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An updated meta-analysis of transanal drainage tube for prevention of anastomotic leak in anterior resection for rectal cancer

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ABSTRACT

Background: Anastomotic leakage (AL) is one of the most serious complications after anterior resection for rectal cancer. Transanal drainage tube (TDT) placement is widely used to reduce AL, but its efficacy remains controversial. We performed a meta-analysis to evaluate the effectiveness of TDT for prevention of AL, using updated evidence.

Methods: Randomized controlled trials (RCTs) and cohort studies evaluating the effectiveness of TDT for prevention of AL after anterior resection for rectal cancer were identified by using a predefined search strategy. Meta-analysis was performed to estimate the pooled rates of AL, reoperation, anastomotic bleeding and mortality separately.

Results: One RCT and ten cohort studies which including 1170 cases with TDT and 1262 cases without TDT were considered eligible for inclusion. Meta-analysis showed that the TDT group was associated with a significant lower rates of AL (RR: 0.42, 95% CI: 0.31–0.58, $P < 0.00001$) and reoperation (RR: 0.29, 95% CI: 0.19–0.45, $P < 0.00001$). There was no significant difference in anastomotic bleeding rate and mortality between the two groups.

Conclusions: TDT placement is associated with significant lower rates of AL and reoperation, hence it is likely to be an effective method of preventing and reducing AL after rectal cancer surgery.

Contents

1. Introduction 334
2. Materials and methods 334
   2.1. Search strategy 334
   2.2. Inclusion and exclusion criteria 334
   2.3. Data extraction and methodological quality assessment 334
   2.4. Data synthesis 334
3. Results 335
   3.1. Description of the included studies 335
   3.2. Methodological quality 335
   3.3. Meta-analysis of outcomes 335
      3.3.1. Anastomotic leakage 335
      3.3.2. Reoperation 335
      3.3.3. Anastomotic bleeding 335
      3.3.4. Mortality 335
   3.4. Publication bias 336

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4. Discussion 337
5. Conclusion 339
Funding 339
Conflicts of interest 339
Disclosure 339
Author contributions 339
References 339

1. Introduction

In the last two decades, thanks to the improvements of surgical instruments, the popularization of total mesorectal excision and the application of preoperative neoadjuvant chemoradiotherapy, the sphincter-preserving rate of rectal cancer surgery has been greatly improved [1–9]. But unfortunately, compared with this advance, the incidence of anastomotic leakage (AL) after anterior rectal resection did not decrease, but increased, which leading to higher rate of mortality and reoperation, and poorer long-term outcome [10–14]. A number of factors, such as male gender, diabetes, low level of anastomosis, and neoadjuvant therapy, are considered as independent risk factors for AL [15–17]. But even for patients without any risk factors, AL is not a rare complication.

In order to minimize the risk of AL, several methods have been explored. Among them, synchronous diverting stoma is one of the most widely used methods, and has been recommended following low anterior resection by some previous studies [18,19]. However, it remains controversial that whether all patients with low anterior rectal resection should receive diverting stoma, because diverting stoma is unnecessary in about 80%–95% of patients which have no AL. Moreover, stomy-related complications, including skin irritation, parastomal hernia, dehydration, and failure of stoma closure, are also concerned by surgeons [20,21].

Transanal drainage tube (TDT) placement is another widely used method attempt to reduce AL rate by reducing the intraluminal pressure. In contrast with diverting stoma, it is less invasive and easier to apply. Several previous studies have identified the efficacy of TDT placement in preventing AL [20,22,23], but some denied it [24,25]. Yang et al. used to conduct a meta-analysis aimed to clarify this issue [26]. But they excluded patients received synchronous diverting stoma in their study, which meant that those with potential high risk were excluded. Since then, moreover, there are a number of new studies focus on this topic have been reported [27–29]. Hence, it is necessary to update the meta-analysis based on the current studies to show more clear results of whether TDT could reduce AL rate after anterior resection for rectal cancer.

2. Materials and methods

2.1. Search strategy

PUBMED, EMBASE, Cochrane library and CNKI (China National Knowledge Infrastructure Whole Article Database) were searched by using the following search term: (transanal tube) AND (rectum OR rectal) AND (anastomotic leakage). Both randomized controlled trial studies (RCTs) and cohort studies evaluating the effectiveness of TDT for prevention of AL after anterior resection for rectal cancer published prior to February 2018 were identified without language restriction. If samples of two studies overlap, only the one with larger sample size was included. Additional articles were checked from reference lists within the articles identified by the electronic search strategy above. Studies with only abstracts or unpublished reports did not be considered for inclusion.

2.2. Inclusion and exclusion criteria

Two reviewers (Hong Chen and Hong-Ke Cai) reviewed titles and abstracts of all citations and retrieved studies. The inclusion criteria are presented in the following: (1) RCT or cohort design; (2) patients were divided into two groups according to the placement of TDT after anterior resection; (3) evaluation of the association between TDT and AL; (4) sufficient data were obtained to calculate the risk ratio (RR) and confidence interval (CI). Patients could be of any age, gender, and race. Patients received preoperative neoadjuvant therapy or synchronous diverting stoma were included as well. Studies were excluded if one of the following occurred: (1) case-control design; (2) duplicate data; (3) insufficient data. All disagreements were resolved by discussion.

2.3. Data extraction and methodological quality assessment

If the title and abstract identified according to the search strategy above suggests relevance, the full text was selected for further assessment. Data was extracted by two independent authors (Hong Chen and Hong-Ke Cai). The following recorded data were extracted from each included study: author, publication year, country, study design, sample size, gender, age, tumor location, preoperative neoadjuvant therapy, diverting stoma, type of tube, tube position, indwelling time of tube. Outcomes extracted for meta-analysis including: AL rate, reoperation rate, anastomotic bleeding rate and mortality. Disagreements were resolved by discussion and consensus between the reviewers. We used the Jadad scoring system to assess the methodological quality of included RCTs [30], and the Newcastle-Ottawa quality scale to that of cohort studies [31].

2.4. Data synthesis

Statistical heterogeneity was assessed using a Chi-squared test, where $P<0.1$ or $I^2>50\%$ indicates significant heterogeneity. We used a random-effects model to synthesize data if heterogeneity was found, and a fixed-effects model if heterogeneity was not found. For meta-analysis, the results were presented as risk ratios (RR) for dichotomous data and weighted mean difference (WMD) for continuous data, and 95% confidence intervals (CI) were calculated for individual studies. Potential publication bias and other possible biases were assessed using funnel plot. A two-tailed P value less than 0.05 was considered to be statistically significant. Statistical analysis was performed by using the statistical package RevMan 5.3 (Cochrane Collaboration, Copenhagen, The Nordic Cochrane Centre, Denmark).