

Enhanced recovery after surgery (ERAS) protocol in gastric cancer: Early term results

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Abstract

Aim: To evaluate the effects of enhanced recovery after surgery (ERAS) protocol on morbidity and mortality in patients undergoing surgery due to gastric cancer.

Material and Methods: Data of a total of 40 patients who were operated due to gastric cancer with ERAS between May 2016 and December 2016 were retrospectively analyzed. Morbidity and mortality results were evaluated as local or systemic depending on whether they developed within postoperative 30 days and whether they developed due to operation. The American Society of Anesthesiologists (ASA) classification was used to assess preoperative risk. Surgical complications were classified according to the Clavien-Dindo classification and pathological staging was performed according to the Tumor, Node, Metastasis (TNM) classification.

Results: Four patients were in ASA I, 11 patients were in ASA II, 24 patients were in ASA III, and one patient was in ASA IV. The mean duration of surgery was 165 (range: 150 to 210) min in total gastrectomy and 115 (range: 95 to 140) min in subtotal gastrectomy. According to the TNM classification, four patients had Stage I, 10 patients had Stage II, and 26 patients had Stage III disease. The mean duration of hospitalization was nine (range: 6 to 21) days in total gastrectomy and six (range: 4 to 15) days in subtotal gastrectomy. The number of morbidities was 15% with a 2.5% mortality rate.

Conclusion: Our study results suggest that ERAS protocol is an evidence-based quality protocol which can be reliably applied even in advanced stage gastric cancer with a high ASA score.

Keywords: Gastric Cancer; Enhanced Recovery After Surgery; Morbidity; Mortality.

INTRODUCTION

The main aim of the enhanced recovery after surgery (ERAS) protocol which has been defined by Data Safety Monitoring Committee (DSMC) in 2009 is to provide early recovery and to shorten the duration of hospital stay without increasing postoperative complications and re-acceptance rates (1,2). Reduction of operation-related neurohormonal response by decreasing postoperative physiological stress forms the basis of more rapid recovery and reduction of complications (3).

The ERAS protocol has been developed by consecutive coordination of pre-intra-postoperative clinical practices. It has been demonstrated that this protocol, which basically aims postoperative pain management, early enteral feeding, and postoperative aggressive rehabilitation and early mobilization, decreases the health expenses and can be reliably performed (4-8). There are several studies

showing that ERAS protocol, which is mostly performed in colon surgery, can be also performed in gastric surgery and it can accelerate postoperative recovery (9,10).

In the present study, we aimed to evaluate the effects of ERAS protocol on morbidity and mortality in patients undergoing surgery due to gastric cancer.

MATERIAL and METHODS

A total of 40 patients with the histological diagnosis of a gastric carcinoma and who underwent total/subtotal gastrectomy in combination with D1-D2 lymph node dissection due to gastric cancer in our clinic between May 2016 and December 2016 were retrospectively analyzed. Laparotomies were performed by standard transverse (bilateral subcostal) incisions above the umbilicus. All patients were preoperatively evaluated by the anesthesia team, and epidural or general anesthesia was performed by the same team.

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All patients had a normal duodenal transition in the preoperative period. Therefore, nutritional support was provided with enteral nutrition for 10 days and prophylactic enoxaparin sodium 6000 IU once daily (subcutaneous) was given one day before surgery and ceftriaxone disodium once daily (intravenous) was given one hour before surgery. A total of 300 mL of clear fluid rich in carbohydrate was administered to all patients three hours before surgery.

During the intraoperative period, epidural analgesia with 10 mL of bupivacaine 0.25% was performed at T 7-11 level in the operation room. No premedication was given, and the nasogastric tube was removed at the end of the operation. Hourly urine output was monitored intraoperatively, and body temperature was maintained using warm air blankets.

During the postoperative period, urinary catheters of the patients who had urine output of more than 30 mL/hour were removed within 24 hours, and epidural analgesia with infusion pump was continued for two days. All patients were mobilized at the postoperative sixth hour and breathing exercises were performed. At the postoperative first day, after 4 hours to start, 1 l of water and 300 mL of filtered and pulpless fruit juice was given to be consumed within 24 hours. This procedure was performed 48 hours later to three patients whose extubating period was prolonged. Parenteral fluid support was also given as 20 to 40 ml/kg/day according to oral fluid intake. In addition to sufficient fluid therapy, dexamethasone 50 mg tid was given and ranitidine hydrochloride 50 mg once daily (intravenous) and enoxaparin sodium 6000 IU once daily (subcutaneous) were applied to the patients with subtotal gastrectomy. Sufficient fluid therapy and medical therapy were administered, and mobilization and breathing exercises were closely monitored in patients who had 500 ml of liquid diet and 1 liter of water as of the postoperative second day. Medical therapy and parenteral fluid support were continued until discharge in the patients whose oral feeding were managed as semi-solid food and 1 liter of water as of the postoperative third day. Necessary laboratory tests and systemic and abdominal examinations twice daily were performed regularly by the surgical team. Ultrasonography (US) or computed tomography (CT) were not used in routine follow-up, they were used for the diagnosis/treatment in patients who were suspected to have any complication.

The patients who did not require intravenous or oral analgesic-anti-inflammatory drugs, who had a Visual Analog Scale (VAS) <4, who had sufficient ability for mobilization and self-care, who took more than 2/3 of the provided oral diet, who had normal physical examination and laboratory test results were discharged with vitamin prophylaxis, enteral nutritional support, and prophylactic enoxaparin sodium 6000 IU once daily (subcutaneous).

Morbidity and mortality results were evaluated as local or systemic depending on whether they developed within postoperative 30 days and whether they developed due

to operation. Surgical complications were classified according to the Clavien-Dindo classification and pathological staging was performed according to the Tumor, Node, Metastasis (TNM) classification.

RESULTS

Of 40 patients, 28 were males and 12 were females. The mean age was 63 (range: 35 to 82) years in males and 58 (range: 34 to 67) years in females. According to the American Society of Anesthesiologists (ASA) scoring, four patients were in ASA I, 11 patients were in ASA II, 24 patients were in ASA III, and one patient was in ASA IV (Table1). The mean duration of surgery was 165 (range: 150 to 210) min in total gastrectomy and 115 (range: 95 to 140) min in subtotal gastrectomy. According to the TNM classification, four patients had Stage I, 10 patients had Stage II, and 26 patients had Stage III disease. The mean duration of hospitalization was nine (range: 6 to 21) days in total gastrectomy and six (range: 4 to 15) days in subtotal gastrectomy (Table 2). One patient in total gastrectomy group and one patient in subtotal gastrectomy group were re-hospitalized due to morbidity. Esophagojejunostomy anastomosis leakage was managed by placing stent in two patients who underwent total gastrectomy. An intraabdominal abscess developed in one patient, which was drained by percutaneous drainage. Pulmonary infection and decompensated heart failure developed during the postoperative period in one patient with an ASA score of IV. Wound infection developed in one patient who underwent subtotal gastrectomy, while stenosis at the level of anastomosis developed in one patient who underwent subtotal gastrectomy. When the surgical complications were evaluated according to the Clavien-Dindo classification, five patients were Grade III, one patient was Grade IV, and one patient was Grade V (Table3). The number of morbidities was 15% with 2.5% mortality rate. The cause of mortality was acute pulmonary embolism on day 11.

Table 1. Demographic data of patients

	Gastrectomy (n:40)	Total (n:26)	Subtotal (n:14)
Age (35-82)	58 (34-82)	56 (34-78)	57
Gender			
Male	28	20	8
Female	12	6	6
ASA score			
ASA 1	4	1	3
ASA 2	11	9	2
ASA 3	24	16	8
ASA 4	1	1	
ASA 5			
Tumor Localization			
Cardia	29	20	2
Corpus	8	6	12
Antrum	12		

Table 2. The operative and postoperative findings

	Gastrectomy (n:40)	Total (n:26)	Subtotal (n:14)
Lymph Node Dissection			
D1 Dissection	4	1	3
D2 Dissection	36	25	11
Combined Organ Resection		2	
Operation Time	130 (95-210) min	165 (150-210) min	115 (95-140) min
TNM classification			
Stage 1	4		4
Stage 2	10	7	3
Stage 3	26	19	7
Stage 4			
Admission time	8 (4-21) day	9 (6-21) day	6(4-15) day
Re-admission	2	1	1
Morbidity			
Local	5	3	2
Systematic	1	1	

Table 3. Postoperative complications in 30 days

Clavien-Dindo Classification	Grade 3	Grade 4	Grade 5
Anastomotic leakage	2 (%5)		
Anastomosis stricture	1 (%2.5)		
Surgical wound site infection	1 (%2.5)		
Deep surgical field infection	1 (%2.5)		
Lung Infection		1 (%2.5)	1 (%2.5)

DISCUSSION

Currently, gastric cancer surgery still maintains its importance as a series of procedures in which it is difficult to manage preoperative preparation, postoperative stress, and complications and the sequela which can develop as a result of complications. Therefore, the incidence of postoperative morbidity is 9 to 46% and mortality is 0 to 13% (11,12). There are also data which support that ERAS protocol which has been developed for improved management of all this process and which is commonly performed in colon surgery, can be also performed in gastric cancer surgery (6,7,13). In a previous study, the mortality rate was found to be 14% in a study including the largest patient series where the ERAS protocol was performed in gastric surgery (14).

In the current study, morbidity rate was found to be 15% and mortality rate was found as 2.5%. In this study which included large case series, ASA I score was reported at a rate of 50% and ASA II score was reported at a rate of 48% in patients who underwent operation and according to pathological staging, Stage I gastric cancer was found at a rate of 63% and Stage II gastric cancer was found at a rate of 17% (14). In the current study in which patients who were ASA II at a rate of 27% and ASA III at a rate of 60% were operated and in which gastric cancer was detected

at Stage II at a rate of 25% and at Stage III at a rate of 65%, the mortality and morbidity rates seem to be consistent with the literature. In spite of the expectation of higher morbidity and mortality rates during the postoperative period in patients with high ASA scores and advanced stage gastric tumors; the results in the current study seem to be consistent with the literature. We believe that application of ERAS protocol could have been effective in these results.

The most important concern of the surgeons during performing ERAS protocol is that postoperative feeding at early period, increases anastomosis leakage and postoperative ileus. In Japan and some European countries, postoperative feeding was started a few days later due to these concerns; however, this has not been supported with sufficient evidences (15,16). Furthermore, early feeding following gastric surgery is supported by several studies (1,9,17,18). Although we have been exposed to similar criticisms at the beginning of application of ERAS protocol in gastric surgery in our clinic, we have observed that the criticisms decreased and the number of surgeons supporting ERAS protocol increased along with the increased number of cases.

In the present study in which short-term results were evaluated, it was found that effective pain management,

absence of urinary catheter, nasogastric tube and abdominal drainage tubes in addition to early oral feeding are the main factors in providing rapid rehabilitation and early mobilization.

We have experienced similar concerns in the patients in which the protocol has been performed for the first time; however we moved away these concerns over time. It has been demonstrated that application of pre/intra/postoperative ERAS protocols can decrease morbidity and mortality which can develop following surgery of patients with high ASA scores and advanced stage gastric cancer. In Turkey where mainly surgery for advanced stage gastric cancer with high ASA scores is performed, obtaining these results in the early period strengthens our opinion that ERAS protocol can be reliably performed. Therefore, we suggest that the ERAS protocol, in which long-term results would be presented with cost-efficacy analysis, can be reliably performed in gastric cancer surgery.

CONCLUSION

In conclusion, our study results suggest that ERAS protocol is an evidence-based quality protocol which can be reliably applied even in advanced stage gastric cancer with a high ASA score without increased morbidity and mortality.

Competing interests: The authors declare that they have no competing interest.

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Ethical approval: In this study, we analyzed retrospectively patients files.

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