



RAPID COMMUNICATION

Effect of preoperative biliary drainage on outcome of classical pancreaticoduodenectomy

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INTRODUCTION

Pancreaticoduodenectomy is a challenging operation and is associated with high morbidity^[1]. In the last two decades peri-operative mortality has decreased to less than 5% in published series from specialized centers^[2,3], although the morbidity remains high (25%-50%). The impact of jaundice on post-operative morbidity and mortality is well known. However the routine use of pre-operative biliary drainage (PBD) remains controversial^[4]. The potential advantages of preoperative stenting include improved nutritional, metabolic and immune function, and the possibility of reduced postoperative morbidity and mortality rates^[5-7]. Opponents of PBD argue that it increases infective complications and morbidity^[8,9]. There are, however, certain clinical situations such as acute suppurative cholangitis and severe malnutrition where urgent biliary drainage is indicated and can be life-saving^[10]. It is not clear whether the procedure itself or its complications influence the morbidity after pancreaticoduodenectomy. The optimal duration of preoperative drainage also remains unknown. Experimental studies have indicated that a period of 6 wk is necessary to obtain clinical benefit with PBD^[11]. On the other hand, a clinical study has shown a higher incidence of morbidity and mortality when surgery was carried out within 6 wk of stent placement^[12]. Although several reports have been published, still there are no clear guidelines regarding use of PBD in these patients. The aim of this study was to evaluate the effect of endoscopic PBD on morbidity and mortality after pancreatico-duodenectomy in a low volume center.

MATERIALS AND METHODS

Details of 48 patients who underwent Kosch-Whipple's pancreaticoduodenectomy for periampullary tumors (excluding tumor of the pancreatic head) from March 1994 to March 2004 were entered into a database that included patient characteristics, details of biliary stenting and stent-related infective complications, surgery, morbidity and mortality. Pancreaticoduodenectomy was performed in the Department of Surgery, S.M.S. Hospital, Jaipur by a single surgical team using a standard Kosch-Whipple's

Abstract

AIM: To investigate the role of preoperative biliary drainage (PBD) in the outcome of classical pancreaticoduodenectomy.

METHODS: A 10-year retrospective data analysis was performed on patients ($n = 48$) undergoing pancreaticoduodenectomy from March 1994 to March 2004 in department of surgery at SMS medical college, Jaipur, India. Demographic variables, details of preoperative stenting, operative procedure and post operative complications were noted.

RESULTS: Preoperative biliary drainage was performed in 21 patients (43.5%). The incidence of septic complications was significantly higher in patients with biliary stent placement ($P < 0.05$, 0 vs 4). This group of patients also had a significantly higher minor biliary leak rate. Mortality and hospital stay in each group was comparable.

CONCLUSION: Within this study population the use of PBD by endoscopic stenting was associated with a high incidence of infective complications. These findings do not support the routine use of biliary stenting in patients prior to pancreatico-duodenectomy.

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Key words: Whipple's operation; Preoperative stenting; Sepsis; Preoperative biliary drainage

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Table 1 Patient variables in the stented and non stented groups

	PBD	No PBD	Significance
Patients (n)	21	27	0.453
Median age (yr)	50 (25-68)	48 (30-72)	0.446
Sex ratio (M:F)	10:11	15:12	0.588
Mean serum bilirubin (mg/dL)	7.85 (SD \pm 5.59)	11.83 (SD \pm 9.05)	0.561
Albumin (mg/dL)	3.34 (SD \pm 0.7)	3.17 (SD \pm 0.82)	0.872
Location of tumor			
Ampulla	18	25	0.439
Bile duct	0	1	0.373
Duodenum	3	1	0.188

technique. Before year 2000 most reconstructions involved a pancreatojejunostomy ($n = 17$), but after year 2000 pancreatogastrostomy ($n = 31$) was performed according to the surgeon's preference. Patients with chronic and benign diseases were excluded from this study. The data were collected retrospectively as well as prospectively and were reviewed.

Pancreatic leak was defined according to the criteria described by Yeo *et al*^[9]: pancreatic fistula was diagnosed when more than 50 mL of drainage fluid with an amylase concentration of more than 3 fold the normal upper limit in serum was obtained on or after postoperative d 5, or when pancreatic anastomotic disruption was shown radiologically. Biliary leak was defined as more than 50 mL bile per day in the drain for at least three consecutive days after postoperative d 7. Biliary leak less than 50 mL per day in drain after postoperative d 3 was considered minor bile leak. Infectious morbidity was defined as any complication with evidence of associated localized or systemic infection indicated by fever, leucocytosis and positive culture.

Statistical analysis

Results are expressed as medians and ranges or as numbers and percentages of patients. Two tailed *t* test, chi-square test and binary logistic regression analysis were used for data analysis. SPSS statistical package was used (SPSS v13.0, Chicago, USA) for analysis. Differences were considered statistically significant at $P < 0.05$.

RESULTS

Forty eight patients had Whipple's operation for periampullary tumors. Twenty five patients (52.1%) were male and 23 (47.9%) were female. Median duration between onsets of symptoms to presentation was 3 mo (range 1 mo to 17 mo). The median age at presentation was 49 years (range 25 to 72). At admission 44 patients (91.7%) had jaundice [mean preoperative total bilirubin level was 10.09 mg/dL (SD \pm 7.91)], 33 (68.8%) had abdominal pain, and 6 (12.5%) had a history of vomiting. Twenty-five (52.1%) patients noticed weight loss, and 27 (56.3%) had anemia. Preoperative liver function tests and other investigations are outlined in Table 1.

Forty three (89.6%) patients underwent side-viewing endoscopy for diagnosis. Preoperative histological diagnosis was obtained in 29 (60.4%) patients. Twenty one

Table 2 Morbidity and mortality in the two groups

	PBD	No PBD	Significance
Sepsis	4	0	0.018 ^a
Wound infection	5	1	0.037 ^a
Minor bile leak	3	0	0.043 ^a
Pancreatic leak	6	2	0.106
Bleeding	1	0	0.252
Lymphorrhoea	2	4	0.580
Median hospital stay (d)	13 (1-147)	12 (9-32)	0.943
Mortality	3	5	0.690

^a $P < 0.05$, PBD *vs* No PBD.

(43.8%) underwent preoperative biliary stenting at the time of preoperative instrumentation with drainage established successfully in all stented patients. All patients in stented group (21) underwent stenting by an endoscopical approach and plastic stents were used for drainage. There were no statistically significant differences in the demographics and pre-operative variables between patient groups with or without PBD (Table 2). Mean pre-operative serum bilirubin in the PBD group was 7.85 (SD \pm 9.05) and 11.83 (SD \pm 5.59) in non PBD group ($P \geq 0.05$).

Thirty one (64.6%) patients had pancreatogastrostomy and 17 (35.4%) patients had pancreatojejunostomy. The majority of the patients (43; 89.6%) had ampullary (ampula of Vater) carcinoma, whilst 4 (10.4%) patients had duodenal carcinoma and one patient had cholangiocarcinoma. Histopathological examinations of specimens revealed well differentiated tumors in 43 patients (89.6%); whilst other 5 were poorly differentiated. Only 8.3% of patients had lymph node involvement identified in surgical specimens and only 3% of the patients had positive resection margins.

All postoperative complications and subpopulation analyses between PBD and non-PBD groups are shown in Table 2. Postoperative sepsis occurred in 8.3% (4/48) of patients. Median hospital stay was 13 d (1-147 d) and overall mortality was 16.67%. One patient had postoperative bleeding that required re-exploration. There were 6 (12.5%) patients with wound infection and lymphorrhoea each and one patient developed delayed gastric emptying. Subpopulation analysis demonstrated a higher occurrence of infection and wound infection in PBD group ($P \geq 0.05$).

DISCUSSION

Pancreatico-duodenectomy is recognized as an acceptable surgical option in patients with pancreatic malignancies although the routine use of PBD remains controversial. In general, our unit's protocol is against PBD but within this series almost half of the patients (21/48) were already stented as they were referred from other centers. This may be reflected by the late presentation of patients in this series (the duration of symptoms varied from 1 mo to over one year).

There were some changes in the surgical technique in our study over the study period. During the initial years, classical pancreaticoduodenectomy was done with

pancreatico-jejunal (Dunking) anastomosis and 17 patients had pancreaticojejunal anastomosis (35.4%). Later on pancreatico-gastric direct duct to mucosa anastomosis was favoured in 31 patients. The morbidity and mortality rates were not significantly affected by the technique of pancreatic anastomosis to the gastrointestinal tract.

Half of the patients had bilirubin levels more than 10 mg% and only 4 cases (8%) presented without jaundice at the time of admission to our surgical unit. An average bilirubin level of 10 mg% at presentation has been reported in other studies. Earlier studies reported that there is an increased morbidity and mortality associated with severe jaundice (> 10 mg%)^[13,14]. On the contrary, some recent studies have reported that the severity of jaundice has no influence on postoperative morbidity and mortality^[15]. Pivoski *et al*^[8] concluded in their study that PBD, but not preoperative biliary instrumentation alone, was associated with increased morbidity and mortality rates in patients undergoing pancreaticoduodenectomy. In a prospective review, Sohn *et al*^[9] reported the incidence of wound infection and pancreatic fistula to be significantly higher in stented patients.

The overall morbidity in our study of 48 cases was 35.41% (17 cases) and mortality was 16% (8 cases). In the first 5 years of our experience with pancreaticoduodenectomy, the operative mortality rate was 17.6%, which reduced to about 9% in last five years. Two patients died because of non surgical complications; one from dengue fever and one of myocardial infarction at the time of discharge. In our study, PBD was associated with increased morbidity following pancreaticoduodenectomy while mortality rates were unchanged. Although recent reports have shown that there is no change in infectious complication rates, notably wound infection, after PBD^[16,17], our experience was different. The stented group had significantly higher morbidity (41%) in comparison to the non-stented group (30.7%). Wound infection, sepsis and minor bile leak were found to be main complications in the stented group. The wound infection rate was 27.2%, and fever 18.1%, both significantly higher in the stented group ($P \geq 0.05$). Minor biliary leak was significantly higher in the stented group ($n = 3$) ($P \geq 0.05$) (Table 2). Further regression analysis showed that PBD was associated with infective morbidity arising from stent placement. Larger prospective studies are needed to resolve the issue of duration of PBD. Other complications such as pancreatic leak, hemorrhage and lymphorrhoea were not influenced by stenting. The mean hospital stay in the two groups was comparable in spite of septic complications.

Some published studies suggest that stenting may have an effect on bile duct bacterial colonization and cause more infective complications^[8,12]. Supporting the data above, our study confirms that PBD may have a negative impact on postoperative outcome after pancreaticoduodenectomy. However, judicious use may reduce the incidence of septic complications in selective patients. Randomized controlled trials in patient groups such as those with severe obstructive jaundice are required to address these controversies and improve outcomes and avoid unnecessary morbidity and

mortality associated with PBD.

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