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Review

Comparison between different approaches applied in laparoscopic right hemi-colectomy: A systematic review and network meta-analysis

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ABSTRACT

Aim: Several different operative approaches have been applied nowadays in laparoscopic right hemi-colectomy. This study aims to evaluate the potential benefits of different approaches by conducting a network meta-analysis (NMA).

Method: A comprehensive literature research of the PubMed, Embase, Medline, the Cochrane Central Library, Wan Fang and China National Knowledge Infrastructure (CNKI) databases was performed. Original articles comparing two of three different approaches including medial to lateral (MtL) approach, lateral to medial (LtM) approach and cranial to caudal (CtC) approach of laparoscopic right colon resection for patients with both neoplastic and benign diseases were included.

Results: 3 RCTs and 3 NRCTs with a total of 571 patients were included in this NMA. The result revealed that LtM approach needs shorter postoperative flatus recovery time than both MtL approach with a WMD of 1.40 (95% CI: 0.13 to 2.67, $P < 0.05$) and CtC approach (WMD = −1.25, 95% CI: −1.90 to −0.61, $P < 0.05$). The length of hospital stay of LtM approach is shorter than that of MtL approach (WMD = 0.29, 95% CI: 0.08 to 0.50, $P < 0.05$). CtC approach can achieve less postoperative complications (OR = 3.37, 95% CI: 1.06 to 10.70, $P < 0.05$) compared with MtL approach.

Conclusion: All three approaches are safe and acceptable in laparoscopic right hemi-colectomy since the pooled evidence revealed that most aspects of different approaches are comparable in general. The postoperative flatus recovery time and hospitalization time of LtM approach is shorter compared with MtL approach. And CtC approach may have slight superiority in postoperative complications compared with MtL approach.

What does this paper add to the literature?

This systematic review and network meta-analysis compared medial to lateral approach, lateral to medial approach and cranial to caudal approach, three main approaches currently applied in laparoscopic right hemi-colectomy with the purpose of helping to standardize the procedure. The pooled evidence revealed that all three approaches are safe and acceptable.

1. Introduction

Colon cancer is the third most common malignant neoplasm worldwide and plays a significant role in cancer-related mortality [1]. Since first described by Jacobs et al. in 1991 [2], laparoscopic colectomy has become the standard procedure for colon cancer surgery, with better short-term outcomes and non-inferiority in long-term outcomes and oncological safety compared with traditional open surgery proved by a number of studies [3–5]. Meanwhile the concept of 'complete mesocolic excision' (CME) with high arterial ligation initially proposed by Hohenberger et al. [6] has been increasingly adopted by clinicians as the optimal principle for colon cancer and has been evidenced to contribute to superior oncological outcomes [7,8]. However, this brings new requirements and challenges to less experienced surgeons in the same time, especially in right hemi-colectomy which encounters anatomic complexity and numerous variations in sizable vessels [9,10].

We believe that standardization of the procedure can help to flatten the learning curve and improve the treatment outcome, even though there are several different approaches in use across the world including medial to lateral (MtL) approach, lateral to medial (LtM) approach and cranial to caudal (CtC) approach. Despite excellent work has been done comparing the medial and lateral approach in the treatment of colorectal disease [11], it still remains controversial which approach is superior in laparoscopic right hemi-colectomy. Besides there is newly emerging evidence favoring the cranial-to-caudal approach [12]. We here presented a systematic review of trials comparing the outcome of

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these three main approaches applied in laparoscopic right hemi-colectomy for patients with both neoplastic and benign diseases and a network meta-analysis (NMA) performed using MtL approach as common comparator to evaluate the potential benefits of different approach selections.

NMA is a recently developed statistical method applied in situations when direct evidence are not available from head-to-head trials comparing two or more interventions of interest while trials comparing each of the two or more interventions with another same intervention can be obtained. As in our case, MtL approach for laparoscopic right hemi-colectomy is nowadays the most widely accepted approach for right colon cancer and trials about traditional approach like LtM or newly-emerging approach like CtC are designed to compare with MtL. Using MtL approach as the common comparator, NMA makes it possible to obtain indirect evidence between LtM approach and CtC approach. Since only two-armed trials were available, we used the method described by Bucher et al. [13] in our NMA, as shown in Appendix A.

2. Materials and methods

This systematic review and network meta-analysis was arranged according to the PRISMA recommendation [14] and its Extension Statement for Network Meta-analyses [15]. There was no need obtaining the ethical approval for this study since the data used in this study was extracted from published trials. A review protocol was registered on http://www.researchregistry.com.

2.1. Data sources and search strategy

Five electronic databases including the PubMed, Embase, Medline, the Cochrane Central Library databases and two Chinese databases, Wan Fang Database and China National Knowledge Infrastructure (CNKI) database, were comprehensively searched to identify articles published up to April 2017. Search key words were a combination of medical subject heading (MeSH) terms, text words, and word variants for “laparoscopic right hemi-colectomy”, “lateral to medial”, “medial to lateral”, “cranial to caudal”, “approach”, “dissection sequence” (search strategy for PubMed shown in Appendix B). Besides, existing systematic reviews on this topic were also searched for potential eligible trials and the authors of some studies were contacted to clarify ambiguous information.

2.2. Study selection and inclusion criteria

Literature screening and selection were performed by two independent reviewers with discrepancies consulting the third senior reviewer to make the decision. Only original articles comparing two of the three different approaches (LtM, MtL and CtC) of laparoscopic right colon resection for both neoplastic and benign diseases with extractable data were considered for inclusion. We included both randomized controlled trials (RCTs) and nonrandomized controlled trials (NRCTs) considering the paucity of high-quality RCTs, which in a way reflects the difficulty conducting these surgical trials [16].

To be included in our study, studies must measure at least one of the following primary and/or secondary outcomes: operative time, blood loss, number of harvested lymph nodes, postoperative flatus recovery time, length of hospital stay, conversion rate, complications during procedure and complications after procedure. In case of same results published for more than one time, we only included study with the highest quality or the most recently published. Only articles published in English or Chinese were screened and included.

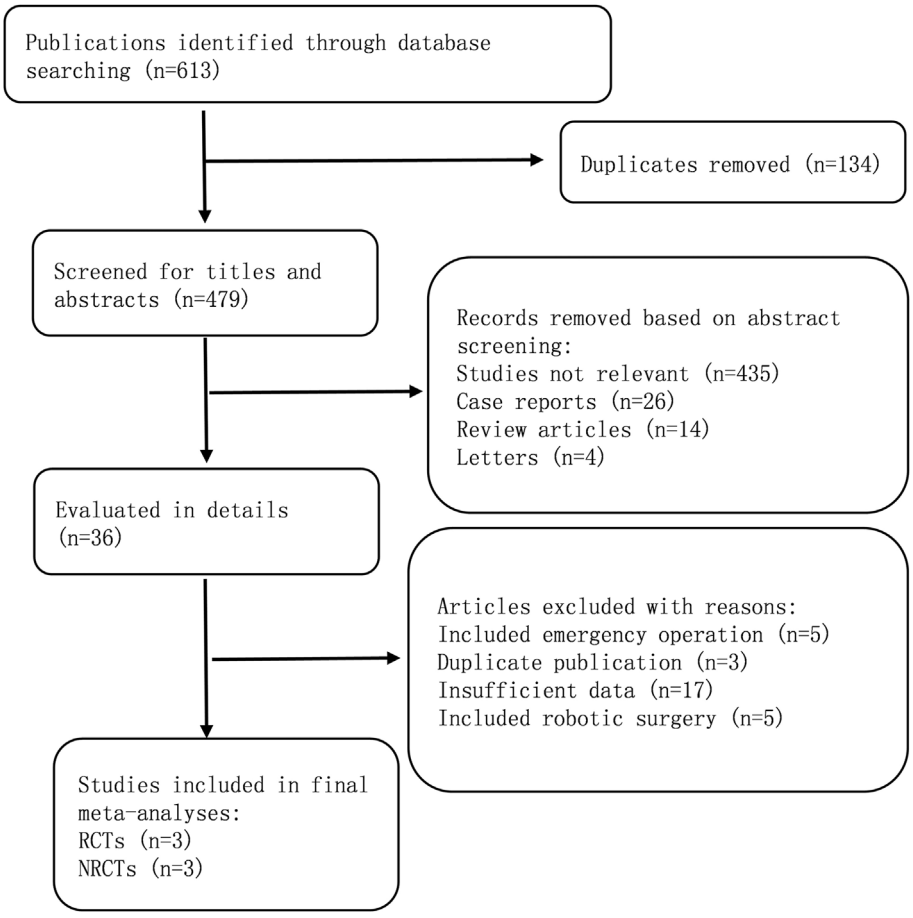

Fig. A. Flow diagram for identification of eligible studies.
RCTs, randomized controlled trials; NRCTs, nonrandomized controlled trials.