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Enhanced Recovery after Surgery for Gastric Cancer

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Abstract

Introduction: While FTS programs are developing in colo-rectal surgery, in upper gastrointestinal surgery they are rare. ERAS programs can be planned and performed in gastric cancer surgery as pre-, intra- and post-operative.

Materials and methods: We have studied 178 gastric cancer patients operated radically in our clinic between 2000 and 2011, comparing outcomes of surgical strategies containing FTS elements. Standard gastrectomies with D2 lymph node dissection were made: esophago-cardial resections - 32; total gastrectomies - 78, proximal gastrectomies - 21; distal gastrectomies - 47. Patient's files were inspected for 19 perioperative indicators applicable to FT surgery. Data for abdominal complaints and early postoperative complications were also collected and analyzed.

Results: Only 42 patients fulfilled the criteria for ERAS intervention, having at least 5 ERAS indicators. The most common FT elements were: lack or removing naso-gastric tube, oral intake and mobilization on postoperative day 1 - 2 and one shot AB prophylaxis. From the 8 types of complications studied, most common were: wound infection - 12.9% and anastomosis dehiscence - 4.5%. Lethality was 6.2%. Six patients died from pulmonary embolism, bronchopneumonia and heart attack. Reoperations for complications were performed in 19 patients, 5 of whom died. Mean hospital stay was - 15.2 days.

Discussion and conclusions: In patients mobilized early, fed orally and deprived from nasogastric tube and urinary catheter on day 1-2, flatus and defecation appeared earlier, wound infections, pulmonary hypostasis and pneumonia rate were lower and hospital stay was less, which coincides with other reports. Usual insertion of naso-gastric tubes, urinary catheters and intra-abdominal drains after gastric cancer resection should be avoided. FTS in gastrectomy for gastric cancer is safe and efficient approach, which hasten return of gut function and shorten postoperative hospital stay.

Keywords: Fast Track Surgery (FTS); Enhanced Recovery After Surgery (ERAS); Gastric Cancer (GCa)

Introduction

From all gastrointestinal malignancies in the western countries stomach cancer takes second place in rate. The standard, potentially curative management of gastric cancer is stomach resection with lymphadenectomy, even though postoperative complications and lethality are not low [1-3].

The pioneers of Fast Track (FT) rehabilitation or Enhanced Recovery After Surgery (ERAS) were Bardram and later Kehlet and Wilmore, who implemented it for the first time in 1995 in a detailed specific protocol. ERAS strategies aim to stimulate rapid postoperative recovery following major surgery and reduce the stress response to surgery and operative morbidity [4].

	Types of ERAS interventions
Preoperative	1. Patient information, risk assessment 2. Short period of liquid and food restriction before surgery(4 hours) 3. Lack of bowel preparation /mechanical, antibiotic/. 4. Cancelled pre-medication
Intraoperative	5. Optimal general anesthesia. 6. Control of hypoxia 7. Control of hypothermia 8. Restriction of intravenous fluid overload. 9. Transverse laparotomy, laparoscopic procedures 10. Avoid naso-gastric tube and urinary catheter when possible 11. Intra-peritoneal drains only when indicated
Postoperative	12. Multimodal analgesia - no systemic use of opioids 13. Per-oral feeding with liquids and solid food from day 1-2 14. Routine anti-emetic 15. Pro-kinetics and/or laxatives when needed 16. Early mobilization from bed - standing up and walking from day 2 17. Routine deep venous thrombosis prophylaxis 18. Early take off nasogastric tubes, drains, urinary catheters, iv access 19. Requirements for discharge - restored per-oral feeding, defecation, primary wound healing, controlled pain

Table 1: Modified perioperative protocol for ERAS interventions in patients with Gastric Cancer.

Perioperatively ERAS programs can be planned and performed as pre-, intra- and postoperative, depending on the time interval, in which the procedures take place [4] (Table 1).

FTS programs are rapidly developing in colonic and rectal surgery where multimodal protocols have been implemented after inter-institutional studies like ACERTO project [5], TAPAS study [6]. Although FTS is not so popular in upper gastrointestinal surgery, in the last two years there are several reports in this field [7,8]. Studies on FT in the upper gastrointestinal surgery (mainly for gastric cancer) concern most of all deprivation of naso-gastric tube and early initiation of per-oral feeding [9-15].

The first ERAS randomized studies on gastric cancer in open [16] and laparoscopic [17] surgeries have been published in 2010. Recently two studies of Kim et al. [18] and Chen et al. [19] randomizing 47 and 88 patients respectively, evaluated the outcomes of fast-track gastric cancer surgery with laparoscopy-assisted radical distal gastrectomy.

For a study to be qualified as ERAS intervention it should research at least five of the 19 elements listed in table 1 and at least one of each coming from the pre-, intra- and postoperative time intervals.

Aim

The aim of this study is to investigate FTS for gastric cancer in

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patients undergoing gastrectomy, by exploring elements and variables coinciding with ERAS programs and comparing outcomes of surgical strategies containing FTS elements.

Materials and Methods

We have studied retrospectively 178 cases of gastric cancer operated radically with resections and anastomoses in our clinic between 2000 and 2011. Patients were divided into four groups depending on tumor localization - cardia cancer, proximal and distal gastric cancer and advanced disease - linitis plastica (Table 2).

The following operations were performed: esophagocardial resections - 32 (18%); total gastrectomies -78 (44%), (Roux (22) or Omega with Braun (56) anastomosis); proximal subtotal gasterctomies - 21 (12%); distal subtotal gastrectomies 47 (26 %) (Billroth I (14) and Billroth II type (33)) (Table 3).

Patients files were inspected for: preoperative stay; ASA score; preoperative food restriction time; mechanical bowel preparation; preoperative antibiotic prophylaxis; fluid overload; nasogastric tube; intra-peritoneal drainage placed; analgesia; initiation of peristalsis; start of postoperative oral feeding; mobilization from bed; term of removal of nasogastric tube, urinary catheter, intra-peritoneal drain, if placed; length of hospital stay. Data for abdominal complaints like vomiting, abdominal distention, length of ileus, food tolerance, duration of intravenous fluid administration, serum albumin, were collected and assessed. Data for early postoperative complications like prolonged intestinal paresis, anastomotic leak, anastomotic dehiscence, complicated intra-abdominal infection, bowel obstruction/stricture, wound infection, pulmonary hypostasis, urogenital infection, embolism and lethality were also collected and analyzed.

Results

The mean age of the patients is 62.4 years, varying from 38 - 91 years of age. The men 104 (58.4%) to women 74 (41.6%) ratio is 1.4:1. Most of the gastric cancer patients were with high risk - ASA I - 5, ASA II - 35, ASA III - 118, ASA IV - 20, ASA V - 0. Every patient with gastrectomy had routinely have deep venous thrombosis prophylaxis, selective morphine analgesia, usually once on the night of operation, pro-kinetics on 1-3 postoperative day, early oral intake of liquids and solids on day 1-2-3 and strict fulfillment of discharge requirements - restored per-oral feeding, defecation, primary wound healing, controlled pain.

Our retrospective analysis showed that only 42 (23.60%) patients fulfilled the criteria to be qualified as ERAS intervention having at least

Localization	n	%
Cardiac Cancer	36	20
Proximal Gastric Cancer/fornix, minor curvature corpus	48	27
Distal Gastric Cancer /corpus, greater curvature, antrum, pylorus	64	36
Advanced gastric cancer/linitis plastica	30	17
Total	178	100

Table 2: Localization of cancer.

Operation	n	%
Esophago-cardia resection	32	18
Total Gastrectomy	78	44
Distal Gastrectomy	47	26
Proximal Gastrectomy	21	12
Total	178	100

Table 3: Types of operations performed.

Complication Type	n /178/	%
Bronchopneumonia	7	3.9
Embolia	2	1.1
Pneumothorax	3	1.7
Anastomosis dehiscence	8	4.5
Wound infection	23	12.9
Wound dehiscence	4	2.2
Postoperative hemorrhage	3	1.7
Postoperative ileus	6	3.4
Lethality	11	6.2

Table 4: Postoperative Complications and Lethality in Gastrectomies for Gastric Cancer.

5 of the elements in table 1 and at least one of each coming from the pre-, intra- and post-operative time intervals.

Their number was increasing within recent years and 80% of the patients were operated by one surgical team. The most common elements were lack or early removing naso-gastric tube day 1-2, early mobilization from bed - stand up and walk on postoperative day 1 - 2, early oral intake - day 1-2-3 and one shot antibiotic prophylaxis.

The postoperative complications have been: bronchopneumonia - 7 (3.9%), embolia - 2 (1.1%), pneumothorax - 3 (1.7%). Anastomosis dehiscence - 8 (4.5%), wound infection - 23 (12.9%) wound dehiscence - 4 (2.2%), postoperative hemorrhage - 3 (1.7%), postoperative ileus - 6 (3.4%), lethality -11 (6.2%) (Table 4).

Six patients died postoperatively from pulmonary embolism, bronchopneumonia and heart attack. Reoperations for complications were performed in 19 patients, 5 of whom died. Mean hospital stay was - 15.2 days (6-89).

Discussion

Throughout the last 18 years ERAS has gained a lot of evidence-based research data, proving that it is beneficial, though not a standardized system for perioperative care improvement in elective surgical procedures, progressing on with optimizing the anesthetic and surgical clinical performance and practice. There is no consensus on different nutritional regimens, though there is agreement that early oral feeding is advantageous [20].

Our data show slight dominance of stomach cancer in males (58.4%). The age of the patients with stomach cancer resections is mainly in the advanced range (mean age 62.4 years). The high risk patient group with moderate to severe disease without disability is dominating (ASA III-118).

In patients with early mobilization in and out of bed on day 1-2, early oral liquid and solid food intake on day 1-2, taking off nasogastric tube and urinary catheter on day 1-2, flatus and defecation appeared earlier, wound infections, pulmonary hypostasis and pneumonia rate were lower and hospital stay was less, which coincides with other reports [10,11,13,14]. Early oral or enteral feeding through the nasogastric tube following elective upper gastrointestinal surgery is feasible, safe, with no evidence of increased morbidity, improves the nutritional status, ensures rapid postoperative recovery and a shorten hospital stay [10,14,15]. Usual insertion of naso-gastric tube is unnecessary after gastric resection for gastric cancer and should be questioned and used when indicated [12,13].

We have observed that in patients with early mobilization in and out of bed on day 1-2, early oral liquid and solid food intake on day 1-2, taking off nasogastric tube and urinary catheter on day 1-2, they

have had, like those reported by Suehiro et al. [10], Yang et al. [11], Hamerlynck and Middeldorp [13], and Hur et al. [14], flatus and defecation appear earlier, wound infections, pulmonary hypostasis and pneumonia rate were lower and hospital stay was less.

The most common were the wound complications - wound infection - 23 (12.9%) and wound dehiscence - 4 (2.2%). Other complications were intra-abdominal/anastomosis dehiscence - 8 (4.5%), postoperative hemorrhage - 3 (1.7%), postoperative ileus - 6 (3.4%), and pulmonary postoperative complications/bronchopneumonia - 7 (3.9%), embolia - 2 (1.1%), pneumothorax - 3 (1.7%).

Performing the best appropriate operation, radical surgery for stomach cancer can favor low morbidity and mortality [21,22].

The lack of randomization and FTS protocol for prospective research does not allow us to make statistically significant conclusions on the results of implementation of several FTS parameters. Nevertheless we consider that the analysis results of our 42 (23.60%) ERAS patients out of all 178 studied are clinically significant and represent a sound basis for further prospective randomized study.

In their comparative study of two patient's groups; ERAS group (n=91) and conventional care group (n=100), Yamada et al. [23], found out advantages in restoring bowel function, less use of analgesics and higher body weight in the ERAS group. These results coincide with our results and we share their opinion that the ERAS protocol is beneficial in elective gastric cancer surgery.

Kim et al. [18] and Chen et al. [19], assessing stomach cancer fast-track surgery, concluded that laparoscopy-assisted radical distal gastrectomy for gastric cancer is beneficial with better outcome.

Although the number of research on fast track surgery is growing worldwide, fast-track protocols are not implemented often due to opportunism per se, based on dogma and tradition which provokes low compliance and difficult multidisciplinary interaction. Advocating fast track philosophy and training medical staff in using protocols will enhance patient care and efficiency of hospital management.

Conclusions

Although adherence to surgical traditionalism and lack of strict FTS protocol did not allow us to perform more specified study we conclude that FTS in gastrectomy for gastric cancer is safe and efficient approach, which hasten return of gut function and shorten postoperative hospital stay.

The multidisciplinary approach of ERAS programs requires further refinement to assure less risk, stress and pain for the surgical patient. Interaction, agreement and self-commitment between care-givers, care providers and decision makers are needed for further wider implementation of fast track protocols in clinical surgery.

The success FTS and ERAS programs are greatly determined not only by strict fulfillment of protocols and criteria but also by surgeon's devotion to his patient, close follow up and individual patient approach. The need for implementation of a protocol for FT and ERAS in Gastric Cancer Surgery, based on national/international study is obvious.

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