Fast-track management of patients undergoing proximal pancreatic resection

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ABSTRACT

INTRODUCTION To avoid the risk of complications of biliary drainage, a feasibility study was carried out to determine whether it might be possible to fast-track surgical treatment, with resection before biliary drainage, in jaundiced patients with proximal pancreatic/peri-ampullary malignancy.

PATIENTS AND METHODS Over an 18-month period, based on their presenting bilirubin levels and other logistical factors, all jaundiced patients who might be suitable for fast-track management were identified. Data on complications and hospital stay were compared with those patients in whom a conventional pathway (with biliary drainage) was used during the same time period. Data were also compared with a group of patients from the preceding 6 months.

RESULTS Nine patients were fast-tracked and 49 patients treated in the conventional pathway. Fast-track patients mean (SD) serum bilirubin level was 265 $\mu\text{mol/l}$ (81.6) at the time of the operation compared to 43 $\mu\text{mol/l}$ (51.3; $P \geq 0.0001$) in conventional patients. Mean (SD) of time from referral to operation, 14 days (9) versus 59 days (36.9), was significantly shorter in fast-track patients than conventional patients ($P \leq 0.0001$). Length of hospital stay mean (SD) at 17 (6) days versus 22 days (19.6; $P = 0.2114$), surgical complications and mortality in fast-track patients were similar to conventional patients. Prior to surgery, the 49 conventional patients underwent a total of 73 biliary drainage procedures resulting in seven major complications. Comparison with the group of patients from the previous 6 months indicated that the conventional group were not disadvantaged.

CONCLUSIONS Fast-track management by resection without biliary drainage of selected patients with distal biliary strictures is safe and has the potential to reduce the waiting time to surgery, overall numbers of biliary drainage procedures and the complications thereof.

KEYWORDS

Obstructive jaundice – Peri-ampullary tumour – Biliary drainage procedures – Fast-track

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Proximal pancreatic resection is performed in specialist pancreatic centres for benign and malignant indications. Usually, the patient will have a suspected pancreatic cancer or peri-ampullary tumour, such as distal bile duct cancer, ampullary cancer, or duodenal cancer and the majority of such patients present with obstructive jaundice. Patients are investigated by abdominal ultrasound and then contrast-enhanced computed tomography (CT). Endoscopic ultrasound or laparoscopic assessment may also be carried out to assist in the staging or diagnostic process. At this point, if there are no surgical contra-indications (locoregional disease or distant metastases) and an anaesthetic assessment has deemed the patient fit for major surgery, the patient will be offered resection of the tumour, this being the only option for cure.^{1,2} The presence of obstructive jaundice, however, is a confounding factor. Surgery in

jaundiced patients with pancreatobiliary tumours is associated with a higher rate of postoperative complications.^{3–7} Complications of jaundice include haemorrhage, impaired wound healing, renal dysfunction and sepsis (cholangitis, abscesses, anastomotic dehiscence). Relief of jaundice by the percutaneous (percutaneous transhepatic biliary drainage, PTBD) or endoscopic (endoscopic retrograde cholangiopancreatogram, ERCP) route may be considered and have been reviewed in current guidelines.² While it is well-established that drainage by the percutaneous route does not favourably influence hospital mortality or morbidity,^{8,9} the use of the endoscopic route is more controversial with early reports showing a reduction in mortality and morbidity.^{10,11} Later reports, however, failed to demonstrate this advantage.^{12–17} In the UK, endoscopic drainage is still the conventional pathway for the management of these

patients prior to surgery, mainly for logistical rather than scientific reasons.

Biliary drainage procedures, themselves, may result in serious complications such as haemorrhage, pancreatitis, cholangitis and perforation of the duodenal wall in about 1–25% of procedures.^{18,19} Mortality as a consequence of the procedure is reported in 0.2–1% of cases.¹⁸ In addition, the success rate of ERCP or PTBD to achieve successful drainage is only about 90%, such that repeat procedures may be necessary.^{20–22} Biliary stents also become occluded before surgery can take place in up to 32% of cases, thereby necessitating a further drainage procedure.²³ We have previously shown in a prospective study of 493 patients that over 50% of patients with a resectable pancreatobiliary tumour were disadvantaged by biliary drainage in terms of a complication, a failed procedure or early stent occlusion.²⁴ We have also previously demonstrated that over half of patients presenting with obstructive jaundice due to a pancreatobiliary tumour present with a serum bilirubin below 200 $\mu\text{mol/l}$ and that the mean length of time for a bilirubin level of 160 $\mu\text{mol/l}$ (the mean presenting bilirubin level) to rise to 300 $\mu\text{mol/l}$ is 13 days.²⁵ Although there is no published absolute maximum bilirubin level above which surgery should not be attempted, previous studies^{15,26–28} and an on-going randomised trial²⁹ use a bilirubin level of 300–350 $\mu\text{mol/l}$ as the upper limit. We were, therefore, able to perform a feasibility study to determine whether it would be possible to fast-track patients from diagnosis to surgery before the level of jaundice became too great to preclude surgery and to compare these patients with those having a biliary drainage procedure prior to surgery (conventional pathway) with regard to complications and hospital stay.

Patients and Methods

Over an 18-month period based on their presenting bilirubin levels and other logistical factors, all jaundiced patients with a suspected pancreatobiliary tumour who might be suitable for fast-track management by resection before drainage were identified. Patient data were prospectively entered into an on-going database including demographics, time from referral to initial consultation, time from referral to surgery, biliary drainage procedures and their complications, surgery and its complications, total hospital stays and histology.

Data were collected from fast-track patients and compared with those patients in whom a conventional pathway (with biliary drainage) was used during the same 18-month period. To ensure that conventional patients within the study period were not disadvantaged during this time period, data were also analysed from a group of patients from the 6 months prior to the study period, during which time patients only underwent treatment in the conventional pathway.

Results

During the study period, nine patients were fast-tracked and 49 patients treated in the conventional pathway. Fast-track patients mean (SD) serum bilirubin level at the time of the operation was significantly lower than from patients treated in the conventional pathway: 265 $\mu\text{mol/l}$ (81.6) versus 42.7 $\mu\text{mol/l}$ (51.3), $P \leq 0.0001$. Mean (SD) of time from referral from an outside hospital to operation, 13.6 days (9) versus 58.5 days (36.9), was significantly shorter in fast-track patients versus conventional patients $P \leq 0.0001$. Mean (SD) total length of hospital stay (for all admissions) was also significantly shorter in fast-track patients at 21.7 days (9.1) versus 32 days (21), $P = 0.014$. Surgical mortality and morbidity in fast-track patients was similar to that of conventional patients. Prior to surgery, the 49 conventional patients underwent a total of 73 biliary drainage procedures resulting in seven major complications. Following ERCP, two patients developed severe acute pancreatitis and biliary sepsis occurred in one patient. Following PTBD, four patients experienced complications. One had biliary sepsis and three others developed biliary peritonitis caused by a bile leak. Comparison with the group of patients from the previous time period indicated that the conventional group within the study period were not disadvantaged in any way in comparison to the previous groups (Table 1).

Discussion

Patients in this study were selected for the fast-track pathway based on presenting bilirubin levels and other logistical factors including the availability of operating space. Over the given time period, nine patients successfully followed the fast-track pathway. This shows that it is logistically possible for patients to be managed in this way. Randomising patients at presentation into a fast-track or conventional pathway was considered but the resource provision needed to achieve this was unavailable at the time of the study.

A bilirubin level of around 300 $\mu\text{mol/l}$ was set as the upper limit, with patients presenting with levels below this cut-off being eligible for selection to enter fast-track management. Many previous studies^{5–7} have shown that operating on patients with high bilirubin levels is worse with regard to complications but none, including a large meta-analysis,³⁰ have suggested a threshold below which surgery without drainage in the non-septic patient is universally acceptable.^{15,26–28} This cut-off level of 300 $\mu\text{mol/l}$ is similar to that used in previous studies.^{26–28} It is also noted that our cut-off level is consistent with the level set in the on-going randomised, multicentre DROP trial (Pre-operative biliary drainage for peri-ampullary tumours causing obstructive jaundice; DRainage vs OPeration).²⁹ In this trial, patients randomised to surgery must have a bilirubin level < 250 $\mu\text{mol/l}$ at presentation and < 300

$\mu\text{mol/l}$ at less than 24 h before surgery. Although no explanation was given in this study about why the cut-off bilirubin level of 300 $\mu\text{mol/l}$ was selected, it does seem to be a consistent standard. In our study, patients managed in the fast-track pathway had a mean bilirubin level of 265 $\mu\text{mol/l}$, consistent with other studies.

Biliary drainage procedures are invasive, frequently difficult and associated with an appreciable morbidity and a recognised mortality rate. The possibility of avoiding a biliary drainage procedure and hence the inherent risk of complications by using fast-track management seems to be in the patients' best interest.¹⁷ It was also thought that this pathway of management might prove popular with patients to avoid waiting for surgery and popular with clinicians to avoid multiple admissions to hospital.

We successfully identified, clinically assessed, radiologically staged and operated on nine patients presenting with

a bilirubin level below the cut-off of 300 $\mu\text{mol/l}$. We found no statistical difference in the mortality or postoperative surgical complication rate between the fast-track and conventional pathway patients. We have, therefore, demonstrated that not only is it possible to follow a fast-track management pathway logistically but, importantly, that the fast-track management pathway does not compromise patient care in any way. In fact, fast-track management could be viewed as an improvement in care considering patients in this group had no complications of biliary drainage procedures, and their total hospital stay and delay to surgery was significantly reduced.

A further important point is that the comparison of patients in the conventional pathway in the preceding 6 months to the study period revealed no differences regarding the delay to surgery, total hospital stay or operative complications. This shows that during the time that patients

Table 1 Details of patients in the fast-track and conventional management pathways

	Fast-track pathway (study period)	Conventional pathway (study period)	Conventional pathway (6 months prior to study period)
Number of patients	9	49	16
Age (years) mean (SD)	53.8 (11.6)	66.2 (10.3)	67.8 (9.0)
Time from referral to consultation (days) mean (SD)	5.9 (2.9)	13.4 (18.9)	11.3 (8.9)
Time from referral to operation (days) mean (SD)	13.6 (9.0)	58.5 (36.9)	56 (22.9)
Procedure performed	9 PPPD	45 PPPD, 4 classical Whipple	12 PPPD, 4 classical Whipple
Surgical complications	No deaths, 2 pancreatic leaks, 1 biliary sepsis, 1 wound infection, 1 urinary retention	3 deaths, 15 pancreatic leaks, 3 GI bleed, 5 wound infections	No deaths, 7 pancreatic leaks, 2 chest infections, 2 wound infections, 1 SVT
Hospital stay at tertiary referral centre (days) mean (SD)	17.1 (6.2)	22.4 (19.6)	25.9 (12.1)
Hospital stay at tertiary referral centre and referring hospital (total hospital stay) (days) mean (SD)	21.7 (9.1)	32 (21.0)	36.5 (16.7)
Tumour histology	7 pancreatic adenocarcinoma, 2 pancreatic neuroendocrine	33 pancreatic adenocarcinoma, 2 duodenal adenocarcinoma, 2 distal cholangiocarcinoma, 2 pancreatic neuroendocrine, 2 tubular adenoma, 1 tubulovillous adenoma, 1 epithelial hyperplasia, 3 benign disease, 2 ampullary adenocarcinoma, 1 B-cell lymphoma	15 pancreatic adenocarcinoma, 1 tubular adenoma
Number of PTBD performed (complications)	0 (0)	15 (4)	6 (1)
Number of ERCP performed (complications)	0 (0)	54 (4)	22 (2)
Pre-operative bilirubin ($\mu\text{mol/l}$) mean (SD)	265 (81.6)	42.7 (51.3)	29.75 (26.7)

PPPD, pylorus preserving pancreaticoduodenectomy.

were being identified for, and managed in, the fast-track pathway, the patients managed in the conventional pathway during this period of time were not disadvantaged by fast-tracking those patients with less severe jaundice.

This study suggests that, due to the advantages afforded to the patient, fast-track management should be considered for patients with a serum bilirubin of < 300 µmol/l who are thought to be anaesthetically and nutritionally fit for major surgery. Of a total of 58 proximal pancreatic resections during our study period, only nine patients could be fast-tracked whereas with 60% of patients presenting with a serum bilirubin below 200 µmol/l,²⁵ one would hope that it would be possible to avoid drainage in at least 40–50% of patients undergoing resection. It is our opinion that this could be achieved with improved planning and liaison with referring hospitals and investment in bed and operating theatre availability and access to urgent specialist radiological investigations.

Conclusions

Fast-track management of patients with proximal pancreatic and peri-ampullary tumours is safe and logistically possible. It offers benefits to patients due to avoidance of the inherent complications of biliary drainage procedures, a reduced time to surgery and a reduced total hospital stay. Fast-track management should be available and become the conventional pathway for all appropriate patients.

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