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Review

Efficacy of fast track surgery in laparoscopic radical gastrectomy for gastric cancer:a meta-analysis of randomized controlled trials

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ABSTRACT

Objective: To conduct a systematic review of efficacy and security of fast track surgery (FTS) in laparoscopic radical gastrectomy for gastric cancer.

Methods: We searched PubMed, Embase, and Cochrane Library Databases and supplemented by other searches to collect randomized controlled trials (RCTs) on the comparison of fast track surgery combined with laparoscopy versus laparoscopy separately used in radical gastrectomy for gastric cancer before December 2016. After screening for inclusion, data extraction, and quality assessment, meta-analysis was conducted by the Review Manager 5.3 software.

Results: A total of 6 RCTs, involving 464 patients, were included. There were 232 patients in the FTS group and conventional care group separately. Compared with the conventional care group, patients of FTS group had shorter postoperative hospital stay [WMD = −1.85, 95%CI: (−2.60, −1.11), P < .00001], earlier first flatus [WMD = −9.33, 95%CI: (−13.74, −4.91), P < .0001], lower level of C-reactive protein (CRP) at postoperative day 4 [WMD = −13.94, 95%CI: (−22.74, −5.15), P = .002], and less hospitalization fees [SMD = −1.12, 95%CI: (−2.07, −0.18), P = .02]. There were no significant differences in operation time, intraoperative blood loss, and postoperative complications between the two groups.

Conclusion: Based on current evidence, the FTS protocol is safe and effective in laparoscopic radical gastrectomy for gastric cancer. Due to the limitations of our study, further larger and multicenter studies are needed to validate our findings.

1. Introduction

Gastric cancer is one of the most common malignant tumours worldwide and the second major cause of cancer-related mortality [1]. China, Japan, South America, Eastern Europe, and parts of the Middle East are reported to have the highest incidence of gastric cancer [2]. Up to now, surgery has been the most common and effective treatment especially for early gastric cancer. For radical gastrectomy, however, conventional elective surgery and perioperative care are associated with a complication rate of 20–46% and a postoperative hospital stay of 8–13 days [3]. Situation improves due to the clinical application of fast track surgery and laparoscopy in gastrectomy for gastric cancer. Fast track surgery (FTS) was pioneered by the Danish surgeon Henrik Kehlet in the field of elective colorectal surgery in the 1990s [4,5], and has gained recognition widely around the world. In contrast to conventional care, FTS applied to open gastrectomy will shorten postoperative hospital stay, reduce expenditure, promote the recovery of bowel function, and limit postoperative complications [3,6,7]. Laparoscopy was first applied to the surgical treatment of gastric cancer in 1994 [8]. Laparoscopic gastrectomy has been a standard treatment for early gastric cancer, and is gradually applied to advanced gastric cancer with the improvement of equipment and the accumulation of experience. The application of laparoscopy in gastrectomy for advanced gastric cancer will decrease intraoperative blood loss, shorten postoperative hospital stay, promote the recovery of bowel function, not increase postoperative complications, but prolong the operation time [9,10].

Meta-analysis of efficacy of FTS in laparoscopic radical gastrectomy is scarce. Only two articles were included in relevant studies of Li et al. [11] and Chen et al. [12] Relevant subgroup of Tan et al. [13] included four articles, of which, one article was a clinical controlled trial. Conclusions of the similar studies were less robust due to the limitations described above. Li et al. [11] conducted a meta-analysis in 2014 to evaluate the efficacy and safety of FTS in laparoscopic and open gastrectomy separately, the results of the meta-analysis supported that FTS

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in open surgery might be more beneficial than in laparoscopic surgery compared with traditional care. The advantages of FTS in laparoscopic gastrectomy were challenged. However it is still far from a conclusion, due to the small number of included articles. We retrieved entirely for most latest articles to make an updated meta-analysis of efficacy and security of FTS in laparoscopic radical gastrectomy for gastric cancer.

2. Materials and methods

2.1. Publication search strategy

Studies published before December 2016 were identified by searching the PubMed, Embase and Cochrane Library databases. No regional and language restrictions were applied. All search algorithms were structured by Mesh (Medical Subject Headings) and free text terms including as follows: “fast track surgery”, “enhanced recovery after surgery”, “multimodal optimization”, “laparoscopic”, “laparoscopy”, “stomach neoplasms”, “gastric cancer”. The reference lists of identified articles and previous reviews or meta-analyses were manually checked to identify additional relevant articles. To verify the search results, two authors (Q. L. and L. D.) participated in the databases search.

2.2. Inclusion and exclusion criteria

Studies were eligible for inclusion if they met the following criteria: (1) participants: adult patients (> 18 years) with confirmed gastric cancer undergoing laparoscopic radical gastrectomy; (2) intervention: use of FTS pathway in the perioperative period. According to the consensus guideline for FTS programme in gastric surgery [14], we made an arbitrary decision that the FTS programme in each study should include at least 10 items (Table 1). This number of FTS elements was required because some items might have been applied to modern routine care; (3) comparison: conventional perioperative care; (4) outcome measures: report at least one of the relevant outcome data mentioned in Table 2; (5) study design: randomized controlled trial (RCT).

Studies were excluded if they (1) were non-randomized, reviews, cohorts, case-controlled trials, abstracts only, or animal research, (2) applied fewer than 10 elements of FTS, (3) consisted of no relevant outcome measures, (4) emergency surgery, (5) were not radical gastrectomy for gastric cancer.

2.3. Data extraction and outcome measures

Two authors independently checked all included studies and extracted all relevant data. Disagreement was resolved through discussion between the reviewers. If they could not reach a consensus, the third author participated in making the final decision. The following information was extracted from each eligible publication: the first author, published year, country of study population, number of patients, age, sex, body mass index (BMI), TNM classification, type of surgery and reconstruction of both cases and controls.

Seven outcome measures were regarded suitable for evaluating the efficacy and security of FTS pathway: operation time, intraoperative blood loss, postoperative hospital stay, time to first flatus, postoperative level of CRP, hospitalization fees and postoperative complications.

2.4. Assessment of methodological quality

Two reviewers independently evaluated RCT quality and risk of bias following the quality checklist supplied in the Cochrane Handbook for Systematic Reviews of Interventions [15]. The authors examined six domains: method of randomization, allocation concealment, blinding, completeness of outcome data, selective reporting of outcomes, and other bias. The risk of bias in each domain was categorized as low, high or unclear. “Unclear” indicated an insufficient information to evaluate risk of bias. We resolved disagreement by discussion.

2.5. Statistical analysis

All statistical analyses were performed using RevMan 5.3 software from the Cochrane Collaboration. Mean differences (MDs) with 95% confidence intervals (CIs) were calculated to analyze continuous variables. Weighted mean difference (WMD) was used when variables were presented in the same scale, standard mean difference (SMD) indicated that variables were presented in the different scale. Odds ratios (ORs)

Table 1
Fast track surgery programme applied in the included trials.

Fast track surgery items	Studies					
	Hu 2012	Kim 2012	Xia 2016	Liu 2016	Abdikarim 2015	Li 2016
Preadmission information and counseling	✓	✓	✓	✓	✓	✓
Preoperative bowel preparation	✓	✓	✓	✓	✓	✓
Preoperative nutritional support	✓					
Preoperative smoking and alcohol consumption						
Preoperative fasting and carbohydrate loading	✓	✓	✓	✓	✓	✓
Preanaesthetic medication						
Prophylaxis against thromboembolism		✓				
Antimicrobial prophylaxis						
Standard anaesthetic protocol						
Prevention and treatment of postoperative nausea and vomiting						
Laparoscopy assisted surgery	✓	✓	✓	✓	✓	✓
Surgical incisions						
Nasogastric intubation	✓	✓	✓	✓	✓	✓
Prevention of intraoperative hypothermia		✓	✓	✓		✓
Perioperative fluid management	✓		✓	✓	✓	
Drainage of peritoneal cavity following anastomosis	✓		✓		✓	
Urinary drainage	✓	✓	✓		✓	✓
Prevention of postoperative ileus	✓	✓	✓	✓	✓	✓
Postoperative analgesia	✓		✓	✓	✓	✓
Postoperative nutritional care	✓	✓	✓	✓	✓	✓
Early mobilization	✓	✓	✓	✓	✓	✓
Audit	✓	✓	✓	✓	✓	✓