

Current Status of Laparoscopic Biliary Bypass in the Management of Non-Resectable Peri-Ampullary Cancer

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Key Words

Laparoscopy · Biliary bypass · Peri-ampullary cancer

Abstract

Background: In patients with non-resectable peri-ampullary cancer, optimization of quality of life is an important goal. Although endoscopic palliation is widely used, the proponents of laparoscopic biliary bypass claim that this procedure alters management towards surgery. However, the evidence base for selection of laparoscopic bypass is limited and the aim of this report is to scrutinize the available evidence in order to assess the current role of this procedure. **Methods:** A computerised literature search was made of the Medline database for the period from January 1966 to December 2004. Searches identified 12 reports of laparoscopic palliation for peri-ampullary cancer. These reports were retrieved and data analysed in the following categories: type of bypass; combination with other procedures; complication and outcome. **Results:** Laparoscopic cholecystoenterostomy is the commonest form of laparoscopic biliary bypass

practiced. Of the 52 reported cases undergoing laparoscopic biliary bypass, 40 underwent laparoscopic cholecystojejunostomy, 6 laparoscopic choledochoduodenostomy and 6 underwent laparoscopic hepaticojejunostomy. **Conclusion:** Current evidence does not justify the incorporation of laparoscopic biliary bypass techniques into contemporary evidence-based management algorithms for patients with non-resectable peri-ampullary cancer.

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Introduction

Surgical resection is generally accepted as having a beneficial effect on survival in patients with peri-ampullary carcinoma [1]. Despite refinements in imaging and staging, the majority of patients with pancreatic cancer are unsuitable for resection either because of comorbidity or the presence of locally advanced tumour or metastatic disease [2]. When curative treatment is unfeasible, careful selection of optimal palliation becomes of central importance in the management of pancreatic cancer. Further, in contemporary management, optimization of quality of life in patients with non-resectable disease is an important goal. Thus the rational focus of care in pa-

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tients with non-resectable disease is on palliation of symptoms using therapeutic interventions associated with the least morbidity.

Trends in management over the last decade have favoured a shift towards endoscopic palliation [3] as these techniques avoid surgery and do not require prolonged hospitalization. Proponents of laparoscopic biliary bypass argue that the introduction of laparoscopic biliary bypass changes the emphasis of management towards surgery. They argue that laparoscopic biliary bypass is associated with low operative risk, devoid of the hazards of endoscopic or radiologic stent placement and allows for combination of staging and palliation in those patients found having unresectable disease at laparoscopy [4]. Yet over a decade after the first reports of laparoscopic biliary bypass [5–7], the techniques remain favoured by enthusiasts but not incorporated into the mainstream of pancreatic oncologic care. The aim of this paper is to review the current status of laparoscopic biliary bypass and to appraise the role of these techniques in contemporary pancreatic cancer care.

Methods

Literature Search

A computerised search was made of the Medline database for the period from January 1966 to December 2003 inclusive. The OVID search engine (Version 9; Ovid Technologies, N.Y., USA) was employed. First, the MESH headings ‘cholecystojejunostomy’, ‘hepaticojejunostomy’, ‘cholechojejunostomy’, ‘cholechooduodenostomy’ and ‘biliary bypass’ were used. Combining these searches using ‘OR’ to exclude duplicates gave 1,542 articles (search 1). The MESH heading ‘Laparoscopy’ revealed 29,972 articles (search 2). Searches 1 and 2 were combined to derive publications on laparoscopic biliary bypass. This combination yielded 57 articles. The abstracts of these articles were scrutinized to exclude those which lacked original data, referred to the treatment of stone disease or were reviews producing a final study cohort of 13 manuscripts.

Data Retrieval and Outcome

Data were retrieved and analysed for outcome in the following areas:

- Laparoscopic cholecystoenterostomy
- Laparoscopic choledochenterostomy
- Laparoscopic choledochoduodenostomy
- Laparoscopic biliary bypass at the time of staging laparoscopy
- Comparative trials of laparoscopic biliary bypass

Results

Laparoscopic Cholecystoenterostomy

The first reports of successful laparoscopic cholecystojejunostomy in non-resectable peri-ampullary cancer appeared in 1992 [5–7]. The initial reports describe a simple intracorporeal, stapled, side-to-side cholecystoenterostomy fashioned using a laparoscopic intracorporeal linear stapler-cutting device with the stapler insertion sites on the gallbladder and jejunum being closed by laparoscopically placed sutures [5]. This operation does not differ from the technique of open cholecystojejunostomy. Being similar to the open operation, the laparoscopic technique although straightforward shares the inherent limitations in applicability of open cholecystoenterostomy. This procedure is indicated only when the junction of the cystic duct with the common hepatic duct was at least 1 cm above the proximal extent of the tumour [8]. In this context, Cotton’s group [8] carried out a retrospective evaluation of endoscopic retrograde cholangiographic (ERCP) findings in patients with malignant obstructive jaundice: of 218 patients undergoing ERCP, 102 were excluded as they had either hilar strictures or prior biliary surgery, further exclusions left 50 patients with radiologically patent hepatocystic junctions of whom 22 were greater than 1 cm from the upper limit of the obstruction. The authors conclude first that only a minority (22 of 218) of patients with malignant non-hilar obstructive jaundice were suitable for bypass to the gallbladder. Of this subgroup of 22 with patent hepatocystic junctions and a distance of greater than 1 cm from junction to obstruction, 4 had ampullary tumours and 5 had distal bile duct cholangiocarcinomas and thus would in all probability have been candidates for surgical resection. Importantly, they also provide evidence that proof of a patent hepatocystic junction should be established prior to bypass [8].

Experience with laparoscopic cholecystojejunostomy has largely accrued in the form of small single-centre cohort series [9–14]. Shimi et al. [5] described laparoscopic cholecystojejunostomy in 5 patients with advanced carcinoma of the pancreas. Raj et al. [9] in their technical paper described the operation in 2 patients with non-resectable pancreatic cancer and appreciable comorbidity. In both patients the operation of laparoscopic cholecystojejunostomy was completed within 1 h. Rhodes et al. [10] described 16 cases of either biliary (n = 7), gastric (n = 5) or double bypass (n = 4). The three indications for laparoscopic bypass in this study were failed endoscopic stent placement due to duodenal obstruction, failed stent exchange either due to duodenal obstruction or difficulty

Table 1. Summary of published experience with laparoscopic cholecystojejunostomy for non-resectable peri-ampullary cancer

Study	Number	Biliary bypass	Gastric bypass	Double bypass	Median operating time, min (range)	Morbidity	Mortality	Inpatient stay (days)
Shimi et al., 1992 [5]	5	5	0	0	90	1	0	10 ^a
Rhodes et al., 1995 [10]	16	7	5	3	75 (45–190)	2	0	4 (3–33)
Raj et al., 1997 [9]	2	2	0	0	45–60	0	0	1–4
Charukhchyan and Lucas, 1998 [13]*	16	6	0	0	NA	NA	NA	NA
Casaccia et al., 1999 [12]	6	0	4	2	82 (60–135)	1	0	4.5 (4–6)
Chekan et al., 1999 [11]**	10	0	7	3	NA	0	0	9.25 (3–15)
Kuriansky et al., 2000 [14]	12	0	0	12	89.16 (35–150)	3	1	6.4 (5–17)
Total	67	20	16	20			1	

^a Data available for 4 patients.

NA = Not available.

* Part of diagnostic/staging laparoscopy study.

** Compared open versus laparoscopic procedures (total number 57, 46 open and 11 laparoscopic).

Rhodes series of 16 patients includes 1 failed laparoscopic cholecystojejunostomy.

Table 2. Laparoscopic Roux-en-Y hepaticojejunostomy

Study	Number	Biliary bypass	Gastric bypass	Double bypass	Operating time, min	Morbidity	Mortality	Postoperative stay, days
Rothlin et al., 1999 [15]	10	0	7	3	129 (30–330)	1	0	9.4 (1–17)
Machado et al., 2000 [16]	1	1	0	0	NA	0	0	6
Gentileschi et al., 2002 [17]	1	1	1	0	NA	NA	NA	NA
Ali and Ammori, 2003 [20]	1			1		0	0	4

in negotiating the biliary stricture with a guidewire and lastly, the presence of peritoneal or hepatic metastatic disease. Laparoscopic bypass could not be completed in 1 patient in whom it was attempted due to obstruction of the cystic duct by tumour.

The current experience with laparoscopic cholecystojejunostomy is summarized in table 1. Of the total experience of 67 patients undergoing palliative surgery for non-resectable peri-ampullary cancer, 40 underwent laparoscopic cholecystojejunostomy. Of these, 20 underwent synchronous biliary and gastric bypass. Data regarding the failure rate of attempted laparoscopic cholecystojejunostomy are provided in only one report.

Laparoscopic Choledochojejunostomy

Rothlin et al. [15] first reported this technique in man in 1999. The biliary bypass was in the form of an end-to-

side hepaticojejunostomy using a Roux loop. Continuous absorbable sutures secured with absorbable clips were used for the anastomosis. Machado et al. [16] have reported a case with modification of the Roux loop technique that avoids division of mesenteric vessels. The technique involves side-to-side hepaticojejunostomy as a first step, followed by division of the jejunum proximal to the anastomosis. Side-to-side jejuno-jejunos- tomy is then performed to fashion a Roux loop. A continuous intracorporeal knotting technique was used for the hepatic- ojejunostomy and a linear stapler for the jejuno-jejunos- tomy. Gentileschi et al. [17] have reported another mod- ification of the technique. They described a case of laparoscopic gastrojejunostomy followed by lateral hep- aticojejunostomy without using a Roux loop. The cur- rent experience with laparoscopic choledochojejunosto- my is summarized in table 2.

Table 3. Laparoscopic choledochoduodenostomy

Study	Number	Operating time, min	Morbidity	Mortality	Postoperative stay, days
Tinoco et al., 1999 [19]	Biliary calculi 19 Pancreatic cancer 6	115 (45–180)	0	1	4.2 (3–8)

Laparoscopic Choledochoduodenostomy

In current hepatobiliary oncologic practice, choledochoduodenostomy is no longer routinely practiced [18]. The risks of tumour extension to the anastomosis and recurrent cholangitis have rendered this procedure uncommon. As a laparoscopic procedure, choledochoduodenostomy has the attraction that the proximity of the obstructed bile duct to the duodenum makes anastomosis technically feasible. However, the limitations of open choledochoduodenostomy apply to this procedure and experience is limited.

Tinoco et al. [19] have reported their experience with 25 cases of laparoscopic choledochoduodenostomy – 19 undertaken for choledocholithiasis and 6 for non-resectable pancreatic neoplasms (table 3). The anastomosis was performed using a continuous 3-0 polyglycolic suture.

Addition of Laparoscopic Biliary Bypass at the Time of Staging Laparoscopy

The theoretical attraction of laparoscopic biliary bypass at the time of laparoscopy is that treatment can be combined with staging in those patients found to have unresectable disease. However from the perspective of staging algorithms, ERCP and stent placement is often a proximal step in patients with obstructive jaundice. In pragmatic terms, if an endoscopic stent has been placed prior to laparoscopy, there is to date no evidence of superior sustained palliation of jaundice to justify additional cholecystojejunostomy in such a patient. If ERCP has not been undertaken it could be argued that critical information regarding the distance between the upper margin of the tumour and the cystic duct has not been obtained. This information may be obtained by intra-operative antegrade cholecystography or pre-operatively without recourse to ERCP by magnetic resonance cholangiopancreatography.

Comparative Trials of Laparoscopic Biliary Bypass

Currently there are no randomized comparisons of laparoscopic biliary bypass to either open surgical biliary

bypass or endoscopic stenting. Rothlin et al. [15] have reported a case-control study in which they compared laparoscopic palliation with open palliation (as part of a larger study evaluating laparoscopic gastrojejunostomy) and found that the laparoscopic surgery group had less morbidity and a shorter inpatient stay.

Discussion

Historically, surgical biliary bypass was the treatment of choice for malignant non-hilar obstructive jaundice. The advent of endoscopic biliary stenting resulted in a major shift in emphasis towards non-surgical palliation of jaundice. Proponents of laparoscopic surgery argue that laparoscopic biliary bypass avoids the morbidity of open surgery, provides definitive relief of jaundice while avoiding the risks of endoscopic palliative techniques and can also be combined with laparoscopic staging. However, over a decade after the first reports of this technique, the literature as reviewed in this study remains sparse. It is possible that there are further reports that may not have been detected by the searches carried out by this study and this is acknowledged as is the possibility that practical experience may be unpublished.

Laparoscopic bypass is most widely applied in the form of cholecystojejunostomy. Although technically straightforward, trends in open surgery favour bypass to the bile duct over cholecystojejunostomy [21]. Laparoscopic choledochojejunostomy has been reported but the experience remains limited. It remains a relatively complex laparoscopic procedure. Its proponents may argue that the additional operating time taken to achieve laparoscopic choledochojejunostomy can be balanced against the costs both of current metallic endobiliary prostheses and of any subsequent endoscopic re-canalization procedures. To date there are no studies comparing laparoscopic bypass to the bile duct with contemporary metallic endobiliary stents. Given the current predominance of endobiliary stents and their relatively minimal adverse

impact on quality of life, it may prove difficult to justify such a trial.

Although laparoscopic staging may be combined with palliation, patients found to have unresectable disease on the grounds of peritoneal dissemination or hepatic metastases have a short life expectancy [22] and if an endoscopic stent is in situ, there is no evidence to suggest that an additional bypass may benefit. In those individuals undergoing staging laparoscopy without a biliary stent in place, an argument could be made for combining bypass

with staging in the presence of conclusive evidence of disseminated disease.

In conclusion, this review article has demonstrated that over a decade after the initial reports of laparoscopic biliary bypass, the technique remains infrequently practiced. At present there is insufficient evidence to justify the incorporation of these techniques into the management algorithms for patients with non-resectable periampullary cancer.

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