal stump directly to the wound in the pancreas, as suggested by Willy Meyer.⁴ The anterior peritoneum and adventitious sheath of the pancreas is then sutured to the anterior surface of the duodenum. We have used this method for something like six years and have not had leakage in a single instance either from the duodenum or the pancreas.

Fig. 2 shows the end of the duodenum closed by purse-string sutures and the vessels tied in the excavation in the pancreas. Fig. 3 shows the end of the duodenum fastened in the wound in the pancreas.

Ulcers of the posterior wall of the stomach often perforate and become attached to the pancreas. In a previous paper I described a method of transgastric excision of such ulcers.⁵ These ulcers usually form an excavation into the body of the pancreas and it is necessary to excise them cleanly well down into the pancreatic tissue, leaving no area of infection. This opening cannot be closed by sutures and after stopping the hemorrhage with catgut on a needle, a piece of the gastrohepatic or gastrocolic omentum is mobilized and turned into the excavation in the body of the pancreas, being held in place by catgut sutures. In our earlier cases we used a drain of folded rubber tissue but abandoned it as unnecessary since no drainage followed.

II. INJURIES TO THE PANCREAS IN THE COURSE OF OPERATIONS ON THE SPLEEN.

In 31 splenectomies performed in our clinic the tail of the pancreas was injured three times, owing to the fact that the tail passes with the splenic vessels well up into the hilum of the spleen. In performing splenectomy the spleen is withdrawn from the abdomen, the adhesions to the diaphragm and region of the left kidney are separated and a rubber-covered clamp of the Lower variety is used to catch the entire pedicle. The tail of the pancreas is often so closely

incorporated with the pedicle of the spleen that it occasionally is injured. This occurred in three of our cases.

In one case about one and one-half inches of the tail of the pancreas was found attached to the removed spleen and the pancreatic duct was plainly visible in the ligated stump. After covering the stump with peritoneal tissue and attaching a drain (which was unnecessary since no drainage followed) it was allowed to drop back into position. The patient recovered.

In the second case the tail of the pancreas was found tied in the pedicle about an inch from the tip. Since the case was one of splenic anæmia and the patient in poor condition, the stump was allowed to drop back in this condition. The patient recovered. The third case (A77736) was a male, aged twenty-six years, in whom a diagnosis of splenic anæmia had been made. At operation (January 14, 1913), the spleen was found to be of great size, extending well to the right of the median line and down to the brim of the pelvis. On account of the adhesions it was unusually difficult to remove the spleen from the abdominal cavity. The clamp was applied and the organ cut away. Catgut ligatures were applied to the splenic pedicle in sections. As the ligatures were tightened on the splenic artery, which was large, tortuous and atheromatous, it cut through and, with a gush of blood, dropped down behind the pancreas. It was caught with the fingers and compressed against the body of the pancreas while a second ligature was applied. This cut through also and it was evident that the splenic vessels would not maintain direct ligature. A double catgut strand was therefore placed around the entire body of the pancreas about three inches from the tail including the splenic vessels, the pancreas being used to strengthen the walls of the vessels. The pancreatic tissues were considerably crushed as the ligature was pulled taut. The hemorrhage was controlled immediately but as softening of the pancreatic tissue with loosening of the ligature was feared, a second ligature was applied in the same manner but one inch further to the right. It is probable that complete separation of four inches of the pancreas from the head and remainder of the body occurred. The patient made a good recovery and left the hospital in two weeks.

Coffey⁶ demonstrated experimentally that tying the pancreatic duct with or without the surrounding pancreatic tissue

would not permanently occlude the pancreatic duct, that the duct would regenerate and reunite within a few days. While the duct itself was not actually tied, the pressure of the ligatures about the pancreas must have been sufficient to mechanically obstruct its lumen. The abundant supply of blood from numerous sources prevented serious damage to the nutrition of the portion of pancreas cut off by the pressure of the ligature.

III. RESECTION OF HALF THE PANCREAS FOR TUMOR.

CASE No. A68699.—J. L., female, aged thirty-seven years. Date of operation, June 15, 1912. History of severe attacks of pain extending into the left abdomen, and left lumbar region so severe at times as to necessitate the use of morphin. At no time was the patient free from pain. Point of tenderness over the region of the body of the pancreas. Loss of weight, 17 pounds. Duration of illness, 3 months. Contents of stomach, stools, blood, and X-ray negative. Tentative diagnosis, cholelithiasis with pancreatic involvement. An exploratory incision was made two inches to the right of the median line in the upper rectus muscle. There were no gall-stones but a hard, irregular tumor the size of an egg was found in the body of the pancreas about its middle. A second working incision was made through the upper rectus muscle three inches to the left of the median line. The gastrocolic omentum was divided, the stomach drawn upward and the transverse colon downward. The body of the pancreas and the tumor were brought to the surface as well as possible. It seemed best to begin at the tail and remove the left half of the pancreas with the tumor. This proved to be a difficult procedure since the entire pancreas was deeply placed and fixed in position. One of the deep veins was injured and a free hemorrhage occurred which was difficult to control without injury to the splenic vessels. Finally the tail and body of the pancreas with the tumor, about $4\frac{1}{2}$ inches in all, was separated, a strong clamp applied across the body one inch to the right of the tumor and the left half of the pancreas with the tumor cut away. Four clamps had previously been attached to vessels in the deep portions of the wound. An attempt was made to tie off one of these clamps with catgut on a needle, and a fresh point of bleeding which required another clamp was the

result. The handles of the five clamps and the handles of the clamp previously placed across the body of the pancreas were brought to the surface and the cavity from which the pancreas had been removed was packed loosely with gauze. On the fourth day the clamps were loosened and on the fifth day they were removed. The gauze was removed on the tenth day. The patient made a good recovery, regained her normal weight and remains well. The tumor, which had the external characteristics of a malignant growth, proved on section to be a benign thick-walled trabeculated cyst buried in sclerosed pancreatic tissue.

Resections of the pancreas for tumor have seldom been made, although as far back as 1884 Billroth⁷ removed the pancreas for an adenocarcinoma with recovery of the patient. Finney⁸ collected 16 cases from the literature in which the pancreas had been removed for tumor, and he reported a most interesting one of his own. There were 9 recoveries and 8 deaths in the series. All of the fatalities occurred in cases of resection for malignant disease. In Finney's case and in two others, a complete resection including the tumor was made and the divided ends of the pancreas resutured with recovery of the patients.

REFERENCES.

- ¹ Deaver: "Pancreatic Lymphangitis and Chronic Pancreatitis." *Jour. Am. Med. Assoc.*, Jan. 4, 1913, pp. 1-4.
- ² Haberkant: Quoted by Paterson, "The Surgery of the Stomach," p. 43.
- ³ Mikulicz: "Surgery of the Pancreas, with Especial Consideration of Trauma and Inflammatory Processes." *Trans. Cong. Am. Phys. and Surg.*, 1903, vi, pp. 55-79.
- ⁴ Meyer, Willy: Discussion of Finney's article, "Resection of the Pancreas." *Trans. Am. Surg. Assoc.*, 1910, p. 330.
- ⁵ Mayo: "Transgastric Excision of Calloused Ulcer of the Posterior Wall of the Body of the Stomach." *ANNALS OF SURGERY*, Dec., 1910, pp. 797-800.
- ⁶ Coffey: "Pancreato-enterostomy and Pancreatectomy." *ANNALS OF SURGERY*, 1911, 1, pp. 1238-1264.
- ⁷ Billroth: Quoted by Finney, *Trans. Am. Surg. Assoc.*, 1910, p. 324.
- ⁸ Finney: "Resection of the Pancreas." *Trans. Am. Surg. Assoc.*, 1910, pp. 315-330.