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ABOUT COVER

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AIMS AND SCOPE

The primary aim of *World Journal of Gastrointestinal Oncology* (*WJGO*, *World J Gastrointest Oncol*) is to provide scholars and readers from various fields of gastrointestinal oncology with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJGO mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal oncology and covering a wide range of topics including liver cell adenoma, gastric neoplasms, appendiceal neoplasms, biliary tract neoplasms, hepatocellular carcinoma, pancreatic carcinoma, cecal neoplasms, colonic neoplasms, colorectal neoplasms, duodenal neoplasms, esophageal neoplasms, gallbladder neoplasms, *etc*.

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ORIGINAL ARTICLE

Observational Study

Is recovery enhancement after gastric cancer surgery really a safe approach for elderly patients?

Zi-Wei Li, Xiao-Juan Luo, Fei Liu, Xu-Rui Liu, Xin-Peng Shu, Yue Tong, Quan Lv, Xiao-Yu Liu, Wei Zhang, Dong Peng

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Abstract

BACKGROUND

This study aimed to evaluate the safety of enhanced recovery after surgery (ERAS) in elderly patients with gastric cancer (GC).

AIM

To evaluate the safety of ERAS in elderly patients with GC.

METHODS

The PubMed, EMBASE, and Cochrane Library databases were used to search for eligible studies from inception to April 1, 2023. The mean difference (MD), odds ratio (OR) and 95% confidence interval (95%CI) were pooled for analysis. The quality of the included studies was evaluated using the Newcastle-Ottawa Scale scores. We used Stata (V.16.0) software for data analysis.

RESULTS

This study consists of six studies involving 878 elderly patients. By analyzing the clinical outcomes, we found that the ERAS group had shorter postoperative hospital stays (MD = -0.51, I^2 = 0.00%, 95%CI = -0.72 to -0.30, P = 0.00); earlier times to first flatus (defecation; MD = -0.30, I^2 = 0.00%, 95%CI = -0.55 to -0.06, P = 0.02); less intestinal obstruction (OR = 3.24, I^2 = 0.00%, 95%CI = 1.07 to 9.78, P = 0.04); less nausea and vomiting (OR = 4.07, I^2 = 0.00%, 95%CI = 1.29 to 12.84, P = 0.02); and less gastric retention (OR = 5.69, I^2 = 2.46%, 95%CI = 2.00 to 16.20, P = 0.00). Our results showed that the conventional group had a greater mortality rate than the ERAS group (OR = 0.24, I^2 = 0.00%, 95%CI = 0.07 to 0.84, P = 0.03). However, there was no statistically significant difference in major complications

between the ERAS group and the conventional group (OR = 0.67, I^2 = 0.00%, 95%CI = 0.38 to 1.18, P = 0.16).

CONCLUSION
Compared to those with conventional recovery, elderly GC patients who received the ERAS protocol after surgery had a lower risk of mortality.

Key Words: Enhanced recovery after surgery; Gastric cancer; Elderly; Mortality

Core Tip: This study was the first pooling up analysis to evaluate the safety of enhanced recovery after surgery in elderly patients with gastric cancer. In conclusion, compared to those with conventional recovery, elderly gastric cancer (GC) patients who received the enhanced recovery after surgery (ERAS) protocol after surgery had a lower risk of mortality. The ERAS protocol was determined to be safe in elderly patients with GC.

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INTRODUCTION

Gastric cancer (GC) is the fifth most common cancer and the third leading cause of cancer-related mortality worldwide[1,2]. It has been reported that more than 50% of GC occur in East Asian countries[3,4]. Among the various treatments available, surgery is the cornerstone of treatment for patients with GC[5-7]. Although the development of surgical techniques has advanced, postoperative complications and mortality are still high[8]. According to a previous study, the postoperative mortality rate is as high as 4%[9]. Therefore, how to reduce postoperative complications and mortality has become the focus of surgeons.

Enhanced recovery after surgery (ERAS) is primarily defined as a multimodal strategy that optimizes perioperative management to improve surgical outcomes and enhance postoperative recovery[10]. This strategy includes preoperative carbohydrate loading, early oral feeding, and early postoperative activity[11]. The ERAS protocol has been proven to reduce the rate of postoperative complications and shorten the postoperative hospital stay for patients with digestive tract cancer [12,13].

With the gradual aging of the population, the number of elderly patients with GC is also increasing[14-16]. Elderly patients usually have a poor physiological function, more comorbidities, and slower recovery after surgery. The use of the ERAS protocol in elderly patients with GC has been reported[17]. However, for elderly patients with GC, there is no convincing evidence that the ERAS protocol is a safe and effective measure. Therefore, the purpose of this study was to evaluate the safety of ERAS in older patients with GC.

MATERIALS AND METHODS

This study was conducted by the PRISMA statement[18].

Search strategy

The PubMed, EMBASE, and Cochrane Library databases were searched from inception to April 1, 2023. The following keywords related to ERAS were used for the search: "enhanced recovery after surgery" OR "ERAS" OR "enhanced recovery" OR "enhanced recovery protocols" OR "enhanced rehabilitation" OR "perioperative care" OR "conventional care" OR "early recovery" OR "fast track" OR "multimodal perioperative protocol" OR "standard care" OR "care standard". As for GC, the search strategy was "gastric cancer" OR "gastric carcinoma" OR "gastric neoplasms" OR "stomach cancer" OR "stomach carcinoma" OR "stomach neoplasms". As for older, the searching strategy was "aged" OR "older" OR "older adult" OR "older patients" OR "elderly". Then, we combined these items with "AND". The search was limited to title and abstract. The language available was English. And two authors performed the search independently.

Inclusion and exclusion criteria

The studies were included in this study if they met the following criteria: (1) Elderly patients who underwent GC surgery; (2) the comparison between the ERAS group and the conventional group was reported; and (3) postoperative complications were reported. The exclusion criteria of this study were as follows: (1) Conferences, reviews, letters, comments, or

case reports, duplicated publication data; and (2) insufficient data for analysis. All disagreements about inclusion and exclusion were solved by group discussion.

Study selection

Two authors searched the database independently. First, after removing the duplicate records, and then the titles and abstracts were screened. Second, the full texts were evaluated for eligibility based on the inclusion and exclusion criteria. The final judgment was made after the group discussion.

Definition

Postoperative complications of this study were classified according to the Clavien-Dindo classification and severe postoperative complications were defined as grades ≥ III[19].

Data extraction

The data of this study were extracted as follows: (1) Studies' information included the publication year, the first author's name, country, sample size, study design; (2) patients' baseline information including age, sex, body mass index (BMI), smoking, American Society of Anesthesiologists (ASA) grade, TMN stage, type of surgery, type of reconstruction, neoadjuvant chemotherapy, cardiovascular system disease, respiratory system diseases, diabetes and renal system diseases; and (3) postoperative complications included operative time, postoperative hospital stay, blood loss, bleeding, time to first flatus(defecation), anastomotic leakage, intestinal obstruction, pulmonary related complication, cardiovascular-related complication, nausea and vomiting, gastric retention, urinary retention, incision infection, urinary tract infection, reoperation, readmission, major complications and mortality.

Quality assessment

The Newcastle-Ottawa Scale (NOS), which had a score ranging from zero to nine points, was used to assess the quality of the enrolled studies[20]. A study with a score of nine points was considered high quality, a study with a score of seven to eight points was considered medium quality, and a study with six or fewer was considered low quality.

Statistical analysis

The mean differences (MDs) and 95% confidence intervals (95%CIs) were calculated for continuous variables. Odds ratios (ORs) and 95%CIs were calculated for the postoperative complications. Statistical heterogeneity was assessed by using the value of I^2 and the result of the chi-squared test. If $I^2 > 50\%$, it was considered high heterogeneity, the random effect model was used and $P < 0.1$ was considered statistically significant[21]. The random effect model was used in this article. Funnel plots and Egger tests were also used to observe the heterogeneity of studies and publication bias. This study was performed with Stata (V.16.0).

RESULTS

Study selection

There were 70 studies in the database. Twenty-four studies were included in PubMed, 46 studies were included in Embase, and 0 studies were included in Cochrane Library. After deleting duplicate studies and study types that not meet the requirements, 35 studies were left for record screening. Then, browsing the titles and abstracts, leaving 22 studies for full text review. Finally, there were six studies[17,22-26] were included for analysis (Figure 1).

Baseline characteristics of all studies

This study consisted by six studies involving 878 participants. These studies were published from 2015 to 2022 and the study period was from 2010 to 2021. There were four retrospective studies and two prospective studies. The NOS scores and baseline characteristics of included studies were summarized in Table 1.

Clinical characteristics between the ERAS group and the conventional group

By comparing the clinical characteristics, no significant differences were found in age (MD = 0.06, I^2 = 46.03%, 95%CI = -0.18 to 0.30, P = 0.65), sex (OR = 0.95, I^2 = 0.00%, 95%CI = 0.71 to 1.26, P = 0.71), BMI (MD = -0.05, I^2 = 0.00%, 95%CI = -0.22 to 0.12, P = 0.54), smoking (OR = 1.00, I^2 = 0.00%, 95%CI = 0.69 to 1.44, P = 0.98), ASA grade (≥ 2) (OR = 1.03, I^2 = 0.00%, 95%CI = 0.64 to 1.64, P = 0.92), Tumor Node Metastasis (TNM) stage II (OR = 1.03, I^2 = 0.00%, 95%CI = 0.69 to 1.54, P = 0.88), TNM stage III (OR = 0.89, I^2 = 0.00%, 95%CI = 0.64 to 1.23, P = 0.47), distal gastrectomy (OR = 1.28, I^2 = 0.00%, 95%CI = 0.74 to 2.22, P = 0.38), proximal gastrectomy (OR = 1.36, I^2 = 0.00%, 95%CI = 0.62 to 2.98, P = 0.44), Billroth-I reconstruction (OR = 1.25, I^2 = 0.00%, 95%CI = 0.59 to 2.67, P = 0.56), Billroth-II reconstruction (OR = 1.17, I^2 = 0.00%, 95%CI = 0.62 to 2.22, P = 0.63), cardiovascular system disease (OR = 1.00, I^2 = 0.00%, 95%CI = 0.72 to 1.39, P = 1.00), respiratory system diseases (OR = 1.04, I^2 = 15.67%, 95%CI = 0.62 to 1.73, P = 0.89), Renal system diseases (OR = 0.92, I^2 = 0.00%, 95%CI = 0.47 to 1.82, P = 0.82) and diabetes (OR = 0.73, I^2 = 12.29%, 95%CI = 0.48 to 1.12, P = 0.15). We found that the conventional group had more neoadjuvant chemotherapy patients (OR = 2.74, I^2 = 0.00%, 95%CI = 1.64 to 4.57, P = 0.00) than the ERAS group (Table 2).

Table 1 Baseline characteristics of included studies

Ref.	Country	Study date	Study type	Sample size		Years old		Age range	NOS
				ERAS	Conventional	ERAS	Conventional		
Xiao *et al*[17], 2022	China	2019-2021	Prospective	50	50	72.7 ± 2.7	72.3 ± 2.3	≥ 70	8
Franceschilli M *et al*[22], 2022	Italy	2013-2021	Retrospective	23	21	69.7 ± 9.8	64.3 ± 6.7	≥ 18	7
Weindelmayer *et al*[23], 2021	Italy	2015-2019	Retrospective	248	103	68	70	60-78	7
Cao S *et al*[24], 2021	China	2014-2018	Prospective	85	86	70.8 ± 3.4	71.4 ± 3.7	65-85	7
Liu *et al*[25], 2016	China	2014-2015	Retrospective	42	42	68.5 ± 4.5	69.5 ± 5.4	≥ 60	8
Bu *et al*[26], 2015	China	2010-2014	Retrospective	64	64	80.1 ± 4.0	79.6 ± 3.5	45-90	8

ERAS: Enhanced recovery after surgery; NOS: Newcastle-Ottawa Scales.

Table 2 Summary of characteristics between the enhanced recovery after surgery group and the conventional group

Characteristics	Studies	Participants (ERAS/conventional)	Odds ratio/mean difference (95%CI)	Heterogeneity
Age (yr)	5	264/263	0.06 (-0.18, 0.30); P = 0.65	I^2 = 46.03%; P = 0.12
Sex, female	6	512/366	0.95 (0.71, 1.26); P = 0.71	I^2 = 0.00%; P = 0.63
BMI (kg/m^2)	5	264/263	-0.05 (-0.22, 0.12); P = 0.54	I^2 = 0.00%; P = 0.45
Smoking	2	333/189	1.00 (0.69, 1.44); P = 0.98	I^2 = 0.00%; P = 0.62
ASA, ≥2	4	222/221	1.03 (0.64, 1.64); P = 0.92	I^2 = 0.00%; P = 0.58
TNM stage				
I	6	Reference	Reference	Reference
II	6	263/215	1.03 (0.69, 1.54); P = 0.88	I^2 = 0.00%; P = 0.81
III	6	399/293	0.89 (0.64, 1.23); P = 0.47	I^2 = 0.00%; P = 0.46
Type of surgery				
Total	3	Reference	Reference	Reference
Distal	3	122/126	1.28 (0.74, 2.22); P = 0.38	I^2 = 0.00%; P = 0.97
Proximal	3	69/72	1.36 (0.62, 2.98); P = 0.44	I^2 = 0.00%; P = 0.38
Type of reconstruction				
Roux-en-Y	2	Reference	Reference	Reference
Billroth-I	2	56/58	1.25 (0.59, 2.67); P = 0.56	I^2 = 0.00%; P = 0.40
Billroth-II	2	78/80	1.17 (0.62, 2.22); P = 0.63	I^2 = 0.00%; P = 0.92
Neoadjuvant chemotherapy	2	271/124	2.74 (1.64, 4.57); P = 0.00*	I^2 = 0.00%; P = 0.45
Comorbidities				
Cardiovascular system disease	4	462/316	1.00 (0.72, 1.39); P = 1.00	I^2 = 0.00%; P = 0.86
Respiratory system diseases	4	462/316	1.04 (0.62, 1.73); P = 0.89	I^2 = 15.67%; P = 0.31
Renal system diseases	2	333/189	0.92 (0.47, 1.82); P = 0.82	I^2 = 0.00%; P = 0.57
Diabetes	4	462/316	0.73 (0.48, 1.12); P = 0.15	I^2 = 12.29%; P = 0.34

ASA: American Society of Anesthesiologists; TMN: Tumor Node Metastasis; 95%CI: 95% confidence intervals; ERAS: Enhanced recovery after surgery.

Clinical outcomes between the ERAS group and the conventional group

We found that the ERAS group had shorter postoperative hospital stays (MD = -0.51, I^2 = 0.00%, 95%CI = -0.72 to -0.30, P = 0.00), earlier times to first flatus(defecation; MD = -0.30, I^2 = 0.00%, 95%CI = -0.55 to -0.06, P = 0.02), less intestinal obstruction (OR = 3.24, I^2 = 0.00%, 95%CI = 1.07 to 9.78, P = 0.04), less nausea and vomiting (OR = 4.07, I^2 = 0.00%, 95%CI = 1.29 to 12.84, P = 0.02), less gastric retention (OR = 5.69, I^2 = 2.46%, 95%CI = 2.00 to 16.20, P = 0.00). However, no

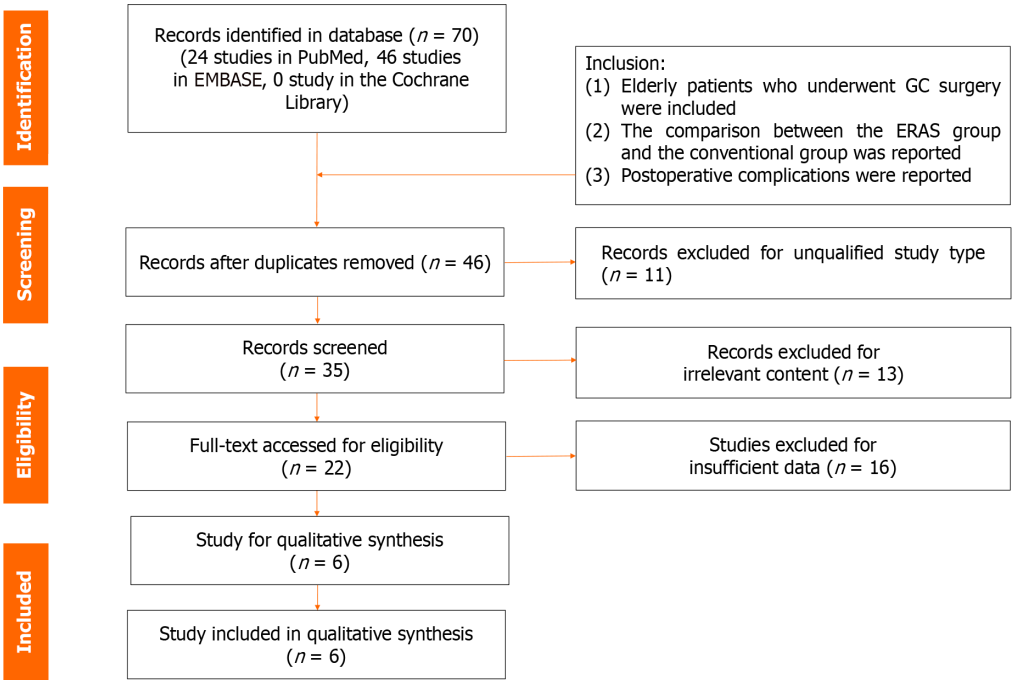

Figure 1 Flowchart of study selection.

significant differences were found in operative times (MD = 0.05, I^2 = 25.46%, 95%CI = -0.16 to 0.26, P = 0.64), operative blood loss (OR = -0.09, I^2 = 0.00%, 95%CI = -0.36 to 0.17, P = 0.49), postoperative bleeding (OR = 0.47, I^2 = 0.00%, 95%CI = 0.08 to 2.23, P = 0.39), anastomotic leakage (OR = 1.10, I^2 = 0.00%, 95%CI = 0.40 to 3.03, P = 0.86), pulmonary related complication (OR = 0.76, I^2 = 0.00%, 95%CI = 0.43 to 1.35, P = 0.35), cardiovascular-related complication (OR = 0.53, I^2 = 0.00%, 95%CI = 0.25 to 1.11, P = 0.09), urinary retention (OR = 0.68, I^2 = 0.00%, 95%CI = 0.25 to 1.88, P = 0.46), incision infection (OR = 2.26, I^2 = 0.00%, 95%CI = 0.49 to 10.41, P = 0.30), urinary tract infection (OR = 0.52, I^2 = 0.00%, 95%CI = 0.18 to 1.46, P = 0.21), reoperation (OR = 0.46, I^2 = 29.68%, 95%CI = 0.07 to 3.00, P = 0.42) and readmission (OR = 1.42, I^2 = 47.15%, 95%CI = 0.46 to 4.33, P = 0.54; Table 3).

Mortality between the ERAS group and the conventional group

There were four studies[17,22-24] reporting the mortality. After analyzing the data, we found that the conventional group had a greater mortality rate than the ERAS group. (OR = 0.24, I^2 = 0.00%, 95%CI = 0.07 to 0.84, P = 0.03; Figure 2).

Major complications between the ERAS group and the conventional group

There were three studies[17,23,24] reported major complications in elderly patients with GC who underwent surgery. We found that there was no statistically significant difference in the major complications between the ERAS group and the conventional group (OR = 0.67, I^2 = 0.00%, 95%CI = 0.38 to 1.18, P = 0.16; Figure 3).

Publication bias

Visual inspection of symmetric funnel plots was used to analyze publication bias for the including studies. A funnel plot was established to reflect the heterogeneity of readmission rates (Figure 4).

DISCUSSION

This study consists of six studies involving 878 elderly patients who underwent GC surgery. By analyzing the clinical outcomes of the ERAS group and the conventional group, we found that the ERAS group had a lower mortality rate than the conventional group. However, there was no statistically significant difference in major complications between the two groups.

ERAS was gradually developed to strengthen perioperative management and accelerate patients' postoperative recovery[27]. Recently, ERAS has been successfully applied to patients with a variety of cancers, including colorectal cancer, bladder cancer and GC[28-30]. Due to preexisting physical injuries or associated comorbidities, elderly patients are more likely to experience higher postoperative complication rates and mortality than relatively healthy and younger patients are[31]. For ERAS to be implemented in elderly people, surgeons first follow the principle of safety.

In recent years, many studies have reported the application of ERAS in elderly patients with GC and confirmed its positive effects[17,22-24]. However, there has been no definitive conclusion regarding postoperative mortality. Xiao *et al* [17] divided elderly cancer patients (aged > 70 years) who underwent GC surgery into an ERAS group and a conventional

Table 3 Operative and postoperative complications between enhanced recovery after surgery group and conventional group

Characteristics	Studies	Participants (ERAS/conventional)	Odds ratio/mean difference (95%CI)	Heterogeneity
Operative time (min)	4	241/242	0.05 (-0.16, 0.26); $P = 0.64$	$I^2 = 25.46\%$; $P = 0.26$
Postoperative hospital stays	10	179/177	-0.51 (-0.72, -0.30); $P = 0.00$[a]	$I^2 = 0.00\%$; $P = 0.52$
Operative blood loss (mL)	2	108/108	-0.09 (-0.36, 0.17); $P = 0.49$	$I^2 = 0.00\%$; $P = 0.41$
Postoperative bleeding	2	108/107	0.47 (0.08, 2.23); $P = 0.39$	$I^2 = 0.00\%$; $P = 0.93$
Time to first flatus(defecation)	4	129/127	-0.30 (-0.55, -0.06); $P = 0.02$[a]	$I^2 = 0.00\%$; $P = 0.74$
Anastomotic leakage	5	470/324	1.10 (0.40, 3.03); $P = 0.86$	$I^2 = 0.00\%$; $P = 0.59$
Intestinal obstruction	3	156/156	3.24 (1.07, 9.78); $P = 0.04$[a]	$I^2 = 0.00\%$; $P = 0.91$
Pulmonary related complication	6	512/366	0.76 (0.43, 1.35); $P = 0.35$	$I^2 = 0.00\%$; $P = 0.87$
Cardiovascular related complication	2	333/189	0.53 (0.25, 1.11); $P = 0.09$	$I^2 = 0.00\%$; $P = 0.93$
Nausea and vomiting	2	106/106	4.07 (1.29, 12.84); $P = 0.02$[a]	$I^2 = 0.00\%$; $P = 0.52$
Gastric retention	2	106/106	5.69 (2.00, 16.20); $P = 0.00$[a]	$I^2 = 2.46\%$; $P = 0.31$
Urinary retention	2	106/106	0.68 (0.25, 1.88); $P = 0.46$	$I^2 = 0.00\%$; $P = 0.57$
Incision infection	2	106/106	2.26 (0.49, 10.41); $P = 0.30$	$I^2 = 0.00\%$; $P = 0.83$
Urinary tract infection	2	106/106	0.52 (0.18, 1.46); $P = 0.21$	$I^2 = 0.00\%$; $P = 0.86$
Reoperation	3	356/210	0.46 (0.07, 3.00); $P = 0.42$	$I^2 = 29.68\%$; $P = 0.24$
Readmission	5	470/324	1.42 (0.46, 4.33); $P = 0.54$	$I^2 = 47.15\%$; $P = 0.11$

95%CI: 95% confidence intervals; ERAS: Enhanced recovery after surgery.
[a]$P < 0.05$.

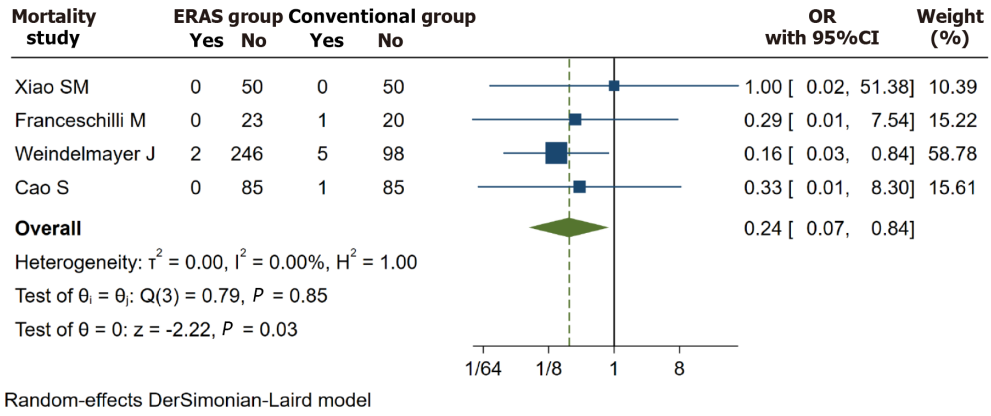

Figure 2 Comparing major complications between the enhanced recovery after surgery group and the conventional group. OR: Odds ratio; 95%CI: 95% confidence interval.

group. However, no significant difference in mortality was found between the two groups. Similarly, Cao *et al*[24] reported that there was no significant difference in the mortality rate between the ERAS group and the conventional group in their study. However, Weindelmayer *et al*[23] held the opposite view. Their research involving elderly patients with GC suggested that the mortality rate in the ERAS group was lower than that in the traditional group. Therefore, the purpose of this study was to evaluate the specific effect of ERAS on older patients with GC. It was necessary for us to determine whether ERAS could be safely implemented in elderly patients.

Our study showed that the ERAS group had a shorter postoperative hospital stays; earlier time to first flatus(defecation); less intestinal obstruction; less nausea and vomiting; and less gastric retention. And the conventional group had a greater mortality rate than the ERAS group. Our research indicated that the ERAS protocol was safe for elderly patients with GC. However, there was no statistically significant difference in major complications between the two groups. This may have been because elderly patients might have a lower adherence to ERAS measures, which reduces the effectiveness of the protocol[32].

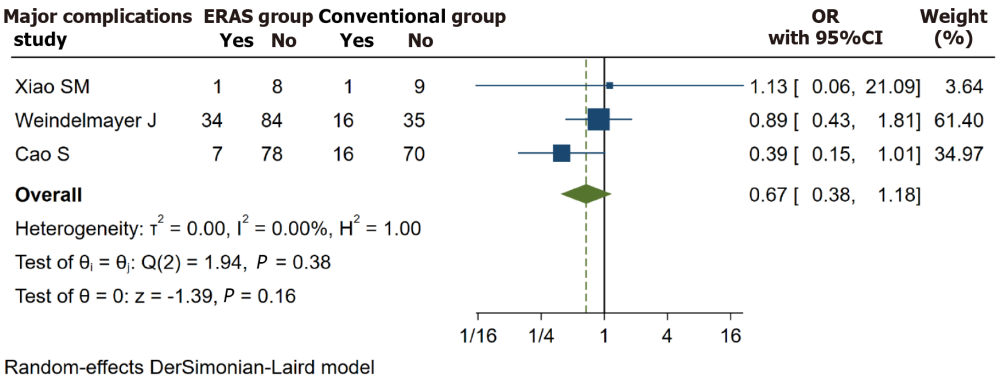

Figure 3 Comparing mortality between the enhanced recovery after surgery group and the conventional group. OR: Odds ratio; 95%CI: 95% confidence interval.

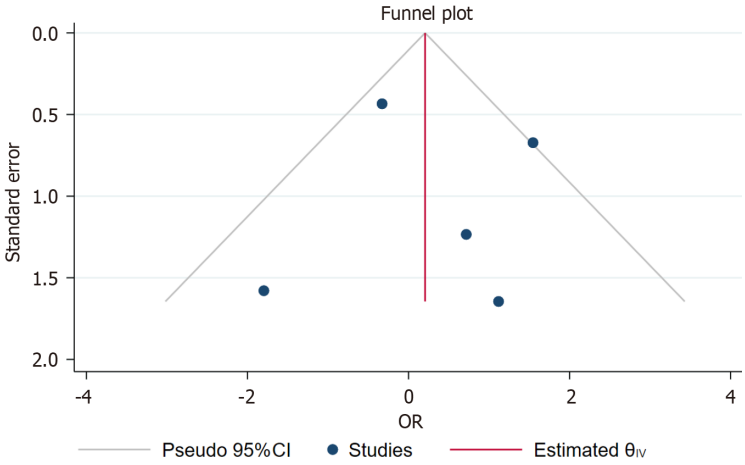

Figure 4 Funnel plot of readmission. OR: Odds ratio; 95%CI: 95% confidence interval.

For all we know, this study was the first pooling-up analysis to evaluate the safety of ERAS for elderly patients with GC. This study has several limitations. First, this study only included six articles, which was relatively small. Second, the age range of the elderly individuals included in the study varied. Third, this study lacked certain short-term and long-term outcomes. Fourth, we could not determine the impact of ERAS on younger or ordinary aged patients. Therefore, comprehensive and high-quality randomized controlled trials should be performed to further confirm our findings.

CONCLUSION

Compared to those with conventional recovery, elderly GC patients who received the ERAS protocol after surgery had a lower risk of mortality. The ERAS protocol was determined to be safe in elderly patients with GC.

ARTICLE HIGHLIGHTS

Research background

This study aimed to evaluate the safety of enhanced recovery after surgery (ERAS) in elderly patients with gastric cancer (GC).

Research motivation

Elderly patients usually have a poor physiological function, more comorbidities, and slow recovery after surgery. Although the application of ERAS protocol in elderly patients with GC has been reported. For elderly patients with GC, there is no convincing evidence that the ERAS protocol is a safe and effective measure.

Research objectives
It was necessary for us to find out whether ERAS could be safely implemented in elderly patients.

Research methods
The PubMed, EMBASE, and Cochrane Library databases were used to search for eligible studies from inception to April 1, 2023. The mean difference (MD), odds ratio (OR) and 95% confidence interval (95%CI) were pooled for analysis. The quality of the included studies was evaluated using the Newcastle-Ottawa Scale scores. We used Stata (V.16.0) software for data analysis.

Research results
This study consists of six studies involving 878 elderly patients. By analyzing the clinical outcomes, we found that the ERAS group had shorter postoperative hospital stays (MD = -0.51, I^2 = 0.00%, 95%CI = -0.72 to -0.30, P = 0.00); earlier times to first flatus(defecation; MD = -0.30, I^2 = 0.00%, 95%CI = -0.55 to -0.06, P = 0.02); less intestinal obstruction (OR = 3.24, I^2 = 0.00%, 95%CI = 1.07 to 9.78, P = 0.04); less nausea and vomiting (OR = 4.07, I^2 = 0.00%, 95%CI = 1.29 to 12.84, P = 0.02); and less gastric retention (OR = 5.69, I^2 = 2.46%, 95%CI = 2.00 to 16.20, P = 0.00). Our results showed the conventional group had a greater mortality rate than the ERAS group. (OR = 0.24, I^2 = 0.00%, 95%CI = 0.07 to 0.84, P = 0.03). However, there was no statistically significant difference in the major complications between the ERAS group and the conventional group (OR = 0.67, I^2 = 0.00%, 95%CI = 0.38 to 1.18, P = 0.16).

Research conclusions
Compared to those with conventional recovery, elderly GC patients who received the ERAS protocol after surgery had a lower risk of mortality.

Research perspectives
Compared to those with conventional recovery, elderly GC patients who received the ERAS protocol after surgery was associated with a lower risk of mortality. ERAS protocol was safe in elderly patients with GC.

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FOOTNOTES

Co-first authors: Zi-Wei Li and Xiao-Juan Luo.

Author contributions: Zi-Wei Li and Xiao-Juan Luo have contributed equally to this work. Data extraction, Xiao-Yu Liu, Xiao-Juan Luo, Xin-Peng Shu, Yue Tong, Quan Lv, and Fei Liu; quality assessments, Xu-Rui Liu and Wei Zhang; data analysis, Zi-Wei Li and Quan Lv; writing-origin draft, Zi-Wei Li; writing-review and editing, Zi-Wei Li, Dong Peng. All authors read and approved the final manuscript. Li ZW and Luo XJ contributed equally to this work as co-first authors. The choice of these researchers as co-first authors acknowledges and respects this equal contribution, while recognizing the spirit of teamwork and collaboration of this study. In summary, we believe that designating Li ZW and Luo XJ as co-first authors of is fitting for our manuscript as it accurately reflects our team's collaborative spirit, equal contributions, and diversity.

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