
Management of Biliary Obstruction in Patients with Unresectable Carcinoma of the Pancreas

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Clinical and pathologic data from 73 patients with unresectable carcinoma of the pancreas treated from 1980 to 1987 were reviewed to evaluate the efficacy of biliary enteric bypass and percutaneous transhepatic biliary drainage (PTBD) in the treatment of malignant biliary obstruction. Fifty-two patients underwent biliary enteric bypass with no operative deaths and with a 15% operative morbidity. These patients had a median postoperative hospitalization of 12 days. Four patients (8%) eventually developed recurrent jaundice, and three of these were successfully treated with PTBD. The median survival for these 52 patients was 7 months. Twenty-one patients underwent PTBD with an 81% technical-success rate. These patients had a 33% early complication rate and a 33% in-hospital mortality. The median hospitalization was 13 days postdrainage. Of the 14 patients surviving the initial hospitalization, 86% developed late complications requiring 16 hospital admissions and ten emergency room visits for a total of 155 days of hospitalization. The median survival for those patients undergoing PTBD was 4 months from the time of diagnosis and 2 months from the time of catheter drainage. Surgical bypass offers excellent palliation for malignant biliary obstruction with extremely low morbidity and mortality in properly selected patients; PTBD is useful in the treatment of those patients with extensive disease, who are poor surgical candidates, or who have failed previous surgical drainage. There is a role for both of these palliative procedures in the management of patients with biliary obstruction from pancreatic cancer.

CARCINOMA OF THE HEAD OF THE PANCREAS is the fifth most common cause of cancer-related death in the United States.¹ Complete tumor resection affords the only chance for long-term survival; unfortunately, most patients present with advanced tumors that preclude any chance of curative surgery. The most common problem facing the surgeon today is de-

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termining the best method of palliation for biliary obstruction. A previous review of the surgical management of unresectable carcinoma of the pancreas from several series reported a mean operative mortality of 19%,² which is similar to the 22% operative mortality reported from our institution for those patients undergoing biliary and/or gastroduodenal bypass from 1967 to 1978.³ However, these data were accumulated before to the frequent use of percutaneous transhepatic biliary drainage (PTBD) for the management of malignant biliary obstruction. More recent reviews show a significant decrease in the operative mortality associated with biliary enteric bypass for malignant biliary obstruction,^{4,5} and this appears to be due, in part, to more frequent usage of PTBD to drain those patients who might be unable to tolerate operation.

The purpose of this retrospective review was to evaluate the efficacy of both biliary enteric bypass and PTBD in the treatment of biliary obstruction due to carcinoma of the head of the pancreas and periampullary region in terms of operative morbidity and mortality, technical success, days of hospitalization, long-term complications, and length and quality of survival. There was no attempt to compare the two groups because selection of treatment was biased by several factors; rather, the two treatment groups were analyzed separately, and their strengths and weaknesses were evaluated.

Materials and Methods

Seventy-three patients were treated at the Medical College of Virginia from 1980 to 1987 for biliary obstruction due to pancreatic or periampullary adenocarcinoma. Ex-

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cluded from this review were any patients who underwent resection with curative intent, did not undergo decompression of the biliary obstruction, did not have histologic confirmation of pancreatic or periampullary carcinoma, or had any histology other than adenocarcinoma. Clinical and pathologic data were reviewed to determine the clinical presentation, type of palliative treatment, morbidity and mortality of the treatment, long-term complications, and survival data.

Percutaneous drainage was performed using methods previously described.⁶⁻⁸ Briefly, after cannulation of a suitable duct, a guide wire was advanced through the sheath into the ductal system across the obstructing lesion and into the duodenum. A biliary drainage catheter was advanced over the guide wire and, if possible, positioned with the side holes above and below the obstructing lesion to allow internal drainage. If the catheter could not be manipulated past the obstruction, the catheter was left above the obstruction and placed to external drainage.

For the purpose of this review, operative mortality was defined as death within 30 days or death during the same hospitalization.

Results

Biliary Enteric Bypass

Clinical presentation. Fifty-two patients underwent a biliary enteric bypass for palliation of their malignant biliary obstruction. The median age of the patients was 66 years (range of 30–79 years). There was a slight male predominance, with a ratio of 1.7:1. The most common presenting complaint was jaundice, which was present in 85% of the patients. Seventy-five per cent of the patients experienced significant weight loss, and 62% had abdominal or back pain. Thirty-three per cent complained of nausea, vomiting, or anorexia, and only 13% had a palpable abdominal mass. None of these patients presented with fever or symptoms consistent with cholangitis. The average duration of symptoms was 1.4 months (range of 0.5–6 months) (Table 1).

Surgical Management. The reasons for the selection of palliative rather than resectional treatment for those patients undergoing operation were the presence of metastatic disease in 28 patients (17 liver metastases, six peritoneal metastases, and five nodal metastases), local invasion of tumor involving vital structures in 16 patients, and poor medical condition in eight patients.

The operative procedures used to bypass the obstructed biliary duct included cholecystojejunostomy in 36 patients, choledochojejunostomy in 15 patients, and hepaticojejunostomy in one patient. Forty-seven of the 52 patients had a gastrojejunostomy performed in addition to their biliary bypass. Of the five patients who did not originally receive a gastrojejunostomy, two subsequently de-

TABLE 1. Presenting Signs and Symptoms of Patients with Pancreatic Carcinoma

Signs and Symptoms	Biliary Enteric Bypass (n = 52)	PTBD (n = 21)
Jaundice	85%	100%
Weight Loss	75%	91%
Pain	62%	53%
Nausea and vomiting	33%	24%
Abdominal mass	13%	10%
Cholangitis	0%	15%

veloped gastric outlet obstruction requiring a gastrojejunostomy. Of note is that both of these latter patients died during their hospitalization after the gastrojejunostomy.

There were no operative deaths among the 52 patients undergoing surgical biliary bypass. Eight patients (15%) had significant morbidity associated with the procedure, including two intra-abdominal abscesses, two wound infections, one pancreatic fistula, one anastomotic leak, and one case of pneumonia.

The technical success of the surgical bypass as determined by serum bilirubin levels is shown in Figure 1. The mean preoperative bilirubin of 14.8 ± 1.13 mg/dl was reduced to 2.8 ± 0.4 mg/dl after surgical bypass. Also, the mean preoperative alkaline phosphatase level of 714 ± 65 U/l was reduced to a postoperative level of 312 ± 29 U/l.

The patients undergoing biliary enteric bypass had a median total hospitalization of 19 days (range of 9–77 days) with a median postoperative hospital stay of 12 days (range of 6–69 days).

Long-term follow-up and survival. Progressive jaundice necessitating readmission to the hospital developed in four of the 52 patients at a median interval of 9.5 months. Three of the four patients had successful PTBD of the biliary obstruction during this admission, and the remaining patient was treated symptomatically. These four patients had a total hospitalization of 60 days (Table 2).

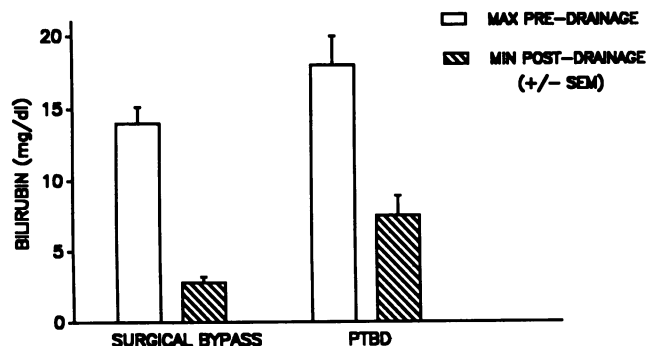


FIG. 1. Means \pm SEM of pre- and postdrainage serum bilirubin in patients bypassed by operative and nonoperative methods.

TABLE 2. Late Complications After Biliary Decompression

Treatment	No. of Patients	Complications			Hospitalization		
		Cholangitis	Catheter Problem	Progressive Jaundice	Admissions	ER Visits	Days
Biliary Enteric Bypass (n = 52)	4 (8%)	0		4*	4	0	60
PTBD (n = 14)	12 (86%)	7	8	0	16	10	155

* Three of these patients were successfully managed with PTBD.

The median survival for those patients with pancreatic adenocarcinoma who underwent palliative biliary enteric bypass was 7 months (range of 1–46 months).

Percutaneous Transhepatic Biliary Drainage

Clinical presentation. Twenty-one patients underwent PTBD for palliation of their malignant biliary obstruction secondary to pancreatic and periampullary carcinoma. The median age of the patients was 71 years (range of 38–84 years). All of the patients were jaundiced, and 91% experienced significant weight loss. Twenty-four per cent of the patients had anorexia, nausea, or vomiting, and only 10% had a palpable abdominal mass. Three of the patients in this group (15%) presented with fever and symptoms consistent with cholangitis. Average duration of symptoms was 1.4 months (range of 1–3 months) (Table 1). Seven of the 21 patients had a previous surgical bypass or resection of their pancreatic carcinoma and had recurrent obstructive jaundice.

Procedure and complications. Of the 21 patients undergoing PTBD, 17 cases (81%) were technically successful, as determined by adequate drainage of bile and decompression of the obstructed bile duct. The average predrainage bilirubin and alkaline phosphatase levels of 18.8 ± 2.0 mg/dl and 995 ± 198 U/l were reduced to 7.5 ± 1.4 mg/dl and 418 ± 55 U/l after drainage (Fig. 1). These patients underwent an average of two catheter changes to achieve adequate drainage, and 57% of the drainage tubes were 8.3 Fr or larger. Only six patients (29%) were able to have their catheter positioned through the neoplastic obstruction for internal drainage.

Seven of the 21 patients (33%) had significant morbidity associated with PTBD. The early complications included four cases of cholangitis, one of hemothorax, one of bile duct perforation, and one dislodged catheter. Furthermore, seven of the 21 patients (33%) died during the same hospitalization in which their PTBD was performed; none of these deaths appeared to be related to the PTBD.

Patients undergoing PTBD spent a median time of 23 days (range of 7–74 days) for their entire hospitalization, and a median time of 13 days (range of 4–53 days) post-drainage.

Long-term complications and survival. Of the 14 patients who survived the initial hospitalization, twelve patients (86%) had one or more complications secondary to the presence of the PTBD catheter. Seven patients (50%) had a total of eleven episodes of cholangitis and eight patients (57%) had a total of 15 episodes of catheter problems requiring either hospital admission or emergency room visit. These twelve patients had a total of 16 hospital admissions requiring a total of 155 days of hospitalization and ten additional emergency room visits. The median time from discharge after initial PTBD to readmission or emergency room visit for catheter-related problems was 1 month (Table 2).

The median survival for the 21 patients undergoing PTBD for treatment of their malignant biliary obstruction due to carcinoma of the pancreas was 4 months from the time of diagnosis and 2 months from the time of catheter drainage.

Discussion

A common problem facing the surgeon today is how best to palliate the patient with biliary obstruction due to carcinoma of the pancreas that is not resectable for cure. The appropriate palliative procedure should have a low morbidity and mortality, a high rate of success of relieving jaundice, and a low rate of long-term complications, thus enhancing the quality of survival. Older reviews on the surgical management of unresectable carcinoma of the pancreas report operative mortality rates in the range of 15–25% and operative morbidity rates of 30%.^{2,3,9-12} These rates are clearly higher than desired for a palliative procedure. However, these dismal results were often due to the advanced nature of the underlying disease process and the overall poor medical condition of these patients rather than the morbidity and mortality associated with the operation itself. Careful analysis of the cause of mortality in these patients indicated that the presence of carcinomatosis was the leading risk factor, and in the absence of metastatic disease, the mortality of surgical bypass approached zero.¹³

With the advent of PTBD, there is a reasonable alternative to operative decompression for the treatment of

malignant biliary obstruction, especially for those patients who are deemed poor surgical candidates. PTBD has been advocated as a safe and effective means of nonoperative biliary decompression that avoids both the morbidity and the prolonged hospitalization frequently associated with surgical bypass.¹⁴ However, this report and a review of the literature both indicate that the results of PTBD for palliation of malignant biliary obstruction are somewhat variable. Most reports note a high rate of technical success (85–97%) in terms of the ability of PTBD to adequately decompress the obstructed biliary system.^{14–19} However, the short- and long-term complications associated with PTBD are significant. The immediate complications associated with the procedure include cholangitis, hemorrhage, bile duct perforation, duodenal perforation, hemopneumothorax, electrolyte disorders, and catheter malfunction. We noted a 33% incidence of early complications associated with PTBD in our series, which is similar to the 20–67% incidence reported in several series.^{14,16,19–22} As noted by Mueller et al.,¹⁶ in a review of 200 cases, long-term complications of PTBD include catheter dislodgement, tube obstruction, and cholangitis, and these occur at least once in most patients. In our series, 86% of the patients surviving their initial hospitalization had late complications. These twelve patients had a total of 26 complications requiring 16 hospital admissions (155 days) and ten emergency room visits. Thus, the palliation afforded these terminally ill patients was less than optimal.

Mortality resulting from the PTBD procedure itself is uncommon, with most series reporting a procedure-related mortality of 1–2%.^{14–16} However, in-hospital mortality in patients undergoing PTBD for palliation of malignant obstructive jaundice has been reported to be as high as 49%,¹⁹ and this is thought to be due to the advanced stage of disease. It is for these reasons that one must carefully select those patients to be palliated by PTBD.

With the advent of routine PTBD, surgeons have been more selective regarding which patients should undergo operation to relieve obstructive jaundice. As a result, in recent reviews, the operative mortality for biliary enteric bypass has been reported to be as low as 0–6%,^{5,23} which is corroborated by our recent experience. Whereas the operative mortality at our institution during the period of 1967–1978, when all patients underwent operation, was 22%,³ it has now declined to zero for patients undergoing biliary enteric bypass for carcinoma of the pancreas during the last eight years. The 33% in-hospital mortality in patients undergoing PTBD in our series merely reflects a shift of the higher risk patients to this nonoperative method of biliary drainage.

Clearly, one cannot compare the results obtained from PTBD with those obtained by surgical drainage, because

the patients undergoing PTBD are generally in worse medical condition and have a more advanced disease. However, it is clear that with proper patient selection, surgical bypass offers excellent palliation of biliary obstruction with extremely low morbidity and mortality and few long-term complications. For these reasons operative bypass appears to be the procedure of choice for palliative management of malignant biliary obstruction from pancreatic carcinoma in the good-risk patient. PTBD has proven to be a useful tool in the treatment of biliary obstruction in pancreatic cancer patients with extensive disease, those who are poor surgical candidates, or those who have failed previous surgical bypass. However, the relatively high hospital mortality and long-term complication rates for the high-risk group of patients undergoing PTBD point to the need for better definition of the role of palliative PTBD.

Recent reports on the use of endoscopic placement of biliary endoprosthesis have suggested that this nonoperative method of biliary decompression is preferable to PTBD.^{22,24,25} Siegel²⁶ noted that in the treatment of 277 patients with carcinoma of the pancreas, 89% had successful insertion of a biliary endoprosthesis with no procedure-related surgery or death; however, there was a 20% complication rate and a 30% occlusion rate for a 3-month period.

A recent randomized trial of endoscopic *versus* percutaneous stent insertion in the treatment of malignant obstructive jaundice revealed a significantly higher success rate for the relief of jaundice and a significantly lower 30-day mortality for those patients undergoing the endoscopic method.²² These data suggest that endoscopic stenting may, in fact, be superior to PTBD in the palliative treatment of patients with carcinoma of the pancreas. However, the long-term complications of both these procedures make them less desirable than surgical bypass in those patients who are expected to survive more than a few months.

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