Case Report.—Unit No. 392089: Mrs. A. C., age 53.

History: The patient was first studied in the Vanderbilt Clinic, in February, 1940, for a complaint of epigastric pain and loss of weight and strength of two month's duration. Her past history, except for three similar attacks 23, 12 and 5 years ago, was irrelevant. During the previous two months, as a result of excessive work, she had developed a severe burning epigastric pain, with acid eructations, relieved by alkalies and small feedings of bland food. During this time she had lost 12 pounds, and had an admission weight of 80.25 pounds. She was admitted to the Medical Service.

Physical Examination: The patient was a tired, thin woman, looking chronically ill, not anemic or jaundiced. The only positive findings were in the abdomen. There was epigastric tenderness, high up near left costal margin and below and to the right, just above the umbilicus, could be felt a firm, nontender movable mass, four centimeters in diameter.

Laboratory Data: Hb, 11/7 Gm., R. B. C. 4,100,000; normal white cell count and differential. Gastric analysis: Free HCl—O, 20 minutes after histamine—58. Guaiac test—negative. Uraanalysis: No abnormalities.

Barium Meal: 50% six-hour residue. A large filling defect was found in the pars media and antral portion of the stomach, which corresponded to a mass palpated in the epigastrium. On the lesser curvature, near the filling defect in the antrum, a persistent barium projection is seen, one centimeter in depth and diameter—characteristic of a penetrating ulcer.

She was observed on the Medical Ward for a week, where she was seen by the surgeons, and everyone agreed with the diagnosis of carcinoma of the antrum of the stomach, and she was, therefore, transferred to the Surgical Service.


Partial gastrectomy; complete duodenectomy; removal of head and part of body of pancreas; anterior gastro-enterostomy, end-to-side; and choledocho-enterostomy.

Operative Pathology: The findings in this patient proved to be quite unexpected. Because of the patient's symptoms, the presence of a movable mass and the positive roentgenologic diagnosis of a carcinoma of the antrum of the stomach, the patient was operated upon with the idea of partial gastrectomy. When the thin abdominal wall was opened the mass could be felt in what was thought to be the posterior wall of the stomach. Because it moved easily the lesser sac was not opened to inspect the posterior wall of the stomach. This was a mistake, for the mass, which proved to be a tumor of the head of the pancreas, was not discovered until after the stomach had been transected. However, the ultimate procedure was not materially endangered because the patient was not jaundiced, and it was felt that a one-stage procedure could be carried out in this case—and it was essential to do so, once having cut through the stomach. The tumor mass was found to be occupying the head of the pancreas. It was hard, but moved over the underlying structures, and no enlarged nodes were felt. When it was being dissected away...
from the portal vein and the superior mesenteric vessels, great care had to be taken because it was thought that in another two or three weeks it probably would have begun invading the vessels.

**Procedure:** A left rectus incision was made. When the tumor mass was felt freely movable on what was thought to be the posterior wall of the stomach, a resection was begun by ligating the vessels in the greater and lesser curvatures at the junction of the upper and middle thirds. The stomach was cut across between Payr clamps and the proximal one covered with a protecting pad, as was the distal one, and the stomach drawn to the right, when it was discovered that the tumor mass was not in the stomach but in the head of the pancreas. The common duct was found to be dilated, although the patient was not jaundiced, and the cystic duct had a somewhat abnormally long course, and it was doubtful as to whether or not the gallbladder could be used for anastomotic purposes.

Figure 1.—One-stage radical pancreaticoduodenectomy, with antecolic gastrojejunostomy and implantation of the common duct into the jejunum.

Inasmuch as the duct was dilated, it was decided to transplant it into the jejunum which would be used for the gastro-enterostomy. Furthermore, this made it easier to continue the dissection of the duodenum. The gastroduodenal artery was ligated, which controlled a good part of the arterial hemorrhage, and the dissection of the duodenum with the head of the pancreas was then begun.

The peritoneum to the outer side of the duodenum was incised, the duodenum mobilized, and the branches of the inferior pancreaticoduodenal artery ligated. The junction of the head and body was found to be narrow. It contained a dilated pancreatic duct which was ligated and the pancreas cut through. The junction of the duodenum and jejunum was then drawn to the right, behind the superior mesenteric vessels, and the duodenum cut between Payr clamps at the junction between the duodenum and jejunum. The distal cut end was then sutured with an over-and-over stitch of No. 00000 chromic and the stump was then buried with interrupted No. 1 silk mattress sutures. When the stump was released it passed behind the superior mesenteric vessels into the greater peritoneal cavity. With the freeing of the duodenum at this point the head of the pancreas was dissected away from the portal vein and splenic vein and from the superior mesenteric vessels. The patient did not lose much blood and the entire specimen of the distal half of the stomach and all of the duodenum and head of the pancreas and terminal
part of the common duct were removed. A loop of jejunum was then brought up in front of the colon and an antecolic gastrojejunostomy, end-to-side, was established between the cut end of the stomach and the antimesenteric border of the jejunum, beginning with a seroserous suture of C silk. The clamp was removed from the stomach and the contents of the stomach aspirated. An incision in the jejunum corresponding in length to the cut end of the stomach was made and the stomata united by No. 00000 chromic on two needles, beginning at the middle of the two adjacent parallel cut edges, locked at the angles and carried around to a point opposite the point of beginning, an over-and-over suture being used. The seroserous suture was then carried to the point of beginning. Finally, the cut end of the common duct was opened by removing the Kocher clamp, the excess bile aspirated and the anastomosis between it and the jejunum distal to the gastrojejunostomy was carried out by a seroserous suture of C silk. The opening in the common duct and an opening in the jejunum similar in diameter were united by an over-and-over suture of No. 00000 chromic and the seroserous suture carried around to the point of beginning. This completed the procedure. Hemostasis was found complete and the pad count reported correct. A Penrose tube was placed down to the bed of the pancreas.

Closure: Peritoneum and posterior rectus sheath with interrupted No. 1 silk mattress sutures; anterior rectus sheath with far- and near-interrupted sutures of C silk; skin with interrupted silk.


The pathologist reported the tumor as being a carcinoma of the head of the pancreas, but of the islet cells rather than the acinar tissue. In addition a penetrating benign ulcer on the lesser curvature of the stomach was found (Fig. 2). Dr. Stout's report is as
Fig. 3.—Microscopic picture of the islet cell tumor of the pancreas.

Fig. 4.—Section of vessel showing islet cells in the lumen.
follows: "This appears to be a characteristic and well-differentiated tumor of islet cells. Most of the cells are filled with characteristic granules (Fig. 3), and it is surprising that the patient did not show clinical symptoms of hyperinsulinism before operation. The tumor has infiltrated the head of the pancreas, destroying most of it. It has surrounded and infiltrated the wall of the common duct as it passed through the head of the pancreas, and in this way narrowed the lumen. It has infiltrated many large and small veins (Fig. 4), so that the possibility of venous metastasis must be kept in mind. No lymph node metastases have been found in any of the lymph nodes examined. The remaining pancreatic tissue, except where it has been attacked by the tumor, is relatively normal in appearance and is well supplied with islets. The small ulcer high on the lesser curvature of the stomach has produced marked destruction of the muscular coat, although a few muscle bundles can still be noted in the scar tissue forming the bed of the ulcer."

Dr. Virginia Kneeland Frantz reported as follows: "With Bensley's stain the granules all stain red. If the stain is reliable, which it has not been previously in our hands with human tissue, this would mean that the tumor is composed of alpha cells."

Fasting blood sugars after operation showed normal levels of 98 to 104 mg. per cent.

Subsequent Course.—The patient made an uneventful convalescence. She has been followed frequently in our Metabolism Clinic because of a fat indigestion. She shows from 30 to 50 per cent fat loss in her stools on repeated measured fat intake and output studies, but this fat loss in the stools is controlled somewhat by the use of 5 panetic and 9 holadin tablets o.d. Her weight is maintained at 90 to 94 pounds. She is still just as active and busy in her household duties and in work as a clergyman's wife in his parish as at any time before her operation. At no time has she shown any evidence of hyperinsulinism or of hypoglycemia either symptomatically or by fasting blood sugar determinations.

COMMENT: This is the first recorded one-stage removal of the head of the pancreas and duodenum, with occlusion of the pancreas. Trimble reported a similar procedure, carried out independently in a patient operated upon several weeks later. As a result of our experience in some 27 radical pancreaticoduodenectomies, 22 for malignant neoplasm and 5 for calcification of the pancreas, we now advocate the one-stage procedure for the following reasons:

1. The danger of hemorrhage and postoperative oozing is controlled by preoperative vitamin K therapy.
2. The danger of two anesthesias and two major procedures is avoided.
3. The difficulties of extensive and in some cases massive adhesions at the second and more difficult stage are avoided.
4. Continuous spinal anesthesia, together with plasma and whole blood transfusion, has made the one-stage procedure safer than the two-stage procedure. We have performed eight two-stage operations, with a mortality of 38 per cent, whereas, in 19 one-stage operations our postoperative mortality from all causes was 31 per cent. We have lost no patients with one-stage procedures for benign lesions.
5. In the one-stage procedure we have found two steps of great advantage:

(a) The implanting of the common duct into the jejunum, either end-to-end or end-to-side, depending on the choice of the loop or Roux-type of jejunoojejunostomy. This avoids the dangers of a cholecysto-
enterostomy, and the serious complication of a biliary fistula as a result of the cutting through of the ligature on a ligated common duct. (b) The implanting of the pancreatic duct into the jejunal loop below the choledochojjunostomy. This eliminates all the uncertainty and debate regarding an occluded pancreas and possible fatty liver degeneration.

There have been many modifications of the one- and two-stage procedures reported since our paper in 1935. Provided a cholecystogastrostomy and ligation of the common duct is not done, I believe it makes little difference what modification of the one-stage is used.

We regret that our subsequent reports on this subject are seldom referred to and that our original paper describing a two-stage procedure is always mentioned. Because of the newer advances in pre- and postoperative treatment, I condemn the two-stage procedure and advocate the one-stage procedure with choledochojjunostomy and implantation of the pancreatic duct into the jejunum as the procedure of choice.