



Assessment of cases undergoing pancreatic surgery by ERAS (Enhanced recovery after surgery) protocol

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Abstract

Enhanced recovery after surgery (ERAS) is a multidisciplinary and evidence-based framework, developed to decrease perioperative surgical stress, accelerate postoperative recovery and significantly reduce the postoperative length of hospital stay (PLOS). The benefit of implementing ERAS programs on postoperative complications in pancreatic surgery has not reached consensus. Hence based on above findings the present study was planned to evaluate the safety and outcome of patients undergoing elective pancreatic surgery with ERAS protocol.

The study was planned in the Department of Surgery in V.I.M.S, Pawapuri, Bihar from March 2018 to July 2018. Total 50 patients were enrolled in the present study undergoing pancreas surgery like pancreaticoduodenectomy, pancreatectomy. Postoperative outcomes included postoperative length of hospital stay, overall morbidity, major morbidity, unplanned reoperation, readmission and mortality. Grades of complications were recorded according to the Clavien Dindo classification. Enhanced Recovery after Surgery protocols are effective in pancreatic surgery. They improve efficiency, hospital length of stay, and costs. Enhanced Recovery after Surgery is safe. Enhanced Recovery after Surgery decreases postoperative morbidity, especially delayed gastric emptying. The perioperative period for pancreatic surgery is safe and effective to implement ERAS programs that can decrease postoperative complication rates and promote recovery.

Keywords: enhanced recovery after surgery, ERAS, pancreatic surgery

Introduction

In medicine, a pancreatectomy is the surgical removal of all or part of the pancreas. Several types of pancreatectomy exist, including pancreaticoduodenectomy (Whipple procedure), distal pancreatectomy, segmental pancreatectomy, and total pancreatectomy. These procedures are used in the management of several conditions involving the pancreas, such as benign pancreatic tumors, pancreatic cancer, and pancreatitis.

The most common surgical procedure involving removal of a portion of the pancreas is called a pancreaticoduodenectomy. Among common consequences of complete or nearly complete pancreatectomy are deficiencies of pancreatic endocrine or exocrine function requiring replacement of insulin or digestive enzymes. The patient immediately develops type 1 diabetes, with little hope for future type 1 diabetes treatments involving the restoration of endocrine function to a damaged pancreas, since the pancreas is either partially or completely absent. Type 1 diabetes can be treated with careful blood glucose monitoring and insulin therapy. Because the pancreas is responsible for the production of many digestive enzymes, a pancreatectomy should only be given as an option for pancreatic disease which is life-threatening, such as pancreatic cancers. It is very important to note that even after a pancreatectomy, pain still exists in most patients. A distal pancreatectomy is removal of the body and tail of the pancreas.

After a total pancreatectomy, the body no longer produces its own insulin or pancreatic enzymes, so patients have to take insulin and enzyme supplements. Those who were not already diabetic become so. Glycemic control is challenging

even for relatively young and healthy apantreatic people, owing to the digestive challenges of not having endogenous insulin and pancreatic enzymes under autonomic control. It can be insurmountably challenging depending on age and comorbidities. But overall, quality of life in patients after total pancreatectomy is comparable with quality of life in patients who undergo a partial pancreatic resection [1]. An experimental procedure called islet cell transplantation exists to help mediate the loss of endocrine function following total pancreatectomy.

A pancreaticoduodenectomy, pancreatoduodenectomy [2]. Whipple procedure, or Kausch-Whipple procedure is a major surgical operation most often performed to remove cancerous tumours off the head of the pancreas [2]. It is also used for the treatment of pancreatic or duodenal trauma, or chronic pancreatitis [2]. Due to the shared blood supply of organs in the proximal gastrointestinal system, surgical removal of the head of the pancreas also necessitates removal of the duodenum, proximal jejunum, gallbladder, and, occasionally, part of the stomach [3].

The most common technique of a pancreaticoduodenectomy consists of the en bloc removal of the distal segment (antrum) of the stomach, the first and second portions of the duodenum, the head of the pancreas, the common bile duct, and the gallbladder. Lymph nodes in the area are often removed during the operation as well (lymphadenectomy). However, not all lymph nodes are removed in the most common type of pancreaticoduodenectomy because studies showed that patients did not benefit from the more extensive surgery [4].

At the very beginning of the procedure, after the surgeons

have gained access to the abdomen, the surfaces of the peritoneum and the liver are inspected for disease that has metastasized. This is an important first step as the presence of active metastatic disease is a contraindication to performing the operation.

The vascular supply of the pancreas is from the celiac artery via the superior pancreaticoduodenal artery and the superior mesenteric artery from the inferior pancreaticoduodenal artery. There are additional smaller branches given off by the right gastric artery which is also derived from the celiac artery. The reason for the removal of the duodenum along with the head of the pancreas is that they share the same arterial blood supply (the superior pancreaticoduodenal artery and inferior pancreaticoduodenal artery). These arteries run through the head of the pancreas, so that both organs must be removed if the single blood supply is severed. If only the head of the pancreas were removed it would compromise blood flow to the duodenum, resulting in tissue necrosis.

Pancreaticoduodenectomy is considered, by any standard, to be a major surgical procedure. Many studies have shown that hospitals where a given operation is performed more frequently have better overall results (especially in the case of more complex procedures, such as pancreaticoduodenectomy). A frequently cited study published in The New England Journal of Medicine found operative mortality rates to be four times higher (16.3 v. 3.8%) at low-volume (averaging less than one pancreaticoduodenectomy per year) hospitals than at high-volume (16 or more per year) hospitals. Even at high-volume hospitals, morbidity has been found to vary by a factor of almost four depending on the number of times the surgeon has previously performed the procedure [5]. de Wilde *et al.* have reported statistically significant mortality reductions concurrent with centralization of the procedure in the Netherlands [6]. One study reported actual risk to be 2.4 times greater than the risk reported in the medical literature, with additional variation by type of institution [7].

Enhanced recovery after surgery (ERAS) is a multidisciplinary and evidence-based framework, developed to decrease perioperative surgical stress, accelerate postoperative recovery and significantly reduce the postoperative length of hospital stay (PLOS). ERAS programs have been launched in a variety of other fields of surgery, such as colorectal, orthopaedics, urology, oesophageal, and gynaecology, and have demonstrated favourable outcomes. The implementation of ERAS programs has lagged surrounding pancreatic surgeries because of the anatomical location of the pancreas and the high rate of postoperative complications (30%-60%). It is very important to promote the postoperative recovery for this high-risk abdominal surgery via implementing ERAS programs during the preoperational period.

There had been an increasing number of Enhanced recovery after surgery (ERAS) programs implemented in pancreatic surgery when the ERAS group published evidence-based consensus recommendations for pancreatic surgery in 2012. The benefit of implementing ERAS programs on postoperative complications in pancreatic surgery has not reached consensus. Hence based on above findings the present study was planned to evaluate the safety and outcome of patients undergoing elective pancreatic surgery with ERAS protocol.

Methodology

The study was planned in the Department of Surgery in V.I.M.S, Pawapuri, Bihar from March 2018 to July 2018. Total 50 patients were enrolled in the present study undergoing pancreas surgery like pancreaticoduodenectomy, pancreatectomy. Postoperative outcomes included postoperative length of hospital stay, overall morbidity, major morbidity, unplanned reoperation, readmission and mortality. Grades of complications were recorded according to the Clavien Dindo classification [8].

ERAS protocol for pancreatic resection included following essential elements:

1. Preoperative counselling;
2. Preoperative carbohydrate loading, with clear liquid of 50 gm, and 200 ml carbohydrate-rich drink on the evening, as well as 3 hours before surgery;
3. Preoperative biliary drainage only in presence of cholangitis or severe malnutrition;
4. Mid-thoracic epidural anaesthesia;
5. Perioperative goal-directed IV fluid therapy using hemodynamic monitoring via arterial line;
6. Early removal of nasogastric tube (Day 1); Early oral feeds (sips on first day, clear liquids on second day and gradually progressed to solid diet by day 6); Early Foley’s catheter removal (Day 3); Early mobilization (on bed active limb movement in day 1, bedside sitting/standing on day 2 and assisted walking on day 3);
7. Restricted intravenous fluids in postoperative periods with permissive relative oliguria (0.4 to 0.5 ml/ kg/hr);
8. Early intra-abdominal drain removal, day 3 for firm pancreas and day 5 for soft pancreas and the drain amylase value less than 3-fold of serum level;
9. Nonnarcotic analgesics.

Results & Discussion

The data from the current findings and the reported literature findings were collected and presented as below. The data from the 50 patients were collected and presented as below. The ERAS protocol for the 50 patients was evaluated successfully.

Table 1: Demographic Parameters

Parameters	No. of Cases
Age	30 – 68 years
Sex	
Male	23
Females	27
Body Mass Index (BMI), kg/m ² ;mean (range)	15.9 – 25.2
Diabetes mellitus	14
Obstructive jaundice	25
Preoperative biliary drainage	6
Pathology:	
Malignant	42
Benign	8
Diagnosis:	
Carcinoma head of pancreas	11
Periampullary carcinoma	19
Solid pseudopapillary neoplasm	8
Chronic pancreatitis	5
others	7
Operative procedures:	
Pancreaticoduodenectomy	31
Distal Pancreatectomy	10
Frey’s Procedure	9

Table 2: Clinical outcomes.

Parameters	No. of Cases
Postoperative Length of Stay (LOS)	6 – 20 days
Overall Morbidity	32
Major Morbidity	11
Mortality	4
Readmission	1
Reoperation	2

Table 3: Postoperative complications

Parameters	No. of Cases
POPF: postoperative pancreatic fistula	9
DGE: delayed gastric emptying	8
PPH : post-pancreatectomy haemorrhage	4
Intraabdominal abscess	5
Wound Infection	6
Postoperative ascites	8
Chylous ascites	2
Others	8

ERAS requires surgical, nursing, anaesthesia, nutritionist and other specialties to work together and uses a series of optimal and evidence-based management measures to lessen perioperative surgical stress while promoting the recovery of organ function in the early postoperative period [9-10]. ERAS programs were initially implemented in colorectal surgery, with recommendations for each step to achieve optimal perioperative care [11]. Subsequently, ERAS programs had been launched in numerous fields of surgery, such as orthopaedics, urology, oesophageal and gynaecology.

The main measures of the ERAS programs include no bowel preparation and clear fluids until 2-3 h before surgery, multimodal analgesia of postoperative, clear fluids or food intakes, enhanced mobilization and removal of the drainage tube in early period. The ERAS group has reduced time of fasting in the preoperative period, which can decrease the insulin resistance in the postoperative period. We adopted multimodal analgesia in the postoperative period, which was able to reduce the stress caused by pain. The programs, such as, no bowel preparation before surgery, clear fluids or food intakes, enhanced mobilization in the early postoperative period which may promote rehabilitation of gastrointestinal function [12].

The ERAS programs aimed to reduce the incidence of complications and accelerate recovery for patients. Among them, gastrointestinal function rehabilitation is an important part of the rapid recovery in abdominal surgery. In addition, the early postoperative oral feeding, which may play an important role in the gastrointestinal function rehabilitation in the postoperative period. This is because early postoperative oral feeding is more in line with human physiology of the digestive tract, and which may have a beneficial effect on immunological, inflammatory and nutritional status. In addition, early postoperative oral feeding can promote the recovery of gastrointestinal motility, protect the gastrointestinal mucosal barrier, shorten time to gas and stools passage, and reduce the incidence of complications.

Although ERAS protocols have the potential to improve outcomes for patients undergoing pancreatic resection, their impact is limited by variable implementation strategies. Simply developing evidence-based protocols is not sufficient to change practice. Simultaneous strategies such as the initiation of patient education, audit and feedback systems, and adherence to standards of desired practice are required to

ensure the effective implementation of ERAS protocols. In general, the reporting of implementation strategies was poor. Only three studies included standardized sets of doctors' orders as part of their implementation process.[13-15]. Other implementation strategies reported include: formal and informal education sessions for HCPs; patient education sessions, and the use of pilot project results to inform the future implementation of ERAS programmes. Although the beneficial effects of audit and feedback on improving the practice of HCPs and ameliorating patient outcomes have been demonstrated, only one of the studies included audit and feedback as part of the ERAS implementation process [14]. Emphasis on discharge planning varied substantially among ERAS protocols. Some studies included explicit criteria to be met prior to discharge, whereas others projected discharge on a specific postoperative day. What is not reported is the degree to which patients and allied health care professionals (HCPs) were involved in discharge planning. Future protocols might explicitly include specific patient-centred discharge planning interventions.

In a meta-analysis by Ji HB *et al.* [16] who analyzed 20 studies including 3694 patients, the ERAS group had lower rates of DGE, postoperative complications rates, particularly mild complications rates, lower abdominal infections rates and shorter postoperative LOS. However, no significant differences existed in POPF, moderate to severe complications, mortality, readmission or unintended reoperation.

It is notable that these improvements in outcomes were demonstrated with protocol implementation, as many of the elements of the protocol were applied, although inconsistently, before ERAS protocol implementation. Preoperative immunomodulating nutritional supplementation and regional anesthesia were used at our institution in the pre-ERAS era. Intraoperative normothermia protocols and antibiotic and venous thromboembolism prophylaxis guidelines were already in place. Postoperative “fast-track” order sets were also standardized. The salient difference with the ERAS protocol was the refinement and consistent use of these pre-existing elements, along with the implementation of novel elements, including preoperative carbohydrate loading, use of adjunctive non-narcotic analgesics, and perioperative fluid restriction. This was achieved with standard education and collaboration between patients, surgeons, residents, nurses, anesthesiologists, intensivists, pharmacists, nutritionists, physical therapists, case managers, and discharge planners in the preoperative, operative, and postoperative periods.

Enhanced Recovery after Surgery protocol development represents an ideal opportunity to review current surgical practice and avoid anecdotal medicine. Surgery and surgical patient care are steeped in tradition. Pancreatic surgery in particular resides in the temple of surgical heroes and experience-based medicine. It might be carping to comment that the art of surgery is long and experience fallacious; it is cogent to highlight that the modern surgeon knows the value of evidence-based practice. By systematically evaluating the available data at each step of perioperative care, one can move toward best practice; where evidence is lacking, opportunity for further study is identified. In the long run, with careful study of the individual protocol elements and protocol refinement, optimal perioperative care will be achieved to facilitate improved outcomes beyond decreased length of stay, cost, and delayed gastric emptying.

Conclusion

Enhanced Recovery after Surgery protocols are effective in pancreatic surgery. They improve efficiency, hospital length of stay, and costs. Enhanced Recovery after Surgery is safe. Enhanced Recovery after Surgery decreases postoperative morbidity, especially delayed gastric emptying. The perioperative period for pancreatic surgery is safe and effective to implement ERAS programs that can decrease postoperative complication rates and promote recovery.

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