

Integration of Neoadjuvant Chemotherapy into the ERAS protocol for Patients with Advanced Gastric Cancer

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Abstract

Objective

We integrated neoadjuvant chemotherapy (NAC) into the protocol for Enhanced Recovery After Surgery (ERAS) in the management of gastric cancer. This study was aimed at investigating the feasibility and effectiveness of this combined approach.

Methods

A retrospective cohort study was conducted on patients with gastric cancer undergoing cancer treatment at our Department from January 2016 to June 2019. All patients were compliant with the ERAS protocol perioperatively and were divided into an ERAS group and an ERAS + NAC group for the study. The following parameters were compared between the two groups: TNM staging, the choice of the surgical approach, estimated blood loss, operating time, placement of drainage and catheter, the volume of fluid resuscitation in surgery, the volume of fluid resuscitation on the first postoperative day, time to postoperative ambulation, time to first postoperative flatulence, time to first clear liquid diet, time to puree and soft food diet, time of catheter removal, length of hospitalization after surgery, length of hospitalization, complications, mortality, and 30-day readmission rate.

Results

This study involved 198 patients who were separated into an ERAS group with 143 patients and an ERAS + NAC group with 55 patients. In comparison with the ERAS group, patients in the ERAS + NAC group were not only pathologically diagnosed with later TNM-stage cancers but were also more likely to undergo total gastrectomy. Further comparison revealed no significant differences in all perioperative parameters related to ERAS. In the ERAS group, the length of hospitalization after surgery was 7.5 ± 5.4 days with a range of 3 to 50 days, the length of hospitalization was 12.5 ± 5.5 days with a range of 9 to 56 days, the incidence rate of complications was 11.2%, and the 30-day readmission rate was zero. In the ERAS + NAC group, the LOHAS was 6.9 ± 3.2 days (4–16 days), the LOH was 11.8 ± 3.1 days (5–21 days), and the complication rate was 10.9%. Both groups had zero 30-day readmission rates and zero deaths.

Conclusion

The ERAS protocol can be feasibly and effectively applied to gastric cancer patients with later TNM stages. Moreover, NAC can be integrated into the ERAS protocol for patients with advanced gastric cancer.

Introduction

Enhanced recovery after surgery (ERAS) combined with fast track surgery, minimally invasive techniques, and a damage control principle constitutes the foundation and framework of modern surgical practice, which is centered on reducing the disruption to physiological stability caused by surgical trauma. ERAS refers to a surgical practice in which a series of clinically confirmed effective measures is used to reduce physical and psychological traumatic stress for surgical patients to accelerate rehabilitation [1–3].

Since its first introduction into the surgical practice by Kehlet et al. in 1995, through more than 25 years of continuous research and practice, ERAS has been widely practiced in nearly all surgical subspecialties and has subsequently transformed the paradigm of perioperative management for surgical patients[4–8]. In the field of gastrointestinal surgery, colorectal surgery, hepatobiliary surgery, and pancreatic surgery, various guidelines have been established with the ERAS protocol for surgical management [9–13] emphasizing the restriction of perioperative fluid resuscitation, the control of postoperative pain, and early restoration of a normal lifestyle and activities.

In the field of oncological surgery, neoadjuvant chemotherapy (NAC) was first introduced by Frei et al. in 1982 [14]. This has led to the development of multimodal treatments administered before primary cancer surgeries, with the overall goal of increasing the effectiveness of local definitive therapy while minimizing the adverse effects patients experience during primary treatments. This approach proved to be truly successful for the oncological management of patients with breast, colon, or lung cancers and increased the likelihood of treating all cancer cells. Consequently, NAC has gradually been embraced as one of the mainstream therapeutic approaches for patients with advanced cancer stages.

China is a country with a high incidence of gastric cancer. Since the early diagnosis rate for gastric cancer is low, definitive cancer resection for a considerable number of patients with advanced gastric cancer is problematic. In the past 10 years, the concept and practice of NAC have been adopted in the field of gastric cancer treatment in China. Our surgical team is one of a handful of groups that apply ERAS for the management of gastric cancer patients. Due to the lack of a clear conclusion on whether ERAS can safely be used in gastric cancer surgery after NAC, we designed this clinical study to address this question.

Clinical Data And Methods

General information and criteria for patient selection

This cohort study was performed using clinical data that were retrospectively retrieved from the medical charts of patients diagnosed with gastric cancer who underwent cancer treatment at our hospital during the period from January 2016 to June 2019. All the patients recruited for this study were further divided into ERAS and ERAS + NAC groups.

The inclusion criteria for patient selection for this study were as follows: (1) patients with complete clinical and pathological data, (2) postoperative pathological examination confirmed the diagnosis of gastric cancer, (3) patients who underwent radical gastric cancer resection, and (4) patients who were compliant with the ERAS perioperative protocol.

To improve the study design, the following exclusion criteria were applied: (1) patients who underwent exploratory laparotomy or reductive surgery, (2) patients who developed synchronous and metachronous malignancies, (3) patients who had emergency surgery, (4) intraoperative exploration revealed tumor invasion of adjacent organs requiring combined organ resection, (5) patients who were converted from laparoscopy to laparotomy, (6) patients who were transferred to the intensive care unit after surgery, (7) patients who failed to complete NAC or were found to have disease progression, and (8) patients who had multiple severe comorbidities.

The ERAS protocol

Patients in the ERAS group followed the preoperative ERAS protocol and underwent a series of preparatory procedures including preoperative admission education, functional exercise, and nutritional support if they were old and malnourished with insufficient cardiopulmonary functions. Gastrointestinal preparation and nil per os were not required for all patients before surgery. Patients without obstruction drank 1000 ml of 10% glucose solution 12 hours before surgery and sipped another 500 ml within 2 hours before surgery. A key procedure to be avoided was the routine placement of a nasogastric decompression tube before surgery.

In accordance with the intraoperative portion of the ERAS protocol, the patients received general anesthesia combined with epidural anesthesia and warm water irrigation to the abdominal cavity. They were also resuscitated with the target-directed fluid-giving approach. Routine placement of an abdominal drainage tube was not performed and the incision was sutured intradermally with absorbable sutures. Afterward, the patients were administered a 0.2% Ropivacaine injection to enhance postoperative pain control at the incision sites.

Postoperatively, the ERAS protocol is mainly focused on multimodal analgesia, which combines thoracic epidural analgesia with intravenous or oral cyclooxygenase (COX) enzyme inhibitors to improve the effectiveness of analgesia. We started a clear liquid diet for all patients approximately 4 hours after

Postanesthesia Care Unit stay without a rigid requirement of flatus first. The patients were encouraged to ambulate early and fluid replacement was stopped after the resumption of a full liquid diet.

Chemotherapy regimen

The XELOX regimen is the standard choice for neoadjuvant and postoperative chemotherapy in our Department. The regimen consists of a 3-week cycle of oral Capecitabine (1000 mg/m² twice daily from days 1-14 of each cycle) plus intravenous Oxaliplatin (130 mg/m² on day 1 of each cycle). Patients in the ERAS + NAC group were underwent at least two rounds of NAC. In the 6th week following the first dose of Oxaliplatin, the patients received a work-up through ultrasonic gastroscopy and contrast-enhanced computed tomography of the whole abdomen to assess the degradation of the original malignancy.

The responses to NAC were classified into complete response, partial response, stable disease, and disease progression according to the Response Evaluation Criteria in Solid Tumors (RECIST). The response was calculated with the following equation: clinical response rate = [(number of cases with complete response + number of cases with a partial response)/number of measurable cases] × 100% and disease control rate = [(number of cases with complete response + number of cases with partial response + number of cases with stable disease)/number of measurable cases] × 100%. Blood routine and serum biochemistry were monitored before and after chemotherapy, and cancer surgery was performed in the 2nd week after the completion of NAC.

For postoperative chemotherapy, the patients were prescribed six cycles of chemotherapy with the XELOX regimen immediately after recovering from the trauma of surgery and after adverse complications related to the surgical operation were ruled out. Postoperative chemotherapy was performed with 1-day periodic admissions for intravenous Oxaliplatin.

Preoperative nutritional support

Nutrition-depleted patients were managed with nutritional support. For patients without obvious obstructive symptoms, oral enteral nutrition powder was given in addition to the normal diet due to the gastrointestinal upset and loss of appetite related to chemotherapy and cancer cachexia. For patients with incomplete obstruction, enteral feeding was performed either through a transnasal feeding tube by

endoscope-guided insertion or a percutaneous feeding tube through endoscopic gastrostomy and jejunostomy (PEG-J). Enteral nutrition preparations consisted of Nutrison Liquid or Nutrison from Nutricia Co.

Surgical operations

All laparoscopic and open procedures were performed by the same surgical team. Based on the tumor site and preoperative workup, the procedure of distal, proximal, or total gastrectomy was selected for R0 resection. Regarding the laparoscopic approach, the continuation of the digestive tract was reconstructed extracorporeally through a small abdominal incision, which was made after laparoscopic perigastric lymph node dissection. In general, Billroth I and II anastomoses were fashioned after proximal and distal gastrectomy, respectively, and Roux-en-Y anastomosis was installed after total gastrectomy. Six cycles of XELOX chemotherapy were carried out after surgery.

Discharge criteria

The patients were discharged upon the restoration of a regular oral diet and normal ambulation without the restrictions of a urinary catheter, drainage tube, and intravenous lines with no complaints of postoperative pain, which was well controlled by oral pain-relieving medication. Most importantly, the patients were discharged after they autonomously agreed to the discharge.

Outcome measures

The parameters for evaluating the effectiveness of the ERAS protocol were TNM staging, the choice of surgical approach, estimated blood loss (EBL), operating time (OT), placement of drainage and catheter, the volume of fluid resuscitation in surgery (VFRIS), the volume of fluid resuscitation on the first postoperative day (VFRFPD), time to postoperative ambulation (TTPA), time to first postoperative flatulence (TTPF), time to first clear liquid diet (TTFCLD), time to puree and soft food diet (TTPSFD), time of catheter removal (TOCR), length of hospitalization after surgery (LOHAS), length of hospitalization (LOH), complications, mortality, and 30-day readmission rate.

Statistical processing

The data following a normal distribution were expressed as the mean \pm SD, and the student's t-test was used for comparison of the data. Data with a skewed distribution were expressed as M (range) and compared using the Mann–Whitney U test. The enumeration data were expressed as an absolute number or percentage and the χ^2 test was used for comparison. $P < 0.05$ was considered statistically significant. IBM SPSS Statistics 26.0 software was used for analysis.

Results

Demography and general information

A total of 198 patients diagnosed with gastric cancer were recruited for this study, comprising 112 men and 86 women with a mean age of 58 years and a range between 33 and 77 years old. Among the 198 patients, 143 did not receive NAC and were assigned to the ERAS group. The remaining 55 patients underwent NAC and were designated as the ERAS + NAC group. There were no significant differences in gender, age, body mass index (BMI), anesthesia risk score, preoperative plasma albumin, and hemoglobin between the two groups (Table 1).

Eleven patients with malnutrition were managed with nutritional support in combination with NAC. Five of these patients who had no obvious obstructive symptoms were managed with oral enteral nutrition powder in addition to a normal diet. The remaining six patients exhibited incomplete obstruction and were treated using feeding tubes for nutritional support.

Effectiveness of neoadjuvant chemotherapy

Of the 55 patients who underwent NAC, 46 patients received two courses of chemotherapy, and nine patients received three courses. The clinical symptoms improved to varying degrees for all patients. None of the patients experienced complete remission, 26 patients had partial remission, and 29 patients had stable disease. Additionally, 47.3% (26/55) of patients had a clinical response and the disease control rate was 100% (55/55).

Comparison of parameters related to surgery between the two groups

The proportion of patients with stages III and IV disease in the ERAS + NAC group was significantly higher than that in the ERAS group ($P < 0.01$). The proportion of total gastrectomy in the ERAS + NAC group was significantly higher ($P < 0.01$) and the proportion of distal gastrectomy was significantly lower ($P < 0.05$). The ratio of laparoscopy to open surgery was similar between the two groups. Abdominal drainage was placed for most of the patients and there was no statistically significant difference in EBL, OT, and intraoperative fluid replacement (Table 2).

Comparison of parameters related to postoperative recovery between the two groups

TTPA was 1.8 ± 0.9 days (median: 2 days, interquartile range (IQR) 1-6 days) in the ERAS group and 1.9 ± 0.9 days (median: 2 days, IQR 1-5 days) in the ERAS + NAC group. TTPF was 2.9 ± 0.8 days (median: 3 days, IQR 1-6 days) in the ERAS group and 3.1 ± 0.8 days in the ERAS + NAC group (median: 3 days, IQR 2-6 days). TTFCLD was 2.5 ± 0.8 days (median: 2 days, IQR 1-6 days) in the ERAS group and 2.7 ± 0.8 days (median: 2 days, IQR 1-6 days) in the ERAS + NAC group. None of these parameters were statistically significant ($P > 0.05$). Other evaluated parameters also showed no significant differences between the two groups ($P > 0.05$) (Table 3, Fig. 1).

LOHAS was 7.5 ± 5.4 days in the ERAS group (median: 6 days, IQR 3-50 Days) and 6.9 ± 3.2 days (median: 6 days, IQR 4-16 days) in the ERAS + NAC group. LOH was 12.5 ± 5.5 days (median: 11 days, IQR 9-56 days) in the ERAS group and 11.8 ± 3.1 days (median: 11 days, IQR 5-21 days) in the ERAS + NAC group. None of these parameters were statistically significant ($P > 0.05$) (Table 3, Fig. 2).

In the ERAS group, 16 patients (11.2%) experienced postoperative complications, specifically three cases of pulmonary infection, five cases of incisional liquefaction, and two cases of incisional dehiscence, all of which were managed conservatively. Additionally, two patients underwent emergent laparotomy for the source control of postoperative abdominal infection from an anastomotic leakage and secondary abdominal bleeding from an anastomotic ulcer. The other two patients developed residual gastric emptying disorders. In the ERAS + NAC group, six patients (10.9%) had postoperative complications, including one case of pulmonary infection, two cases of incision liquefaction, one case of abdominal infection that recovered after an exploratory laparotomy with irrigation and drainage, and two cases of residual gastric emptying disorder.

The Clavien–Dindo classification (CDC) is widely used in the surgical field as a standardized system for the registration of surgical complications. In the ERAS group, the CDC was grade I for six patients (4.19%), II for seven patients (4.89%), IIIa for one patient (0.69%), and IIIb for two patients (1.39%). Two patients (3.63%) in the ERAS + NAC group had CDC grade I and four patients (7.27%) had grade II. There was no statistically significant difference in the incidence rate of complications and CDC grade between the two groups, determined with the χ^2 test ($P > 0.05$) (Table 4). Regardless of the CDC, all patients were cured and discharged.

Finally, 30-day readmission rates did not show any significant difference between the two groups.

Discussion

ERAS has been demonstrated to minimize the physical and psychological stresses experienced by surgical patients, reduce postoperative catabolism of the body, and diminish the adverse consequences from surgical complications as well as surgical trauma to organs through the application of clinically proven and effective methods [15]. Since Kehlet et al. proposed the concept of ERAS in 1995, this concept has transformed day-to-day surgical practices. Expert consensus and guidelines for ERAS have been released for multi-professional and multi-disciplinary management of patients who undergo either minimally invasive or open colorectal, hepatobiliary, pancreatic, and gastric surgeries in the field of general surgery [16].

In the ERAS guidelines for gastric cancer resection, the strength of recommendation for each ERAS measure is buttressed by high levels of evidence; however, NAC has never been included in the ERAS protocol and some studies purposefully excluded patients who received NAC [17, 18]. A large body of evidence confirms that NAC can not only effectively downgrade advanced gastric cancer after a patient undergoes a palliative operation to achieve R0 resection, but also significantly improves long-term survival by reducing the recurrence of cancer [19, 20].

There are more than one million new cases of gastric cancer each year worldwide, approximately half of which occur in China, where gastric cancer has been ranked the second most malignant tumor in terms of morbidity and mortality. Although surgical resection is still an important means of gastric cancer treatment, the early diagnosis rate for gastric cancer in China remains below 10% and many patients with advanced gastric cancer either have difficulty achieving R0 surgical resection or have a poor surgical prognosis.

Although NAC does not increase the mortality or morbidity of surgery [21, 22], adverse reactions such as bone marrow suppression, gastrointestinal reactions, and tissue edema caused by chemotherapeutic agents coupled with surgical trauma often prolong the time of postoperative recovery, thus affecting postoperative recovery and subsequent adjuvant therapy. Therefore, it is important to investigate whether ERAS can be applied to patients that receive NAC for gastric cancer.

The regimen that we routinely used for NAC is XELOX, which consists of Oxaliplatin and Capecitabine. Clinical studies have found that even though Oxaliplatin and Capecitabine are no less effective than Cisplatin and 5-Fluorouracil in the treatment of gastrointestinal tumors, the chances of developing gastrointestinal reactions, bone marrow suppression, and hepatorenal toxicity with the former are relatively lower than with the latter [23]. Additionally, oral Capecitabine circumvents the problem of venous irritation induced by a chemotherapeutic agent and is therefore more acceptable to patients. We found that peripheral white blood cells and platelets were initially lower than normal in some patients after XELOX, but promptly returned to normal levels after the application of granulocyte growth factor and interleukin-11. Liver and kidney function was normal and gastrointestinal reactions were mild in all patients after NAC.

Our patients tolerated the XELOX regimen well; therefore, the symptoms of pain, obstruction, and bleeding from gastric cancer were quickly relieved preoperatively after the onset of the regimen. Additionally, the degree of fear, depression, anxiety, and mentality experienced by the patients just after admission decreased and gradually subsided. Over the course of treatment, the patients' confidence in the treatment of the disease increased, consequently leading to better appetite and sleep. For patients with obstructive symptoms, NAC combined with nutritional support globally improved their preoperative condition. Following NAC, most patients could switch to liquid food due to the alleviation of obstructive symptoms, and also had different degrees of weight gain after chemotherapy. Finally, the serum levels of hemoglobin and plasma albumin also increased, indicating the nutritional status of the patients had improved. Therefore, NAC combined with appropriate nutritional support not only controls tumor growth but also improves the general condition of patients, providing the necessary conditions for the implementation of ERAS [24].

The obstructive symptoms of patients were resolved after effective NAC; therefore, nasogastric tube placement was unnecessary before surgery and some oral carbohydrates could be given to the patients for enhanced metabolic preparation before surgery. With the resolution of the symptoms of hunger and anxiety, the postoperative insulin resistance was diminished, further reducing the decomposition and metabolism of the body after surgery as well as the occurrence of complications. This practice is also conducive to the intraoperative control of fluid replacement [25, 26].

Good postoperative analgesia can reduce the body's stress response [9, 27]. Multimodal analgesia is an important part of the ERAS protocol, in which thoracic epidural analgesia is the basic analgesic method for open abdominal surgery [28]. However, with the popularization of laparoscopic techniques, there is no special emphasis on external analgesia. We still adhere to epidural analgesia because general anesthesia plus epidural anesthesia before ERAS is common. However, laparotomy remains an important part of treatment for gastric cancer. In the early stage of ERAS, most patients will still have an abdominal drainage tube placed during surgery, which is not conducive to the recovery of the gastrointestinal function and also increases the requirements for multimodal analgesia. We used local infiltration anesthesia around the surgical incision as an adjuvant analgesic method. We also used intravenous or oral Paracetamol, nonsteroidal antiinflammatory drugs, and COX-2 inhibitors combined with multiple

drugs to reduce the opioid dosage and improve the analgesic effect. In the process of encouraging patients to perform early ambulation, those who underwent laparotomy and laparoscopic surgery had better compliance. Further, due to the reduction of the opioid dosage in anesthesia and analgesia, most patients did not experience enteroparalysis, increasing the probability of early eating.

There was sufficient time for perioperative preparation during chemotherapy in the ERAS + NAC group, and all ERAS measures were successfully implemented. In addition to multimodal analgesia, although the pathological stage was later in the ERAS + NAC group than in the ERAS group, the proportion of total gastrectomy was also significantly higher. However, the postoperative off-bed activity time, anus exhaust, and diet recovery time were similar to those in the ERAS group. The incidence rate of postoperative complications was not higher than that in the ERAS group and there was no significant difference in the length of hospital stay between the two groups. NAC resulted in tumor shrinkage, partial fibrosis of the tumor and regional lymph nodes, and surgical trauma, which were not significantly higher than those in the ERAS group.

Conclusion

The results from this study showed that ERAS is safe and effective for patients with advanced gastric cancer receiving NAC. The selection of an appropriate NAC regimen and adequate preparation during NAC is the key to successful implementation of ERAS.

Declarations

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None.

Author contributions

YB designed the study and wrote the manuscript, XD collected the data and performed analysis, DZ, XY, YY, LK, YG and QG collected the data.

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Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Ethical approval

All studies were approved by the Committee on Ethics of Wuhu City Second People's Hospital. Permission from Wuhu City Second People's Hospital's Institutional Review Board was obtained prior to data review. The ethics committee's reference number is 2019B06.

Consent for publication

All patients enrolled in the study signed the consent for publication.

Competing interests

The authors declare that they have no competing interests.

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Tables

Table 1 Comparison of demographic data between the two groups

	ERAS group (n=143)	ERAS+NAC group (n=55)	P value
Age, Mean±SD	33-77 (59.2 ±10.2)	45-75 (57.3±8.6)	NS
<60 yo, n (%)	75 (52.45)	30 (54.55)	
>60 yo, n (%)	68 (47.55)	25 (45.45)	
Sex (M/F)	78/65	34/21	NS
BMI (kg/m ²), Mean±SD	22.4±2.6	22.3±2.5	NS
Co-morbidities, n (%)			
Hypertension	33 (23.07)	12 (21.82)	NS
Diabetes Mellitus	9 (6.29)	4 (7.27)	NS
ASA Classification, n (%)			
1	79 (55.24)	31 (56.36)	NS
2	61 (42.66)	23 (41.82)	NS
3	3 (2.10)	1 (1.82)	NS
Preoperative Albumin (g/L)	38.3±5.2	40.1±6.7	NS
Preoperative hemoglobin (g/L)	121±11.6	124±13.4	NS

NS: No statistical significance

Table 2 Comparison of surgical conditions between the two groups

	ERAS group (n=143)	ERAS+NAC group (n=55)	P value
TNM Staging, n (%)			
I	14 (9.79)	3 (5.45)	NS
II	75 (52.45)	6 (10.91)	<0.01
III	53 (37.06)	41 (74.55)	<0.01
IV	1 (0.69)	5 (9.09)	<0.01
Type of operation, n (%)			
Total gastrectomy	43 (30.07)	28 (50.91)	<0.01
Distal gastrectomy	78 (53.15)	19 (34.55)	<0.05
Proximal gastrectomy	22 (15.38)	8 (14.55)	NS
Operative approach, n (%)			
Laparoscopic	102 (71.33)	38 (69.09)	NS
Open	41 (28.67)	17 (30.91)	NS
Intraoperative detail			
Estimated blood loss (ml)	186.6±167.2	203.2±155.8	NS
Operating time (min)	218.1±72.4	226.4±55.8	NS
Intraoperative resuscitation (ml)	1988.5±285.46	2016.5±228.05	NS
Drain Placement, n (%)	139 (97.20)	55 (100)	NS

Table 3 Comparison of postoperative recovery between the two groups

	ERAS group (n=143)	ERAS+NAC group (n=55)	P value
Fluid Replacement on POD 1	1876.4±233.56	1904.6±254.18	NS
Time to ambulation	1.8±0.9	1.9±0.9	NS
Time to first flatulence	2.9±0.8	3.1±0.8	NS
Time to first clear liquid diet	2.5±0.8	2.7±0.8	NS
Time to first semi liquid diet	5.6±0.8	5.3±0.8	NS
Time to catheter removal	2.2±0.9	2.3±0.9	NS
Postoperative LOH	7.5±5.4	6.9±3.2	NS
Total LOH	12.5±5.5	11.8±3.1	NS

Table 4 Comparison of postoperative complications between the two groups

	ERAS group (n=143)	ERAS+NAC group (n=55)	P value
Clavien-Dindo, n (%)			
Grade I	6 (4.19)	2 (3.63)	NS
Grade II	7 (4.89)	4 (7.27)	NS
Grade IIIa	1 (0.69)	0 (0)	NS
Grade IIIb	2 (1.39)	0 (0)	NS
Total, n (%)	16 (11.2)	6 (10.9)	NS
Pulmonary infection	3	1	
Incisional liquefaction	5	2	
Incisional dehiscence	2	0	
Emptying dysfunction	2	2	
Abdominal bleeding	1	0	
Abdominal infection	1	0	
Anastomotic bleeding	1	0	
Anastomotic leak	1	1	

Figures

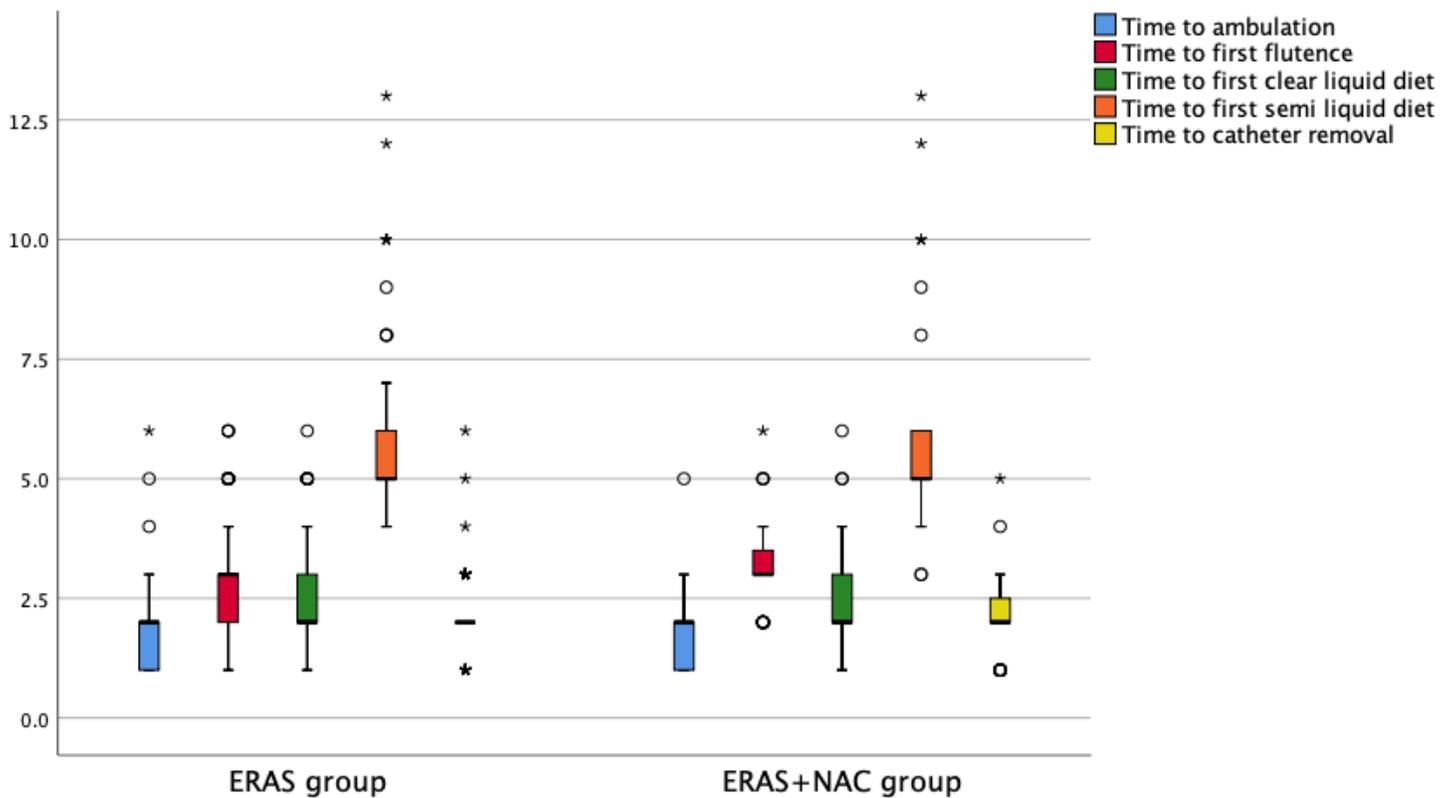


Figure 1

Comparison of postoperative recovery between the two groups

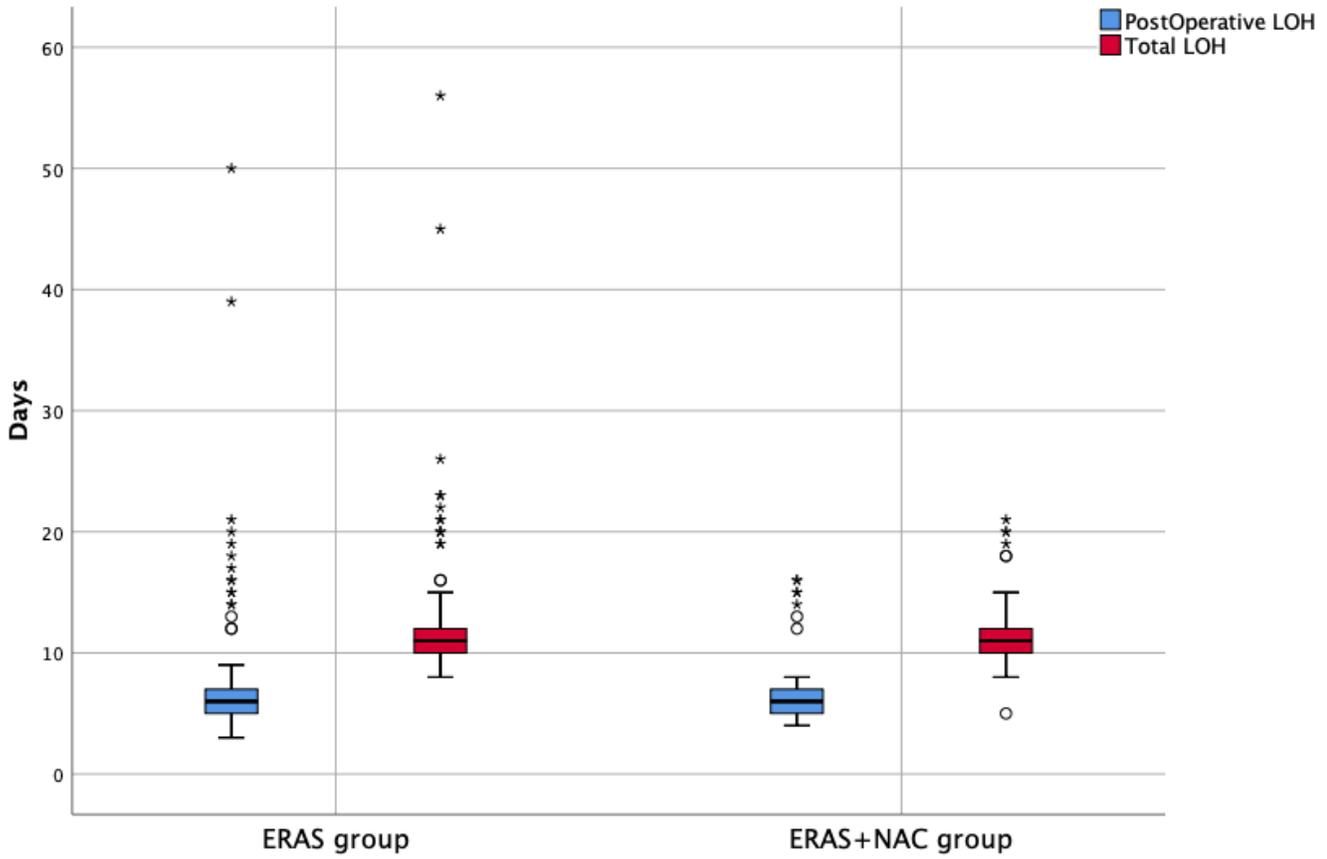


Figure 2

Comparison of length of hospitalization between the two groups