

PANCREATICOJEJUNOSTOMY AND OTHER PROBLEMS ASSOCIATED WITH THE SURGICAL MANAGEMENT OF CARCINOMA INVOLVING THE HEAD OF THE PANCREAS

REPORT OF FIVE ADDITIONAL CASES OF RADICAL PANCREATODUODENECTOMY

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It has become increasingly apparent during the past five years or so that surgical armamentaria have been increased to a point where carcinoma involving the head of the pancreas may be attacked radically. It is common knowledge that prior to 1935 sporadic attacks were made upon cancer in this region. The incidence of success, however, was so meager and the mortality so high that no operation contemplating eradication of the disease ever gained any degree of popularity. The most complete review of these early experiences may be found in Hunt's¹ review of the subject, appearing in 1941.

Largely due to the impetus given this problem by Whipple, Parsons and Mullins,² in 1935, and by Whipple,³ in 1938, the entire subject has been reopened and the number of successful attacks upon ampullary and periampullary carcinomata have been increasing yearly.³⁻¹² In order to further the study of patients confronted with cancer in this region and to counter the all too generally held impression that its surgical attack is hopeless, the following seven cases are recorded. In general, these experiences parallel those reported from other institutions with regard to mortality, postoperative complications and the evolution of the operation as it is now commonly performed.


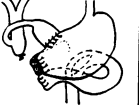




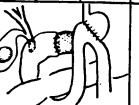
One of these cases (Case 4) has been previously reported⁹ but is included here for the sake of completeness. The significant features of each case are recorded in Table I, while more detailed clinical abstracts appear in the case reports.

In view of the fact that each of these cases demonstrates one or another of the significant phases in the evolution of this major surgical operation they may best be discussed under subject headings rather than as individual cases.

Diagnosis.—One of the most difficult problems associated with the surgical management of these patients is the establishment at the operating table of a positive diagnosis of cancer. In this respect these tumors may be conveniently divided into two groups: Those in and about the ampulla of Vater, and those lying deeply in the head of the pancreas. The former usually offer no great difficulty save for the fact that upon frozen section of their more or less superficial portions these polypoid tumors may appear

benign under the microscope, where actually they are malignant. If, however, it is borne in mind that very few ampullary tumors are benign, it is obvious that unless their benignity can be clearly demonstrated, they should, if possible, be subjected to radical removal. Case 6 is an excellent example of this problem. Numerous frozen sections at the first operation all showed a benign tumor, and it was upon this assumption that local excision was per-

TABLE I
SIGNIFICANT FEATURES OF SIX CASES OF RADICAL PANCREATODUODENECTOMY

| PATIENT NO. AGE SEX | HISTORY AND PHYSICAL EXAMINATION | DIAGNOSIS | OPERATION | OPERATION DIAGRAMMED | P.O. COMPLICATIONS | FOLLOW-UP |
|---|--|--|---|---|--|--|
| CASE 1. R.A. NO. 277074 57 YRS. M | ABDOMINAL DISTRESS 3 WKS. JAUNDICE 2 WKS WT. LOSS 10 LBS P.E. JAUNDICED | CARCINOMA OF AMPULLA OF VATER | 1. GASTROENTEROSTOMY CHOLECYST GASTROSTOMY 2. TRANSDUODENAL EXCISION REIMPLANTATION OF COMMON AND PANCREATIC DUCTS |  | NONE | WELL 2 YRS. RECURRENCE 3 YEARS 2 |
| CASE 2. F.B. NO. 27640 56 YRS. F | LOSS OF APPETITE 2 WKS. MILD JAUNDICE 2 MOS. DEEP JAUNDICE 1 WK NO WEIGHT LOSS P.E. NEGATIVE | CARCINOMA OF AMPULLA OF VATER | 1. DUODENOTOMY, GASTROENTEROSTOMY, LIGATION COMMON DUCT CHOLECYST GASTROSTOMY 2. PANCREATODUODENECTOMY 3. ATTEMPTED CLOSURE DUODENAL STUMP 4. JEJUNOSTOMY |  | PERSISTENT COMPLETE DUODENAL FISTULA | P.O. DEATH |
| CASE 3. P.D.M. NO. 254422 52 YRS. M | PAINLESS PROGRESSIVE JAUNDICE 4 MOS. WEIGHT LOSS 30 LBS P.E. LARGE PALPABLE GALL BLADDER | CARCINOMA OF PANCREAS | 1. CHOLECYST GASTROSTOMY GASTROENTEROSTOMY 2. PANCREATICO-DUODENECTOMY 3. RESECTION OF FISTULOUS TRACT |  | PERSISTENT PANCREATIC FISTULA SEVERE STEATORRHEA | LIVED 8 MONTHS (NO POST-MORTEM) |
| CASE 4. J.B. NO. 31583 57 YRS. M. PREVIOUSLY REPORTED | PAINLESS JAUNDICE 1 MON. WEIGHT LOSS 20 LBS. P.E. JAUNDICED | CARCINOMA OF DUODENUM | RADICAL PARTIAL PANCREATECTOMY DUODENECTOMY PANCREATICOJEJUNOSTOMY CHOLECYST JEJUNOSTOMY GASTRO JEJUNOSTOMY |  | P.O. PNEUMONIA INTERMITTENT ATTACKS CHOLANGITIS | LIVED 14 MONTHS DIED OF CARCINOMATOSIS POST MORTEM |
| CASE 5. N.M. NO. 361219 69 YRS. M | PAINLESS JAUNDICE 6 WKS WEIGHT LOSS 30 LBS. P.E. JAUNDICED | CARCINOMA OF AMPULLA OF VATER | RADICAL PARTIAL PANCREATECTOMY DUODENECTOMY PANCREATICOJEJUNOSTOMY CHOLECYST JEJUNOSTOMY GASTROJEJUNOSTOMY |  | P.O. WOUND INFECTION | WELL 1 YEAR |
| CASE 6. S.H. NO. 363096 55 YRS. F | PAINLESS JAUNDICE, INTERMITTENT 5 WKS. NO WEIGHT LOSS P.E. JAUNDICE | CARCINOMA OF AMPULLA OF VATER | 1ST. ADMISSION EXCISION AMPULLARY CARCINOMA 2ND. ADMISSION 2 MOS. LATER RADICAL PANCREATODUODENECTOMY PANCREATICOJEJUNOSTOMY CHOLEDOCHOJEJUNOSTOMY GASTRO JEJUNOSTOMY |  | NONE | WELL 3 MONTHS |
| CASE 7. W.M. NO. 375953 67 YRS. M | EPIGASTRIC FULNESS 2 MOS. WEIGHT LOSS 20 LBS. P.E. EPICAST TUMOR | CARCINOMA OF STOMACH WITH EXTENSIONS TO HEAD OF PANCREAS | SUBTOTAL GASTRIC RESECTION PARTIAL PANCREATIC RESECTION DUODENECTOMY PANCREATICO JEJUNOSTOMY CHOLEDOCHOJEJUNOSTOMY GASTRO JEJUNOSTOMY |  | NONE | WELL 2 MONTHS |

formed. Following removal, however, a section from the base of the tumor was obviously malignant.

The second group, those primary in the head of the pancreas, may offer great difficulty in clearly establishing their malignant nature at the operating table. This, of course, is due to the fact that not infrequently these tumors have their origin deep in the gland itself and, as they grow, they continue

to be surrounded by a shell of pancreatic tissue. And it is only this normal tissue that is generally accessible for frozen section. Further confusion in this regard may also arise from the fact that since these lesions frequently obstruct one or more branches of the duct system of the pancreas, the gross and microscopic picture of chronic pancreatitis is presented. Because the most difficult differential diagnosis lies between this entity and carcinoma, the problems associated with the accurate diagnosis of these lesions can readily be appreciated. This dilemma has led Cattell¹⁰ to point out that frequently the decision as to whether or not to perform a radical operation must depend upon the surgeon's ability to make a diagnosis based upon the clinical and gross pathologic findings. This, of course, may, at best, be uncertain, and undoubtedly will mean that as more and more of these tumors are attacked surgically, some patients will undergo a radical procedure for chronic pancreatitis. At the moment, there is not apparent any exact solution of this problem. The most logical approach, however, would seem to be one of carefully weighing all the details of a given case, and proceeding upon what seems to be the most reasonable course.

In connection with this problem of diagnosis a related situation may be mentioned. In patients requiring common duct exploration in which an associated chronic pancreatitis is found, it may be wise to leave a small catheter in the common duct in order to obtain postoperative cholangiograms. If such roentgenologic studies demonstrate a persistent obstruction of the common duct not due to overlooked stones, a number of pancreatic carcinomata will undoubtedly be discovered sufficiently early to warrant re-exploration at a time when such a tumor may be amenable to radical extirpation.

Local Excision of Ampullary Tumors.—Because local excision of small ampullary tumors, together with reimplantation of the common and pancreatic ducts, is a relatively innocuous procedure, the early literature upon this subject is replete with case reports of transduodenal excision of these carcinomata.

A critical review of 98 patients subjected to this operation, as compiled by Hunt,¹ reveals that the postoperative mortality was 27 per cent, and that but five patients were alive over four years. Three of these may be considered cured, as they were well five, nine, and 22 years after operation. These data indicate that local excision of these tumors may be expected to yield an occasional long-range cure, but that certainly the incidence is low.

In this series, there are two cases in point (Cases 1 and 6). In Case 1 there was an apparent cure for three years but at the present time the patient presents complaints suggestive of recurrence. Case 6 promptly recurred after local excision.

One- Versus Two-Stage Operation.—Whipple's² original communication postulated a two-stage operation. The many disadvantages attendant upon this soon became evident. With the discovery of the ability to control the

bleeding tendency in jaundiced patients by means of vitamin K, one of the foremost reasons for the two-stage procedure became invalid, and, in 1940, Whipple¹¹ performed, for the first time, the operation of radical pancreaticoduodenectomy in one stage. Since then the operation of choice has been that of complete extirpation of the pancreatic head and duodenum at one sitting, reserving the two-stage procedure only for the poorest of operative risks.

Extent of Duodenum to Be Removed.—One of the most dreaded complications of operative procedures involving the duodenum is that of fistula formation at the site of closure of the duodenal stump. Early in the history of the development of the two-stage operation only that portion of the duodenum adjacent to the head of the pancreas was removed. Because this may leave the blood supply of the remainder of the duodenum seriously impaired, it is considered necessary to remove all of this structure together with the upper few centimeters of the jejunum. Case 2 is one in which a persistent duodenal fistula, which defied closure, undoubtedly was the greatest single factor contributing to her death.

Cholecystenterostomy versus Choledocho-enterostomy.—The problem whether to secure external drainage of the biliary tract by way of the gallbladder or the common duct has been much discussed. In the two-stage operation it would have been obviously disadvantageous to have obscured the operative field by some form of choledochojejunostomy; therefore, the gallbladder had of necessity to be used, the anastomosis usually being performed between this organ and the stomach. This, all too frequently, presented two untoward complications; early, that of a biliary fistula at the site of division of the common duct; late, of an ascending biliary tract infection. With the acceptance of the one-stage procedure the possibility of the development of both of these sequelae could be minimized by the performance of a choledochojejunostomy. Although the gallbladder was utilized in Cases 2, 3, 4 and 5 without the development of any immediate postoperative complication, troublesome attacks of acute cholangitis marred the result in Case 4. In Cases 6 and 7 the common duct was employed at the suggestion of Doctor Whipple (Discussion⁹). In neither of these cases has any untoward complication developed. In the future it will undoubtedly be the policy of this clinic to utilize the common duct whenever possible.

Management of the Pancreatic Stump.—The best method of dealing with the pancreatic stump has proved a troublesome problem centering about two controversial points: First, whether or not the external pancreatic secretion is necessary for the maintenance of an adequate digestive process, particularly of fats. It is unquestioned that an, as yet, undetermined percentage of patients tolerate deprivation of their external pancreatic secretions reasonably well. There are a number, however, of which Case 3 is an example, who persistently suffer from a severe degree of steatorrhea following ligation of their pancreatic ducts. The significant single fact is that it cannot be forecast prior to operation to which group any given patient will ultimately

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belong. It would seem apparent, therefore, that until further information is available the external pancreatic function should, if possible, be maintained.

The second difficulty lies in the fact that no matter how meticulously the pancreatic duct and stump are closed, there is the risk of the formation of a postoperative fistula. This undesirable, and oftentimes fatal, compli-

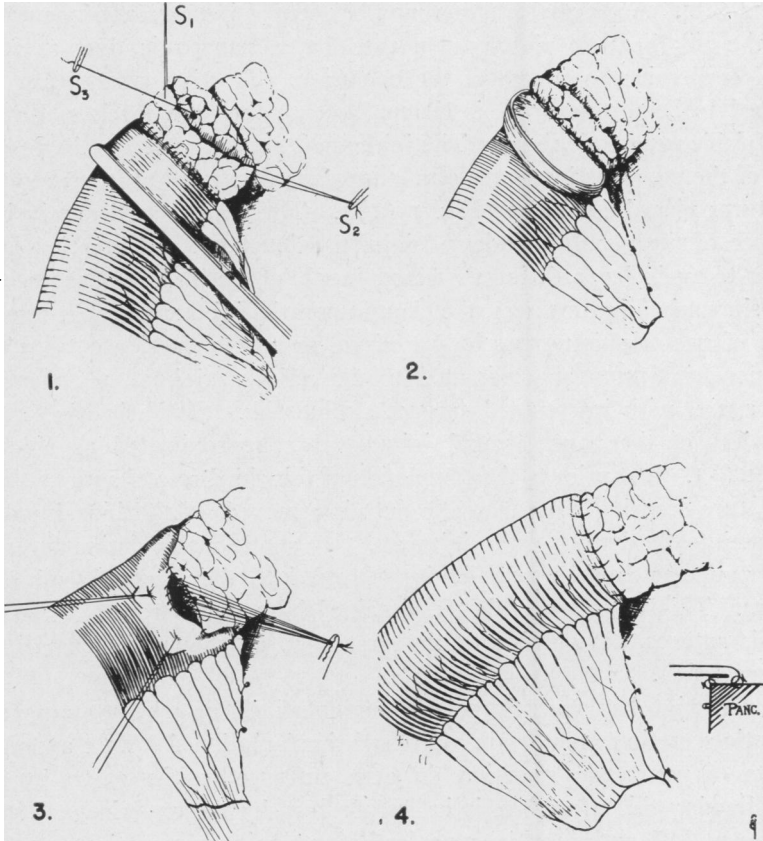


FIG. 1.—(1) First suture line in place, approximating the posterior aspect of the pancreas and the jejunal wall. (2) Second posterior suture line, approximating the posterior cut-surfaces of the pancreas and jejunum. (3) First anterior suture line, placed but not completed. Just before these last few are tied, the ligature is removed from the pancreatic duct, permitting its immediate drainage into the jejunum. (4) Completed anastomosis. The inset demonstrates that the pancreatic stump is actually introduced into the inverted end of the jejunum.

cation may be avoided by a safe method of anastomosis between the intestinal tract and pancreatic stump. That such a satisfactory method is available seems apparent from examination of Cases 4, 5, 6 and 7, in which drainage of the external pancreatic secretions into the gastro-intestinal tract was secured by suture of the proximal end of the pancreas into the open end of the jejunum. The method by which this has been accomplished is outlined in some detail as follows:

Method of End-to-End Pancreaticojejunostomy.—After completion of the radical removal of the duodenum and head of the pancreas, the proximal end of the jejunum is passed to the upper abdomen through a suitable rent in the mesocolon. As shown in Figure 1, the posterior aspect of the distal two centimeters of the pancreas is freed from the underlying tissues and held with its cut-surface upward by two suitably placed silk stay-sutures S. 1 and S. 2. Additional traction may be secured if necessary by means of S. 3, the silk ligature placed upon the dilated pancreatic duct as it was divided earlier in the course of the operation. Traction sutures are to be preferred to hemostats or Allis clamps because they are far less damaging to the friable pancreatic tissue. The jejunum is approximated to the posterior aspect of the pancreas by means of a suture line composed of interrupted fine silk sutures placed as shown (Fig. 1 (1)). These are placed deeply in the substance of the gland, include the jejunal submucosa, and are tied loosely in order to avoid jeopardizing the blood supply of the included tissues.

As shown in Figure 1 (2), the clamp upon the jejunum is next removed, its bite of necrotic tissue carefully excised, and the posterior cut-border of the pancreatic stump approximated to the adjacent jejunal mucous membrane, again, with interrupted sutures of fine silk. Similarly, the anterior cut-borders of the pancreas and jejunum are approximated as shown in Figure 1 (3). Just prior to the completion of this third row of sutures the fine silk ligature securing the pancreatic duct is removed, establishing immediate drainage into the lumen of the jejunum. By gentle manipulation the stump of the pancreas is then actually introduced into the inverted end of the jejunum. This inversion is then maintained by a fourth row of interrupted fine silk sutures, comparable to the first row, as shown diagrammatically in Figure 1 (4).

Brunschwig⁸ has recently raised the question "of whether appreciable pancreatic secretion may obtain after such implantations." That appreciable amounts of pancreatic secretion do gain entrance to the gastro-intestinal tract following this procedure is indicated, first, by the experimental studies of Person and Glenn,¹⁴ in which a perfectly functioning pancreaticogastrostomy was demonstrated following implantation of the stump into the posterior wall of the stomach; second, by Case 4, in which the presence of pancreatic enzymes was demonstrated in the intestinal tract by means of the secretin test; third, by Cases 4, 5, 6 and 7, in which there has been no evidence of digestive disturbances following operation. In these four cases there has been no instance of the development of a postoperative pancreatic fistula, a most undesirable complication not only from the point of view of the difficulty involved in the management of the fistula itself, but also because of the danger of severe hemorrhage associated with the escape of pancreatic juice into the site of a but recently completed operation.

Gastrojejunostomy.—Judging from the reported cases and from this series, much latitude may be exercised in reestablishing the continuity of the

stomach and jejunum. As a matter of principle a stoma so placed as to prevent the enteric stream from passing either the pancreatic or biliary anastomosis is to be preferred. In Case 4 it is noted that the cholecystojejunostomy lay distal to the gastro-enterostomy. This may well have been a factor contributing to this man's episodes of biliary tract infection. At the present time an effort is made to place the gastro-enterostomy as illustrated in Cases 5, 6 and 7. Whether ante- or retrocolic would appear to be of minor significance.

Suture Material.—Throughout all of these radical procedures silk has been used entirely except for the mucosal suture in the biliary and gastric anastomoses. Particularly is the use of silk important in performing not only the pancreatic anastomosis but also in securing hemostasis, for catgut is digested with amazing rapidity by pancreatic juice. It is probable that much of the current pessimism expressed toward pancreatico-enterostomies finds origin in the poor results obtained at a time when catgut was used almost exclusively.

Closure of the Abdominal Wall.—In this entire series, with the exception of the last case, all of the abdominal wounds were closed with through-and-through silver wire stay-sutures together with catgut approximating the individual layers.¹³ Although several of these individuals developed rather severe wound infections there was no case in which wound disruption or evisceration occurred. The last case was closed with buried double medium silk securing all layers with a modified on-end mattress suture. The significant factor in wound closure in these patients is considered to be the inclusion of some form of nonabsorbable suture that will permit adequate wound drainage, without the risk of disruption should infection occur.

Drainage.—It is important to secure drainage of the site of the pancreatic anastomosis. This is performed by preference through a stab wound in the flank, placing the drains to the neighborhood of, though not actually to, the pancreaticojejunostomy suture line. This suture line incidentally can usually be reasonably well protected by an adjacent tab of omental or retroperitoneal fat.

Anesthesia.—Open-drop ether was employed with satisfaction in all of these patients save the last (Case 4) in which continuous spinal was administered. Because of the many advantages associated with the latter agent, it may become the anesthesia of choice in the future.

CLINICAL ABSTRACTS OF CASE REPORTS

Case 1.—N. Y. H. No. 277074: R. A., age 57, male.

Diagnosis: Carcinoma of ampulla of Vater.

History: This 57-year-old white male gave a history on admission of vague upper abdominal distress of three weeks' duration, associated with the onset of jaundice a week later, and a weight loss of ten pounds.

Physical Examination: Revealed a poorly nourished man, moderately jaundiced. On abdominal examination the liver edge was palpable 4 cm. below the right costal margin.

Laboratory: The only significant finding was the presence of bile in the urine. The stools were light brown and negative for blood.

Roentgenology: Negative G. I. series.

Operations: First—September 17, 1940. Exploratory celiotomy led to the discovery of a movable tumor of the ampulla of Vater. A posterior gastro-enterostomy and a cholecystogastrostomy were performed as a first-stage Whipple procedure.

Second—September 30, 1940. Transduodenal local excision of a carcinoma of the ampulla of Vater, with implantation of the common and pancreatic ducts. Because of the small size of the ampullary tumor it was not considered necessary to subject this patient to the hazards of the second-stage Whipple operation, *i.e.*, radical pancreaticoduodenectomy.

- Follow-up: 1 year—Well. Back at work. No complaints.
 2 years—Well. Back at work. No complaints.
 3 years—Well. Back at work. No complaints.
 3.5 years—Patient beginning to complain of loss of appetite and of weight, together with upper abdominal pain. Physical examination negative. A definite diagnosis of recurrence cannot be made at this time, but in view of the patient's difficulties it seems probable.

Case 2.—N. Y. H. No. 276140: F. B., age 56, female.

Diagnosis: Carcinoma of ampulla.

History: Mother and one brother died of carcinoma.

This 56-year-old housewife gave a history of progressive loss of appetite of two and one-half months, and of mild jaundice and pruritis of two months. She became deeply jaundiced one week before admission. No weight loss.

Physical Examination: This revealed an obese white female who was deeply jaundiced. On abdominal examination the liver was palpable one centimeter below the right costal margin.

Laboratory: The significant finding was a positive reaction for blood in the stools. Roentgenology: Negative G. I. series.

Operations: First—September 9, 1940. Duodenotomy and biopsy of ampullary tumor. Ligation of common duct. Posterior gastrojejunostomy. Cholecystogastrostomy. Postoperative Course: Unremarkable. Icteric index became normal.

Second—October 15, 1940. Partial resection of duodenum and head of the pancreas. Closure of duodenal and pancreatic stumps.

Postoperative Course: Developed a duodenal fistula, draining as much as 5000 cc. a day.

Third—October 31, 1940. Unsuccessful attempt to close the duodenal stump.

Postoperative Course: Persistent duodenal fistula.

Fourth—November 15, 1940. Jejunostomy for enteric feeding.

November 29, 1940.—Postoperative death due to inanition and sepsis.

Postmortem Examination: Duodenal fistula and localized abscess.

Case 3.—N. Y. H. No. 254422: P. DiM., age 52, male.

Diagnosis: Carcinoma of head of the pancreas.

History: This 52-year-old white male gave a history of progressive painless jaundice of four months' duration, associated with a weight loss of 30 pounds.

Physical Examination: Revealed a deeply jaundiced white male, with an enlarged, easily palpable, nontender gallbladder.

Laboratory: The stools were negative for blood. The prothrombin was 48 per cent, rising to 70 per cent after administration of vitamin K.

Roentgenology: G. I. series revealed a mucosal irregularity in the second portion of the duodenum.

Operations: First—January 15, 1940. Cholecystogastrostomy and posterior gastroenterostomy.

Second—February 1, 1940. Resection of pancreatic head and first and second portions of duodenum. Closure of the pancreatic stump.

Postoperative Course: Patient developed both a pancreatic and biliary fistula which closed spontaneously after five months, only to break open again within one week. An attempt to resect and reimplant the fistulous tract was unsuccessful, and the patient finally died after eight months of all but continuous hospitalization. During the entire postoperative period he was unable to digest fat, as manifested by persistent steatorrhea.

Case 4.—N. Y. H. No. 311583: J. B., age 57, male. (Previously reported⁸).

Diagnosis: Carcinoma of duodenum.

History: This 57-year-old white male presented himself complaining of jaundice, cutaneous pruritis, and a weight loss of 20 pounds over a course of one month.

Physical Examination: Revealed a well-developed and well-nourished jaundiced male. On abdominal examination the liver edge could be felt 3 cm. below the right costal margin, and the gallbladder was easily felt.

Laboratory: Hb. 10 Gm. R. B. C. 3,8 M. W. B. C. 9,050. Urine: Bile present. Stools positive for blood. Prothrombin time 61 per cent rising to 100 after vitamin K.

Roentgenology: G. I. series revealed marked irregularity of the mucosal pattern in second and third portions of the duodenum.

Operation: November 28, 1941. Radical partial pancreatectomy and duodenectomy. The enteric canal was reestablished first, by retrocolic pancreaticojejunostomy, then an antecolic gastrojejunostomy and, lastly, an antecolic cholecystojejunostomy. The right gutter was drained through a stab wound in the flank.

Postoperative Course: Patient developed an atelectasis followed by pneumonia. He was discharged well 30 days after operation.

During the next 12 months the patient was readmitted twice because of rather severe attacks of acute cholangitis. Fourteen months after his initial operation he was readmitted because of reappearance of his jaundice. Exploratory celiotomy revealed extensive intra-abdominal carcinomatosis; the patient died several weeks later. At postmortem examination an effort to examine the pancreaticojejunostomy was unsuccessful because of massive replacement with tumor.

Case 5.—N. Y. H. No. 361219: W. M., age 69, male.

Diagnosis: Carcinoma of ampulla of Vater.

History: This 69-year-old white male presented himself with a history of the sudden onset of jaundice six weeks prior to admission. As the jaundice increased he lost his appetite and 30 pounds in weight.

Physical Examination: Revealed an intensely jaundiced, somewhat senile male in no acute distress. B. P. 175/90. Examination of the abdomen revealed a liver palpable 3-4 cm. below the right costal margin.

Laboratory: Urine: Bile present. Stools positive for blood. Prothrombin 45 per cent rising to 80 per cent after vitamin K.

Operation: July 3, 1943. Resection of the head of the pancreas and duodenum. In succession, a retrocolic anastomosis was performed between the pancreas and jejunum, end-to-end, between the gallbladder and jejunum, side-to-side, and between the open end of the stomach and the side of the jejunum.

Postoperative Course: This was complicated by extensive suppuration of the abdominal wound. This subsided under adequate therapy, and the patient was discharged well on the 42nd day after operation.

Follow-up: Gained 30 pounds. No digestive disturbance. Entirely well one year after operation.

Case 6.—N. Y. H. No. 363096: S. H., age 55, female.

Diagnosis: Carcinoma of ampulla of Vater.

First Admission. **History:** This 55-year-old Italian female gave a history on admission of intermittent painless jaundice of five weeks' duration. No loss of appetite. No weight loss.

Physical Examination: Revealed a well-developed and well-nourished woman who was moderately jaundiced. B. P. 150/70. Abdomen: No masses or solid viscera palpable.

Laboratory: Urine strongly positive for bile. Serum proteins 4.8 Gm./100 cc. Stools positive for blood. Hb. 12.2 Gm. R. B. C. 3.8 M. W. B. C. 14,000. Prothrombin 78 per cent rising to 92 per cent after vitamin K.

Preoperative Care: Three transfusions.

Operation: August 17, 1943. At exploration of the ampulla through a duodenotomy, a small soft adenomatous tumor was found which did not appear malignant either in the gross or upon frozen-section. Accordingly, a presumably complete local excision was performed transduodenally and the common and pancreatic ducts reimplanted.

Postoperative Course: Her jaundice cleared rapidly and she was discharged well on her 18th postoperative day.

Second Admission. Within three weeks after discharge she again became jaundiced, and was readmitted to the hospital.

Physical Examination. On this admission an enlarged gallbladder was easily palpable.

Laboratory: Icteric index 152.

Second Operation: December 20, 1943, two months after local excision. At exploration a firm tumor mass occupying the head of the pancreas was discovered. In spite of the numerous adhesions due to the previous operation the lesion could be easily mobilized and was subjected to radical pancreaticoduodenectomy in one stage. In succession, the following retrocolic anastomoses were performed: Pancreas and open end of jejunum, choledochus and jejunum, end-to-side, and stomach to jejunum, end-to-side. A small tube was placed in the gallbladder as a safety valve for the biliary tract.

The postoperative course was unremarkable. The patient was discharged on her 21st postoperative day.

Case 7.—N. Y. H. No. 375553: W. H. J. M., age 65, male.

Diagnosis: Carcinoma of stomach invading head of the pancreas.

History: On admission the patient's complaint was one of persistent epigastric fullness after ingestion, even of liquids, for the previous two months.

Physical Examination: Poorly nourished white male in no distress. B. P. 150/98. On examination of the abdomen a hard, freely movable mass could be felt in the right upper quadrant.

Laboratory: Urine 2 plus sugar. Fasting blood sugar 150 mg./100 cc. Hb. 80 per cent. R. B. C. 4.5 M. W. B. C. 7,800. Plasma proteins 6.5 Gm./100 cc. Stool repeatedly positive for blood.

Roentgenology: G. I. series led to a diagnosis of carcinoma of the pyloric end of the stomach with 75 per cent retention at six hours.

Operation: January 6, 1944. On exploration an obvious carcinoma of the pyloric end of the stomach was found. Since the only evidence of extension was into the head of the pancreas a subtotal gastric resection (three-quarters of the stomach) was performed, together with removal of the head of the pancreas and duodenum. A retrocolic pancreaticojejunostomy and choledochojejunostomy was performed, and an antecolic long loop gastrojejunostomy. Drainage to the right gutter was established through a stab wound.

Postoperative Course: Unremarkable. The patient was discharged well on the 14th postoperative day. At two months he is entirely well, having gained over 15 pounds.

SUMMARY

(1) Five previously unreported cases of carcinoma involving the head of the pancreas which have been treated radically are recorded.

(2) Some form of pancreaticojejunostomy following partial pancreatic-

otomy is recommended, and a method is outlined which has proved satisfactory in four cases.

(3) A case of subtotal gastric resection and radical pancreaticoduodenectomy for carcinoma of the stomach invading the head of the pancreas is reported.

(4) Various other problems associated with radical extirpation of cancer involving the head of the pancreas are discussed.

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