Choledochojejunostomy—Its Ability to Control Chronic Recurring Pancreatitis*

RALPH F. BOWERS, M.D.

Memphis, Tenn.

From the Surgical Service, Veterans Administration Medical Teaching Group Hospital, Memphis 15 Tennessee

SEVEN YEARS AGO, choledochojejunostomy en Roux-Y was employed by us in an attempt to control chronic relapsing pancreatitis, recurrent acute pancreatitis, or recurrent calcareous pancreatitis. The method and results were published when it was obvious that good early control was being achieved.

The purpose of this study is to reveal factual details of the clinical courses in these patients for long-term follow-up, and to gain some idea of the real effectiveness of control by this operation.

Earlier communications[3-5] describe the indication for the use of the procedure, the technic, and some "don'ts" in regard to its use. No case has been subjected to choledochojejunostomy if gallbladder or common duct pathology was found at the first operation. Cholecystectomy, exploration of the common duct, removal of common duct stones, and instrumental dilatation of the sphincter of Oddi were done; and a period of time permitted to elapse. During this time the patient was observed for pancreatic attacks. Some patients recovered from the biliary tract surgery alone, and were not subjected to choledochojejunostomy. If the attacks continued and our observations suggested that the attacks would continue to appear in the future, then choledochojejunostomy was performed in all cases, except when the patient demonstrated extensive pancreatic insufficiency as revealed by marked diabetes, steatorrhea, excessive weight loss, etc.

Choledochojejunostomy was not performed in those cases sometimes called "burning-out" or "burned-out" pancreas, because of the likelihood of peptic ulcer when the neutralizing effect of bile and pancreatic juice was denied.

The rationale for the use of the procedure is based on the etiological concept of bile regurgitation under pressure into the pancreatic duct. The vast literature on the subject presents considerable evidence that regurgitation under pressure can be had without a common channel, although common channels are observed in as many as 70 per cent of autopsied patients. It employs exactly the same reasons for its use as the more popular sphincterotomy. It is a matter of sound reasoning to conclude that if prevention of bile regurgitation is a desirable state for control of this disease, then a shunt procedure must accomplish more accurate control than sphincterotomy, and that the controlling measure will be a permanent one. One of our successful cases experienced failure from the effect of the first sphincterotomy operation performed elsewhere. Reynolds[12] employed choledochojejunostomy in two cases where sphincterotomy failed. It is also sound reasoning to conclude that any etiologies which do not involve bile regurgitation, or possibly spasm of the sphincter of Oddi, will not permit control by this operation. Fortunately, it appears that this number will be small.

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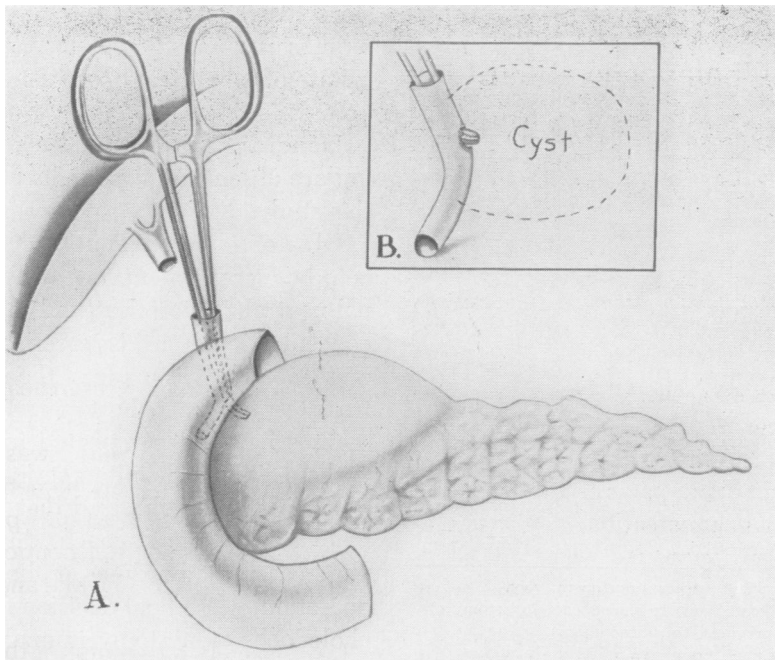

FIG. 1. Demonstrates method of drainage of pseudocyst in the pancreatic head through distal common duct segment.

Great care and patience were employed in the selection of these cases for operation. When a suspected patient is examined, biliary surgery is performed first, if disease of the gallbladder or common duct is noted. Choledochojejunostomy is performed at the first operation if biliary surgery *per se* is not indicated. After cholecystectomy, removal of common duct stones and dilatation of the sphincter of Oddi are accomplished, the indwelling T-tube is removed at the 3-month interval. A period of observation now ensues, sometimes as long as a year or more, during which the occurrence of pancreatic attacks is studied. Clinical appraisal, with laboratory aids, is the method leading to decision to operate. Vague abdominal pains and psychosomatic conditions are studied carefully and lengthily, and if they present the main symptom complex, are reasons to avoid operation. Calcification of the pancreas or the presence of pancreatic calculi do not urge the deciding hand. When it is believed that the attacks of pain, nausea, vomiting or inability to eat or drink without discomfort are due to the pancreatic infection, choledochojejunostomy is performed, with excellent results in our hands. Marked relief has been afforded all 14 patients. Many Kennedy physicians (some not too enthusiastic about choledochojejunostomy originally, question and examine these patients, and the concensus favors control in 12 of the 14 patients, failure in one, and drug addiction failure in another.

Choledochojejunostomy has some disadvantages in the minds of many surgeons. It requires cutting across the common duct, a maneuver which is frowned upon by every knowing surgeon. It creates the loss of an important neutralizer from the duodenum, which loss might mean the formation of peptic ulcer. It is technically difficult in the instance of the occasional small-caliber common duct, and it is a more extensive operation than sphincterotomy. Therefore, to meet the demands, the operation must be done without a high incidence of common

TABLE I. *Operative Results.*
(Patients previously operated upon.)

Patient	Previous Surgery	Average Postop. Amylase Reading (mg/100 c.c.)	Post-operative (years)†
G.B.	Exploratory laparotomy; repair umbilical hernia; cholecystectomy.....	139	6-2/12
*D.M.	Exploratory laparotomy; appendectomy.....	37	5-3/12
R.B.	Exploratory laparotomy; (acute pancreatitis)....	53	4-10/12
C.B.	Cholecystectomy.....	63	4-6/12
V.S.	Exploratory laparotomy (acute pancreatitis) repair ventral hernia..	378	3-10/12
S.S.	Cholecystectomy;choledochostomy; appendectomy.....	63	2
C.W.	Exploratory laparotomy (acute pancreatitis); trans-duodenal sphincterotomy.....	441	7/12

*Died traffic accident—4 years postoperatively.
†Postoperative years refers to choledochojejunostomy operation. (Patients previously operated upon.)

duct stricture, and if strictured, a second choledochojejunostomy must be accomplished with ease and permanent relief. Peptic ulcer should not frequently appear, the mortality should be no higher than that observed in ordinary common duct surgery, and the morbidity must be low.

Study of these different phases follows:

I. There has been no mortality in the 14 cases.

II. *Common duct stricture and cholangitis.* There is no instance of cholangitis in the group except in the patient who developed a common duct stricture. One patient (C. B.) developed a stricture because of the extremely small size of the common duct at the time of the first operation. The patient's normal weight is in the neighborhood of 285 pounds, which contributed to the difficulty of the anastomosing of this small duct to the jejunum. The stricture appeared 11 months later. At re-operation, the common duct was greatly dilated, and resection of the stricture and a second choledochojejunostomy were performed with ease. No cholangitis or other evidence of stricture have appeared since his re-operation three years and five months ago, and the patient has returned to a state of good health, weighing nearly 300 pounds.

Jaundice, chills, fever, back pain, sweating are absent in all patients at the time of this study.

III. *Peptic ulcer.* Peptic ulcer formation is to be feared whenever the normal duodenal neutralizers are lessened in amount and concentration. For this reason, a careful preoperative study is made of the patient's gastro-intestinal tract. Postoperative roentgenograms have been repeated in all patients without finding definite peptic ulcer in any.

It must be emphasized that a careful examination of the stomach, duodenum and pancreas must be done at the time of the operation, when final decision for the use of choledochojejunostomy is made. At operation, two patients demonstrated duodenal ulcers which had penetrated into the pancreas, and were associated with pancreatitis. Choledochojejunostomy had been planned for both patients, but was not performed in the light of these findings. Both patients recovered and gained relief from pancreatitis by subtotal gastric resection. It is strongly suggested that if choledochojejunostomy had been performed in these two cases, the ulcer situation would have been made very much worse.

Clinically, one postoperative patient (G. B.) has been an ulcer suspect. This patient drinks heavily and daily. He has been followed for six and one-half years, has no symptoms attributable to pancreatitis, but there is liver enlargement, one episode of gastro-intestinal bleeding, and many episodes of alcoholic excesses. The gastro-intestinal hemorrhage ceased promptly when conservative measures were instituted. No ulcer can be demonstrated by repeated roentgenologic examinations, and he has remained well in spite of continued heavy drinking. All competent observers, including a few doubters who are newly appointed

TABLE II. *Operative Results.*
(Patients not previously operated upon.)

Patient	Previous Surgery	Average Postop. Amylase Reading (mg/100 c.c.)	Postoperative (years)
*L.M.	None	28	7
J.T.	None	110	5
D.H.	None	623	3-5/12
C.P.	None	46	2-7/12
J.H.	None	201	1-11/12
E.D.	None	127	1-4/12
H.T.	None	72	5/12

*Died traffic accident—13 months postoperatively.

to the Kennedy staff, agree that this bleeding episode was probably caused by alcoholic gastritis. No other patient has presented any symptoms which even mildly suggest ulcer formation.

IV. *Other complications.* One 60-year-old patient (J. T.) with pernicious anemia, who had suffered pancreatic attacks for 22 years, endured extravasation of bile into the addominal wall, which resulted in ventral hernia, and has been repaired. This complication is not necessarily attributable to the choledochojejunostomy, and will be occasionally encountered in any type of common duct surgery.

V. *Pseudocyst formation.* There were two instances of pseudocyst formation. One occurred approximately one year after choledochojejunostomy, and was successfully treated by cystgastrostomy. A pseudocyst was encountered in a second case at the time of choledochojejunostomy. The cyst was located in the head of the pancreas, and was drained *via* an opening in the distal common duct remnant, as described in Figure 1. Perfect control of the disease has not been achieved in either patient.

VI. *Effectiveness of success.* Table I and II indicate the number of years following operation. All patients are seen personally at least once per year, except the pernicious anemia patient, who is observed by competent physicians in a reliable hospital where he receives treatment by the hematologist.

Of the 14 patients, 12 can be stated to have received perfect control of pancreatic attacks. Two heavy-drinking patients met violent deaths in traffic accidents; one one-and-a-half years after operation and the other four-and-a-half years after operation. Neither had the slightest pain, but accelerated their drinking activities because pancreatitis was controlled. As a matter of fact, the main deterrent to the operation from this study reveals acceleration of alcoholic consumption, because the G. I. tract will "take it." There has been one divorce because the patient drank heavily in the absence of gastro-intestinal symptoms after successful control. Ten patients have stopped drinking. The two patients listed as failures do not drink.

These 12 successful patients can eat or drink any amount or any type of food and drink without the slightest discomfort. They do not present symptoms which could be attributed to pancreatitis. They have regained their normal weight, and in most instances have gone beyond their normal weight. All but one engage in their normal occupation. This one was the elderly patient with pernicious anemia, but he states that he has had no gastro-intestinal disturbance following the operation. As a matter of fact, he is the only patient who has not returned to work. The codeine addict performs more work than before operation, but the pace cannot be described as normal. No patient is hospitalized except for follow-up studies, with the exception of the elderly anemia patient, and the one failure who must return occasionally during a mild attack. Before the use of this operation at Kennedy, these patients were frequent bed occupants. Several have had their pensions reduced or taken away.

Amylase readings have been recorded during the follow-up visits. As seen in Tables I and II the average ranged from 28 to 663 mg. per 100 ml. The 623 mg. per 100 ml. reading occurred in the frank failure

(D. H.). The 441 mg. per 100 ml. was obtained shortly after the operation in a well-controlled patient (C. W.), and has not been repeated for almost a year. Patient is free of symptoms. The 378 mg. per 100 ml. reading presents an interesting problem. This is a Negro (V. S.), who was hospitalized for pneumonia four times in the first postoperative year on the Medical Section. On each occasion, the serum amylase readings read approximately 400 mg. per 100 ml., and for this reason he was classified earlier as a failure. Now, nearly four years after choledochojejunostomy, he states that he has remained well, gained weight to normal level, and has no gastro-intestinal symptoms regardless of the type or amount of food and drink intake. Several physicians questioned this patient separately, and all agree that he does not demonstrate any sign or symptom of pancreatitis. The elevated serum amylase cannot be explained. Fibrosis of the pancreas with partial pancreatic duct obstruction is a possible explanation. Perhaps this level is normal for him.

VII. *Failures.*

1. (D. H.) A 34-year-old white male, with vicious recurring attacks and no previous surgery. Cholecystectomy and choledochojejunostomy were performed on October 29, 1951. Relief was obtained, but the patient described symptoms of pseudocyst, for which cystgastrostomy was performed on June 2, 1952. Definite relief after cystgastrostomy was obtained for a period of 10 months. He experienced 3 attacks during the past year, which were mild, but have required short hospitalizations. Serum amylase averages 623 mg. per 100 ml. during attacks. This patient works normally, and he bitterly resents being classified as a failure when his condition is described to visiting physicians. Unquestionably, he has received great relief because his preoperative attacks were very severe. Perhaps a second pseudocyst will appear, the drainage of which might permit better permanent control.

2. (C. P.) A 35-year-old white male with no previous operation. Cholecystectomy, choledochojejunostomy and choledochocystostomy were performed August 13, 1952. Prompt cessation of attacks was obtained, and the patient gained weight to above normal, but has not been able to stop use of drugs. Patient is now 2 years and 7 months past operation, and was studied extensively in March 1955. While on the ward, patient would state that he had severe pain, but ½ grain codeine hypodermically completely controlled it. He is diabetic without steatorrhea, and requires 20 units of insulin daily. He helps his wife to conduct a small grocery business. Nearly all foods and liquids are tolerated without difficulty, but he insists upon small dosage administration of codeine for relief of pain. Serum amylase readings average 46 mg. per 100 ml. This patient is classified as a failure because of his requests for codeine to control his pain. Most observers, including the patient's wife, family physician and several Kennedy physicians, do not believe that the pain, if any, is the result of pancreatitis. Nevertheless, a codeine addict before operation has not been rid of his habit after operation for pain, and the patient must be classified as a failure.

Speaking of recurrent or relapsing subacute pancreatitis in September 1951, Rodney Maingot[9] stated: "Here, I believe, it is necessary to deflect the flow of bile from the ampullary region to prevent a recurrence of the distressing symptoms. The deflection of bile is best achieved by dividing the choledochus and implanting it into the 'defunctioned' Roux-Y proximal loop of jejunum."

Poth and Wolma[10] have used variations of this shunting procedure in 11 cases, and report successes in all. Barclay[2] remains extremely enthusiastic after obtaining five excellent results in five patients. Allbritten[1] has used the procedure when obstruction to the common duct is present, with good results.

One of the first good results was reported by Cole and associates,[6] although they performed choledochojejunostomy for a common duct stricture in a case of chronic recurring pancreatitis. They not only corrected the common duct stricture, but also controlled the pancreatitis.

Trimble[15] had two successes in two patients. Thoroughman[14] reports excellent results in two cases. Rousselot's[13] paper contains the only report of consistent failures. Dunphy[7] has related a failure to the author. Priestley[11] intimates but does not state in a recent article that choledochojejunostomy

should be superior to sphincterotomy (which he favors) but he despises the necessity of cutting across the common duct to accomplish it.

Faxon[8] finally performed complete choledochojejunostomy in an extremely complicated case, and obtained control of the pancreatitis.

SUMMARY

1. Follow-up studies are reported on 14 patients who have had choledochojejunostomies en Roux-Y for chronic recurring pancreatitis.

2. The patients have been followed from seven months to six and one-half years.

3. Common duct stricture and peptic ulcer formation have not proved to be significant problems.

4. There has been no mortality and morbidity is slight.

5. Great relief has been observed in all patients. Twelve patients have experienced "perfect" control.

6. The two failures include a patient with a few mild attacks *per annum*, with elevated serum amylase readings, and a codeine addict whose pain is removed by the administration of ½ grain of codeine. This patient has a low serum amylase reading.

CONCLUSIONS

In carefully selected cases, when biliary tract surgery, if indicated, proves unsuccessful, choledochojejunostomy has controlled 12 of 14 patients from experiencing attacks of pancreatitis. The two patients classed as failures in this report have been greatly benefited by the operation.

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DISCUSSION.—DR. JAMES T. PRIESTLEY, Rochester, Minnesota: I am sure that we all enjoyed this presentation by Dr. Bowers. A report on any surgical procedure which will relieve those unfortunate patients who have chronic relapsing pancreatitis is welcome news.

In my experience results of the surgical treatment of these patients may be either most gratifying after a single relatively simple initial procedure, or most disappointing after perhaps multiple procedures.

Actually, the results of treatment for chronic relapsing pancreatitis are very difficult to evaluate for several reasons. In the first place, by the very nature of the disease, it is recurring in type, and obviously a prolonged period of follow-up is necessary in order to evaluate accurately the results of operation. I don't know just how long that period