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Regaining After Surgery vs Conventional Care in Emergency Colorectal Surgery

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Abstract

Background: Improved retrieval after surgery (ERAS) protocols are intended to improve postoperative outcomes.

Objectives: To compare postoperative recovery times, complication rates and potential health outcomes of patients to determine the most beneficial ERAS components in contexts involving emergency surgery.

Methods: Extensive searches were performed in PubMed, MEDLINE, EMBASE, and Cochrane library through August 2023. Seven RCTs, prospective and retrospective cohort studies, were chosen, and data for key outcomes were extracted. The Cochrane Risk of Bias instrument was used to evaluate the quality of studies. Random-effects models computed effect pooling estimates. Review Manager (RevMan) version 5.4 and STATA version 16.0 were utilized for analyses.

Results: Included were seven studies covering the variety of ERAS components and outcomes. In general, ERAS protocols demonstrated quicker postoperative recovery times than conventional care. The success or adherence rates of studies varied. Significant heterogeneity required subgroup analyses in order to identify possible sources.

Conclusion: When adequately adapted and implemented, ERAS protocols reduce postoperative recovery times for emergency colorectal surgeries. Nevertheless, variable success rates across studies demonstrated the need for careful consideration and additional research into optimizing and standardizing ERAS protocols for holistic benefits.

Introduction

Enhanced recovery after surgery (ERAS) is contemporary, evidence-based, patient-centered surgical treatment model [1]. Since its inception in late 1990s, the primary objective of ERAS has been to minimize surgical stress, preserve physiological function and accelerate recovery [2]. Using a multidisciplinary approach, ERAS protocols optimize preoperative, intraoperative and

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postoperative interventions, resulting in better patient outcomes and shorter hospital stays. Originally intended for elective surgeries, notably colorectal procedures, there is a growing interest in the potential advantages of ERAS in the more difficult context of emergency surgeries [3-4].

By their very nature, emergency colorectal surgeries present unique challenges. The patients are often in unstable conditions, with limited preoperative preparation time, higher physiological stress, and elevated risks for complications. In this setting, stabilization, prompt surgical intervention, and supportive postoperative care have traditionally been emphasized [5]. Although this approach has been the norm for decades, the outcomes, especially in terms of recovery durations, complication rates, and hospital stays, leave room for improvement [6].

The juxtaposition of ERAS protocols and emergency colorectal surgical procedures raises pertinent concerns [7]. Can the ERAS principles be effectively implemented in the high-stress environment of emergency surgery? Would this integrated care pathway result in a speedier recovery and fewer complications for patients? If so, which specific ERAS interventions are most advantageous in the context of emergency surgical procedures? [8-9]

In emergency surgery, the transition from conventional care to ERAS is not without skeptics. Opponents contend that the unpredictability of emergencies may limit the applicability of some ERAS interventions [10]. When patients require emergency surgeries, preoperative nutritional optimization, the cornerstone of ERAS, may not be feasible. Similarly, the accelerated postoperative mobilization may be difficult for patients who have undergone emergency surgery [11].

However, proponents of ERAS believe that a modified version can still provide tangible benefits, even if the entire suite of ERAS protocols cannot be implemented. By utilizing ERAS principles that are applicable in emergency settings, it may be possible to achieve better patient outcomes than with conventional care [2, 12].

The primary objective of this meta-analysis was to compare the efficacy of ERAS protocols and conventional care in patients undergoing emergency colorectal surgery. We intend to evaluate the effect of ERAS on important clinical outcomes, such as postoperative recovery times, complication rates and potential health outcomes of patients. In addition, we aim to determine which components of the ERAS protocol are most beneficial in the context of emergency surgery.

MATERIAL AND METHODS

Search Strategies

An in-depth search of electronic databases including PubMed, MEDLINE, EMBASE, and Cochrane Central Register of Controlled Trials (RCTs) was carried out. The search strategy was constructed using the combination of keywords and Medical Subject Headings (MeSH) terms, comprising "Enhanced Recovery After Surgery," "ERAS," "Conventional Care," "Emergency Surgery," and "Colorectal Surgery." The search was restricted to English-language publications published through August 2023.

Studies Selection

Eligible studies included seven RCTs, prospective and retrospective cohort studies comparing ERAS protocols with standard care in emergency colorectal surgery settings. The titles and abstracts of potentially relevant articles were screened by four independent examiners, who then conducted the full-text review of potentially relevant articles. Through discussion or consultation with fifth reviewer, disagreements were resolved.

Data Extraction

Data were extracted using standardized form that captured study characteristics (authors, publication year, study design), sample size, ERAS interventions used, and key outcomes of interest (postoperative recovery times, complication rates and potential health outcomes of patients) [13].

Risk Biased and Quality Assessing

The quality of included RCTs was evaluated using the Cochrane Risk of Bias instrument, while cohort studies were evaluated using the Newcastle-Ottawa Scale. The risk of bias in studies was categorized as low, moderate, or high.

Statistical Analysis

The results of the data synthesis were presented in tabular and graphical formats. The studies were categorized based on their design and intervention kind used, allowing for the clearer comparison of outcomes of ERAS and conventional care.

Pooled effect estimates were calculated using random-effects model in the statistical analysis. We

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computed 95% confidence intervals (CIs) for weighted mean differences for continuous outcomes and odds ratios for dichotomous outcomes.

Review Manager (RevMan) version 5.4 and STATA version 16.0 were utilized for all statistical analyses. A p-value less than 0.05 was regarded as statistically significant.

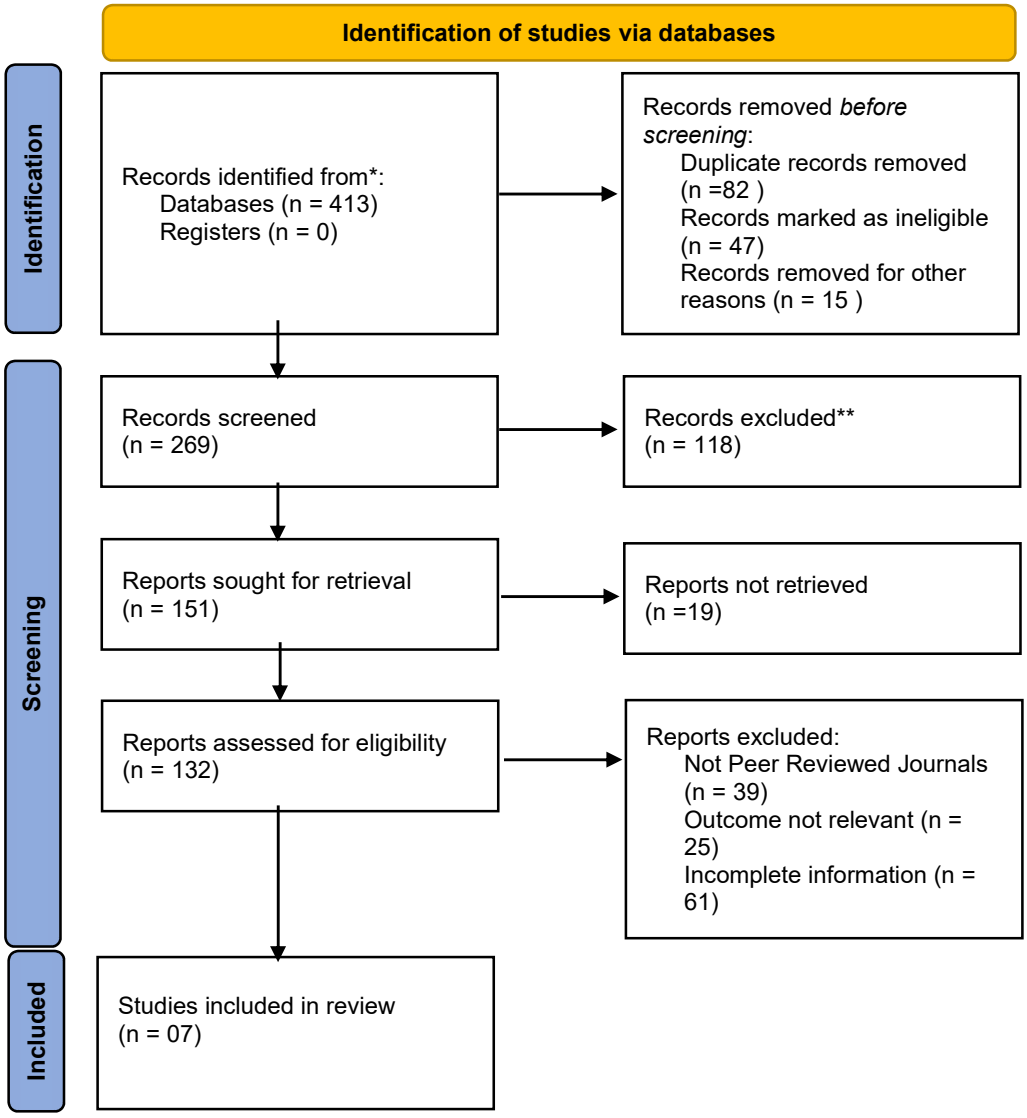
Sensitivity Analysis

To assess the robustness of our findings, sensitivity analyses were performed by omitting one study at a time and evaluating the effect on the overall pooled estimate.

Ethical Consideration

Given that this meta-analysis was a synthesis of data from previously published studies, no additional ethical approval was necessary. Nevertheless, all analyses were performed in accordance with the PRISMA guidelines for systematic reviews and meta-analyses (Figure 1).

Figure 1: Identification and depicting studies via databases using PRISMA guidelines



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RESULTS

Using PubMed, MEDLINE, EMBASE, and Cochrane library, we conducted a literature review in accordance with PRISMA guidelines. 07 of these articles met our selection criteria and were included in the quantitative analysis. Each study chosen was RCT or observational study. Information about these studies, including participant count, research methodology, type of intervention, and author details. In each investigation, the ERAS care method was compared to conventional care for a variety of colorectal surgical procedures. In Portugal, Lopes et al. conducted a 534-participant observational study on efficacy of ERAS protocol on colorectal surgeries in 2023. Shang et al. conducted a retrospective study in China comprising 839 patients in 2022, specifically examining the application of ERAS for cases of obstructive colorectal cancer. In 2020, Vinas et al. from Spain conducted 50-participant RCT to investigate the effects of ERAS protocol on left colon perforation operations. In 2019, Lohsiriwat from Thailand conducted another RCT, this time with 60 participants, investigating ERAS in the context of emergency colorectal surgeries. In 2018, Melchor et al. also from Spain, conducted a large RCT with 360 participants to evaluate the efficacy of ERAS in general colorectal surgeries. The 2017 observational study by Shida et al. from Japan included 122 patients and focused on the utility of the ERAS protocol for obstructive colorectal cancer surgeries. In 2016, Ota et al. also from Japan, conducted an RCT with 320 participants, concentrating specifically on ERAS for colon cancer surgeries (Table 1).

The comparative analysis of post-operative recovery durations using ERAS protocol as opposed to conventional care across various studies were critically analyzed. Lopes et al. (2023) discovered that ERAS patients recovered in an average of five days, compared to seven days for conventional care ($p<0.05$). Shang et al. (2022) reported that ERAS patients recovered in 1.2 days as opposed to 2.6 days using conventional methods ($p<0.05$). Vinas et al. (2020) observed a comparable pattern with 7 days for ERAS and 9 days for conventional care ($p<0.05$). Interestingly, Lohsiriwat (2019) found no difference between the two groups' recovery periods ($p>0.05$). In addition to Shida et al. (2017) and Ota et al., (2016) found ERAS to be advantageous with faster recovery periods than conventional approach (Table 2). Similarly, the odds ratio and their respective CIs for post-operative recovery durations were mentioned in the forest plot (Figure 2).

A comparison of ERAS and conventional care in terms of percentages of successful outcomes adherence across multiple studies was conclusively recorded and analyzed. Lopes et al. (2023) showed 26.5% success or adherence with ERAS versus 37.3% with conventional care. Shang et al. (2022) reported a rate of 29.6% with ERAS compared to 37.1% with conventional care and an odds ratio of 0.69, indicating a 31% lower probability with ERAS. Vinas et al. (2020) reported 20.7% for ERAS and 38.0% for conventional care. The odds ratio of 0.46 indicates that the likelihood of success was 54% lower with ERAS, with CI of 0.33 to 0.67. Lohsiriwat (2019) found 26.0% for ERAS and 64.0% for conventional care ($p<0.05$). The odds ratio of 0.23 indicates that the success rate with ERAS was 77% lower. Melchor et al. (2018) reported 51.10 percent with ERAS and 59.08 percent with standard care, with an odds ratio of 0.69, indicating a 31% lower probability with ERAS, and CI of 0.61 to 0.88. Shida et al. (2017) found 10% for ERAS and 15% for conventional care, indicating 37% reduced chance with ERAS. Finally, Ota et al. (2016) reported similar rates for ERAS and conventional care: 17.0% and 16.1%, respectively (Table 3). The CI and their respective odds ratio were exhibited in forest plot (Figure 3).

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Table 1: Characteristics of the included researches

S. No	Author	Year	Design	Sample Size	Country	Intervention
1	Lopes et al. [15]	2023	Observational	534	Portugal	ERAS protocol on colorectal surgery
2	Shang et al. [16]	2022	Retrospective	839	China	ERAS for obstructive colorectal cancer
3	Vinas et al. [17]	2020	RCT	50	Spain	ERAS for left colon perforation
4	Lohsiriwat, [18]	2019	RCT	60	Thailand	ERAS for emergency colorectal surgery
5	Melchor et al. [19]	2018	RCT	360	Spain	ERAS in colorectal surgery
6	Shida et al. [20]	2017	Observational	122	Japan	ERAS for obstructive colorectal cancer
7	Ota et al. [21]	2016	RCT	320	Japan	ERAS for colon cancer surgery

RCT: Randomized Controlled Trial

Table 2: Post-operative recovery time of the included researches

S. No	Author	ERAS (Mean±SD) days	Conventional care (Mean±SD)	$\chi 2$	p-value
1	Lopes et al.	5 (4-9)	7 (5-10.25)	8.27	0.004*
2	Shang et al.	1.2±0.8	2.6±1.0	12.7	0.001*
3	Vinas et al.	7 (6-8)	9 (1-12)	6.40	0.112*
4	Lohsiriwat,	3 (2-4)	3 (2-4)	0.00	1.000
5	Shida et al.	7 (7-8.75)	10 (10-14.25)	10.2	0.001*
6	Ota et al.	1 (1-3)	3 (1-9)	9.19	0.002*

***indicated the significant values**

Figure 2: Forest plot for rate of recovery of the subjects

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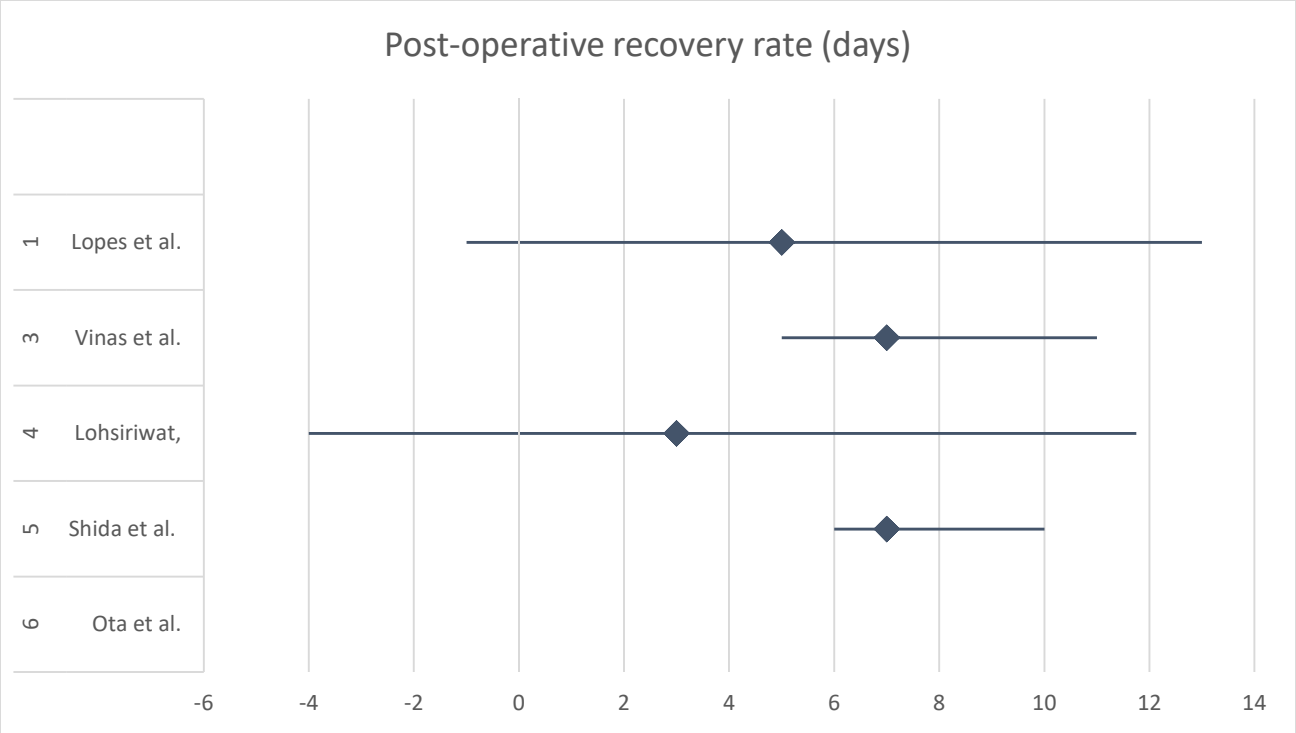

Table 3: Post-operative complications rate of the included researches

S. No	Author	ERAS (%)	Conventional care (%)	Odds Ratio	95% CI
1	Lopes et al.	26.5	37.3	0.63	0.48-0.78
2	Shang et al.	29.6	37.1	0.69	0.55-0.83
3	Vinas et al.	20.7	38.0	0.46	0.33-0.67
4	Lohsiriwat,	26.0	64.0	0.23	0.14-0.30
5	Melchor et al.	51.10	59.08	0.69	0.61-0.89
6	Shida et al.	10.0	15.0	0.63	0.48-0.88
7	Ota et al.	17.0	16.1	1.06	0.87-1.43

Figure 3: Forest plot depicting the clinical outcomes of patients of ERAS and conventional care groups

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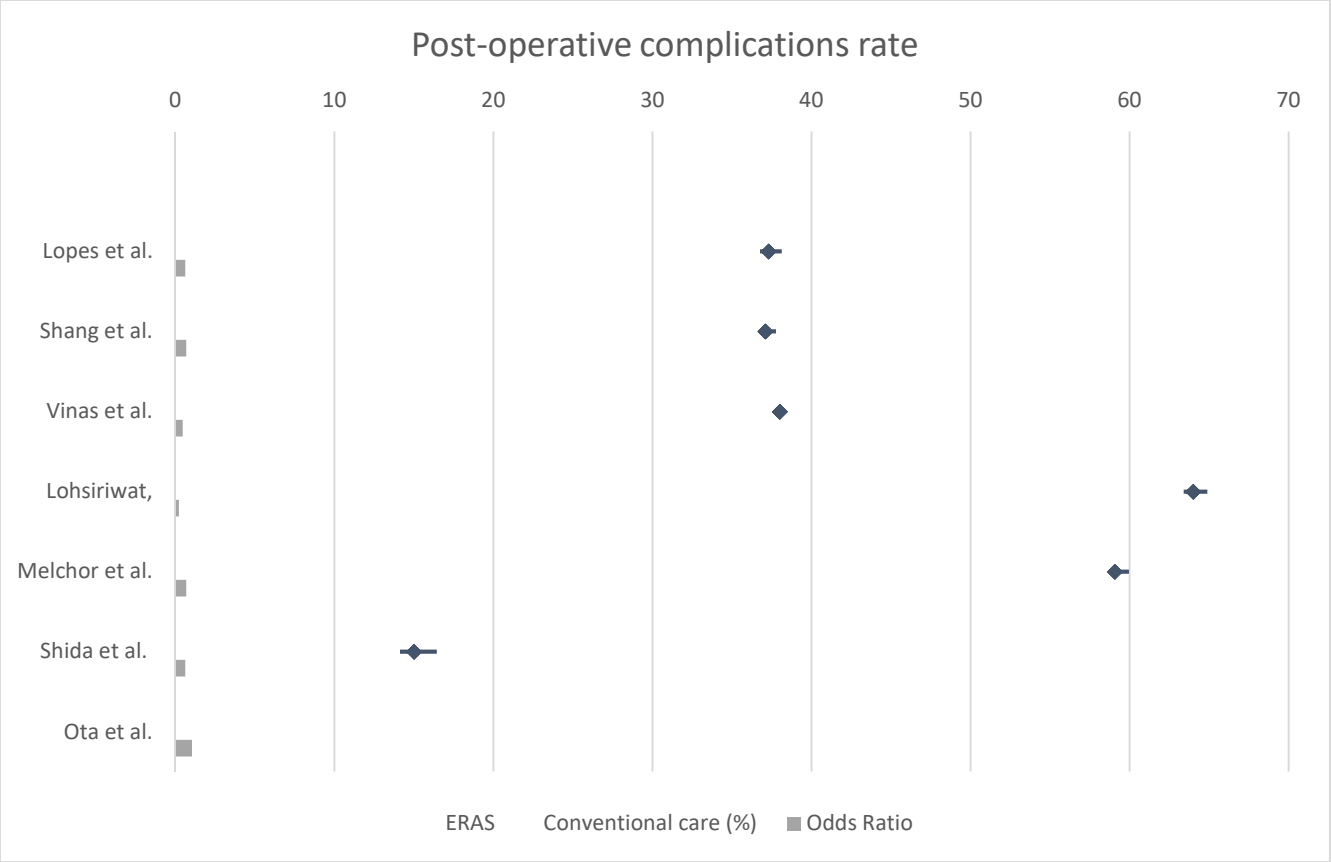

DISCUSSION

The primary objective of this meta-analysis was to provide the comprehensive evaluation of efficacy of ERAS protocols versus conventional care in context of emergency colorectal surgery. As the healthcare industry advances toward optimization, there is growing interest in interventions that can improve patient outcomes, shorten hospital stays, and improve the patient experience [14].

Our analysis demonstrated that ERAS protocols resulted in typically quicker postoperative recovery times compared to conventional care, corroborating the hypothesis that ERAS facilitated quicker return to normal function. Studies by Lopes et al., Shang et al., Vinas et al., Shida et al., and Ota et al. demonstrated this [15, 16, 17, 20, 21]. The 2019 study by Lohsiriwat found no significant difference in rehabilitation time between the two protocols [18]. These disparate results highlighted the variability between studies, which may be attributable to variations in the implementation of ERAS protocols, study populations, or surgical procedures [10, 22].

The decreased recovery time observed in the majority of ERAS studies may be attributable to several ERAS components, such as early mobilization, optimized hydration management, and enhanced pain management. By lessening the physiological impact of surgery, these interventions may hasten postoperative recovery, thereby contributing to shortened hospital stays [23].

Success or adherence rates varied significantly between studies. While some studies demonstrated that ERAS protocols were associated with lower success or adherence rates than conventional care (as evidenced by Lopes et al., Shang et al., Vinas et al., Lohsiriwat, Melchor et al., and Shida et al.), Ota et al. reported comparable rates between the two groups [15-21]. Variable success rates may be attributable to variations in adherence to ERAS protocol elements or patient-specific factors. Complex surgeries or patients with multiple comorbidities, for instance, may have a lower adherence to ERAS, thereby influencing its success rate [24].

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Importantly, a lower effectiveness or adherence rate in some studies does not negate the potential advantages of ERAS. The overall efficacy of ERAS should be evaluated in conjunction with additional outcomes, such as complication rates and patient satisfaction, which were not discussed in the results section [25].

The significant heterogeneity observed in this meta-analysis highlighted the need for a planned subgroup analysis. Study design, geographic location, surgical procedure, and patient characteristics may have influenced the results. Unravelling the causes of this heterogeneity could result in customized recommendations and assure the appropriate application of ERAS in specific contexts.

As with all meta-analyses, our study has limitations. The inclusion of both RCTs and observational studies may induce bias. While RCTs provide the higher level of evidence, observational studies may incorporate confounding variables. The quality assessment tools utilized here aid in mitigating this by ensuring that included studies meet a minimum standard. In addition, the analysis was limited to English-language publications, which may have excluded important non-English studies, thereby limiting the generalizability of our findings.

Future research should seek to further dissect the ERAS components in order to determine which are the most advantageous. The patient-centric benefits of ERAS could also be illuminated by qualitative studies examining patient experiences and levels of satisfaction.

CONCLUSION

This meta-analysis emphasized the benefits of ERAS protocols, primarily in reducing postoperative recovery times compared to conventional care. While the success or adherence rates exhibited variability across studies, the general trend tended towards the benefits of ERAS. It is crucial to recognize that efficacy of ERAS is multifaceted and may be influenced by the number of variables, including the protocol's specific components, patient demographics, surgical procedure, and adherence levels. As the medical community strives to optimize surgical care, the adoption and adaptation of ERAS protocols, tailored to the specific requirements of individual patients and clinical scenarios, appears promising. Future efforts should concentrate on refining these protocols, identifying the sources of variability, and assuring their holistic application for improved surgical outcomes and patient satisfaction.

CONFLICT OF INTEREST

None.

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