

# Morbid Conditions Following Choledochojejunostomy\*

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CHOLEDOCHOJEJUNOSTOMY has proved to be a worthwhile operative procedure for a few surgical conditions. Some form of it must be used in pancreaticoduodenectomy (Whipple procedure) and has been employed for common duct stricture, certain phases of chronic pancreatitis and when biliary shunt for other rare conditions is desirable or necessary. Pancreatic resection for aneurysm of the pancreaticoduodenal artery is an example of this.

The operation requires transection of the common duct, anastomosis of the central end of the duct to the distal end of the divided jejunum and then a jejunojejunostomy. No one questions its use when the Whipple procedure is done for carcinoma or if no other simpler operation is available. However, when its use for benign conditions is suggested, criticism may be directed at the extensiveness of the operation and fear that common duct stricture, cholangitis, duodenal ulcer and intestinal obstruction would appear in numbers great enough to contra-indicate its use. This study reveals the number and severity of the complications following choledochojejunostomy.

First, a look at the benefits should be made. Proper flow of bile into the gastrointestinal tract has been successfully achieved in the Whipple procedure. Choledochojejunostomy has been employed in eight patients with common duct strictures. Seven of these patients have been followed longer than one year. Single revision was required in two and three revision in one patient. Ultimate cure of the stricture was obtained in these three cases

and four others, representing successful result in seven of eight strictures treated by choledochojejunostomy. One patient died from liver failure with common duct stricture one year after choledochojejunostomy. The control rate of chronic pancreatitis in 31 cases has proved to be 75.9 per cent.

## Technic

The technic has been described in a previous publication.<sup>1</sup> A small number of sutures, silk as well as catgut, is believed to contribute heavily to a successful permanent anastomosis. Surgeons hesitate by training and tradition to sever the common duct, but this fear could easily be dispelled if strictures appeared in small numbers. The procedure may be classified as extensive but when not accompanied by pancreatic resection, it carries the major classification similar to subtotal gastric resection and is not nearly so extensive as a total gastric resection.

## Study

Eighty-five choledochojejunostomies have been performed, 37 for pancreatic resection of which 34 were for cancer of the pancreatic head, lower common duct, ampulla of Vater and duodenum; two for aneurysms of the pancreaticoduodenal artery and one for pancreatitis. Of these 37 patients, 11 have been followed for more than one year, five for more than five years, and two for more than ten years (Table 1).

Thirty-one choledochojejunostomies have been performed for chronic pancreatitis and have been followed from 1+ years to 12+ years. There were no postoperative deaths. All but one have been followed to

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death or living without evidence of trouble due to the operation unless stated.

There were 12 deaths in the pancreatic resection group and two in the non-pancreatic resection group. Seventy-one patients have survived operation.

The average follow-up time of four years and five months in 71 instances should provide numbers great enough to be statistically significant.

**Stricture**

Five resulted following choledochojejunostomy, a stricture formation rate of 7.0 per cent. One occurred after performing the operation on a 260-pound man for chronic pancreatitis. The common duct was so small that the anastomosis was extremely difficult and technically could not be accomplished correctly. One year later, there appeared obstructive jaundice and cholangitis. His weight dropped to nearly 200 pounds, adding ease of operative exposure. Now also the common duct was hugely dilated and the revision requiring resection of the anastomosis and re-choledochojejunostomy was easily accomplished and there has been no trouble for ten years.

**Comment**

This experience reveals a pertinent problem in performing choledochojejunostomy. It refers to the extremely small size of the common duct, and there certainly are instances when the common duct is so small that safe choledochojejunostomy cannot be accomplished. If then contra-indicated technically, one could employ sphincterotomy or some form of resection or pancreaticojejunostomy. On one occasion when the small common duct was severed before the possibility of anastomosis was properly estimated, the operator was frustrated because choledochojejunostomy could not be done without certain stricture formation. In that instance, the goal was obtained by using a technic similar to the Coffey operation for implantation of the ureter into

TABLE 1. *Morbid Conditions Following Choledochojejunostomy*

Operation-Diagnosis	No.	Follow-up Time (yrs.)	Longer Than 1 Year	Average Follow-up (yrs.)	Postop. Deaths	Mortality Rate	Subsequent Ulcers	Cholangitis	Post-op. Strictures
Whipple	37	1/12 to 14	11	2-7/12	(12)	(32.4%)	0	0	0
Malignancy	34				10	29.4%			
Aneurysm	2				2	100.0%			
Pancreatitis	1								
Cholechojejunostomy	48								
Pancreatitis	31	1 to 12-7/12	31	6	0	0	3	1	1
Extensive CA pancreas or ampulla of Vater	8	1/12 to 1-3/12	2	7/12	1	12.5%	0	0	0
Stricture common duct	8	4-5/12 to 11-2/12	7	9-5/12	0	0	1	4	4
Mistaken diagnosis	1	—	—	—	1	—	—	—	0
Totals	85	1/12 to 14	51	4-7/12	14	16.4%	4	5	5

the sigmoid.<sup>2</sup> This had been accomplished previously in our animal laboratory and provided an excellent escape mechanism. In the animals, all anastomoses functioned without stricture.

Another stricture followed choledochojejunostomy performed during gastric resection for ulcer. This stricture resulted from technical imperfection during subtotal gastric resection and pancreatic fistula with marked pericholedochal infection and induration, and was finally corrected by the third choledochojejunostomy and implantation of a T-tube for one year. There has been no jaundice or evidence of cholangitis since that time—a period of three years. The three revisions were not actually required on account of the choledochojejunostomy *per se*, but due to the surrounding pancreatic fibrosis, induration and edema.

A third stricture followed cholecystectomy with iatrogenic severance of the common duct for which immediate choledochojejunostomy was performed. Stricture was revised five years later and the patient was in good health when last seen one year after revision.

The fourth stricture resulted from an injury to the common duct during gastric resection for ulcer for which choledochojejunostomy was performed. Revision was done two years and nine months later and the patient was well ten years after revision.

The fifth stricture was a post-vitallium tube repair for iatrogenic common duct injury during cholecystectomy performed elsewhere. The vitallium tube had been expelled creating tremendous induration, fibrosis and edema in and around the common duct. The remaining segment of common duct was grossly altered by the resulting fibrosis and the choledochojejunostomy was performed with this fibrotic remnant. He died one year later from stricture, cholangitis and liver failure. Here, choledochojejunostomy failed to correct the stricture.

**Cholangitis.** This diagnosis was recognized when there was jaundice, chills and fever, and laboratory confirmation of biliary obstruction. Icterus often followed the chills and fever and was usually intermittent unless of course the obstruction became complete.

There were five and only five instances of cholangitis, all observed in the patients with common duct strictures. One cannot state that the length of the Roux-Y loop prevents cholangitis. However, creation of the loop does not cause physiological improprieties and does not add to the extensiveness or time of the operation. A 4-inch or 5-inch loop would be necessary anyhow; therefore, why not 12 to 18 inches?

Therefore, stricture, always accompanied by cholangitis which only appears when obstruction is present, has not posed the serious problem anticipated when this work was started in 1948. It is recognized also that as the operator gains experience, the occurrence of stricture should diminish.

**Ulcer.** Duodenal ulcer was predicted by critics of this operation in the non-resective choledochojejunostomy because the duodenum would be denied the alkalizing effect of bile and pancreatic juice.<sup>3</sup> To study the frequency here, we must discard resected cases, as the duodenum has been removed. There indeed seems to be an increase. In 48 patients (choledochojejunostomy without duodenal resection), one gastric ulcer appeared at four years and two duodenal ulcers appeared—one at six years and the other at 11 years. With our present knowledge of the etiology of gastric ulcer, it would be hard to identify antral phase of gastric ulcerative formation from a choledochojejunostomy and perhaps this gastric ulcer is coincidental. But the two duodenal ulcers could result from the operation. A fourth patient developed symptoms of duodenal ulcer with x-ray evidence obtained in another institution. This choledochojejunostomy was performed for complete avulsion of the common duct in a closed abdominal injury received during

a tractor accident. Symptoms appeared approximately 11 years following operation and to date have not interfered with his ability to work and live normally. He will be studied shortly during a work layoff when subtotal gastric resection will be performed if the findings are substantiated. Medical management has been fairly successful, but his symptoms appear to be increasing in intensity.

Customarily, gastric acidity is determined preoperatively in all patients expected to receive the operation. Also, twice choledochojejunostomy was contemplated for chronic pancreatitis when at operation, penetrating duodenal ulcer was found and thought to be the cause of the pancreatitis. Subtotal gastric resection plus vagotomy evoked control of the pancreatitis in these two patients who have enjoyed normal health for eight and 13 years, respectively. Obviously, if choledochojejunostomy is employed when duodenal ulcer exists, one can expect disastrous exacerbation of the ulcer because of lack of duodenal alkalinity. It is the author's impression that several surgeons abandoned this useful procedure for the early phases of chronic pancreatitis, because the ulcer was not recognized to be the culprit that caused the need for operation.

However, subsequent care of these patients suggests no reason to predict hopelessness because the ulcer exists. In two patients, vagotomy and gastric resection were successfully performed although the operations were made more difficult on account of the previous choledochojejunostomy. The third patient responds nicely to medical management of his ulcer, but will probably become intractable in which event gastric resection and vagotomy should be done.

If this dreaded chronic pancreatitis can be controlled early in the course of the disease and functioning pancreatic tissue thereby retained, eventual gastric resection and vagotomy may prove not too high a price for this achievement.

Therefore, there appears to be a small increase in duodenal ulcer incidence for which the resultant necessary medical management or operation should not be too disparaging. If high acidity in volume as well as quality is found preoperatively, it should warn the surgeon not to employ choledochojejunostomy and in its place to use sphincterotomy, resection or pancreaticojejunostomy.

**Intestinal Obstruction.** This complication was anticipated early and late. No case has developed significant obstruction, although a few patients have complained of vague, disappearing, cramp-like pain with nausea and vomiting. These attacks are usually seen early and have completely disappeared in the few patients who complain in this fashion. If intestinal obstruction, it is mild, has disappeared in all cases and therefore has not proved to be hazardous, dangerous or debilitating.

#### Summary

Studies have been made on 85 patients who had received choledochojejunostomy with an average followup time of four years and five months.

Morbidity rate remains low.

Five strictures followed the operation, an incidence of 7.0 per cent.

One gastric ulcer, two duodenal ulcers and a possible duodenal ulcer constitute a lower incidence of ulcer occurrence than we anticipated at the start of this work in 1948.

No instances of intestinal obstruction and no other complications were noted.

Choledochojejunostomy is a valuable operative procedure that can be accomplished with low mortality and morbidity rates.

#### References

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