



Review

Early elective versus delayed elective surgery in acute recurrent diverticulitis: A systematic review and meta-analysis



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HIGHLIGHTS

- We found no difference in clinical outcomes between early and delayed elective surgery for acute diverticulitis.
- Early elective surgery is associated with longer operative time and longer length of stay.
- Early elective surgery is associated with higher rate of conversion to open surgery.
- Delayed elective surgery may be more cost-effective than early elective surgery.
- High quality randomised controlled trials are required for definite conclusions.

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ABSTRACT

Objectives: To investigate outcomes of early versus delayed surgery in patients with acute recurrent diverticulitis.

Methods: We performed a systematic review in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement standards. We conducted a search of electronic information sources, including MEDLINE; EMBASE; CINAHL; the Cochrane Central Register of Controlled Trials (CENTRAL); the World Health Organization International Clinical Trials Registry; ClinicalTrials.gov; and ISRCTN Register, and bibliographic reference lists to identify all randomised controlled trials (RCTs) and observational studies investigating outcomes of early versus delayed surgery in patients with acute recurrent diverticulitis. We used the Newcastle-Ottawa scale to assess the risk of bias of included studies. Random-effects models were applied to calculate pooled outcome data.

Results: We identified three retrospective and one prospective cohort studies enrolling a total of 1046 patients. The included patients were comparable in terms of age, ASA score and Hinchey classifications (Hinchey I and II). The results of our analyses suggested that there was no difference between two groups in surgical site infection [Odds ratio (OR) 1.61, 95% CI 0.79–3.27, $P = 0.19$], intra-abdominal abscess (OR 0.92, 95% CI 0.21–4.00, $P = 0.91$), anastomotic leak (OR 1.27, 95% CI 0.50–3.25, $P = 0.61$), 30-day mortality [Risk difference (RD) 0.00 95% CI -0.01–0.01, $P = 0.80$], postoperative ileus (OR 1.35, 95% CI 0.50–3.66, $P = 0.55$), postoperative bleeding (OR 0.93, 95% CI 0.32–2.69, $P = 0.89$), ureteric injury (OR 0.62, 95% CI 0.08–5.07, $P = 0.65$), and overall morbidity (OR 1.42 95% CI 0.76–2.66, $P = 0.27$). The early surgery was associated with longer operative time [Mean Difference (MD) 12.8, 95% CI 5.08–20.53, $P = 0.001$] and length of stay (MD 4.41, 95% CI -0.34–8.53, $P = 0.03$). Among those undergoing laparoscopic surgery, conversion to open surgery was higher in the early surgery group (OR 2.71, 95% CI 1.36–5.40, $P = 0.005$).

Conclusions: The best available evidence suggests that there is no difference between early elective and delayed elective surgery for acute recurrent diverticulitis in terms of clinical outcomes. However, longer operative time and length of stay and higher conversion rate to open surgery associated with early elective surgery may make the delayed elective surgery more cost-effective. The best available evidence is derived from non-randomised studies; therefore, high quality randomised controlled trials are required to provide more robust basis for definite conclusions.

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1. Introduction

Diverticular disease is a common surgical condition. Its incidence is increasing with the rising average age of the population [1,2]. Up to one-third of people aged 45 years and older and up to two-thirds of people older than aged 85 years may be affected [3]. Recurrent diverticulitis or complicated diverticular disease, i.e., diverticulitis associated with abscess, phlegmon, fistula, obstruction, bleeding, or perforation, may need surgery.

According to the latest updated recommendation of the Standards Committee of The American Society of Colorectal Surgeons, the decision to recommend surgery after an acute attack should be made on a case-by-case basis [4]. The number of attacks of uncomplicated diverticulitis is no longer the only decisive factor. The age of the patient, medical condition, severity of the attack, and persistent symptoms should influence the decision making.

The timing of surgery whether to operate early or after 6 weeks (delayed) is presently being widely discussed [5,6]. There is controversial evidence in literature regarding management of acute recurrent non-perforated sigmoid diverticulitis [7,8]. The current practice in non-complicated recurrent diverticulitis is to treat with antibiotics and consideration given to a delayed colectomy. One possible option is to treat with antibiotics and do colectomy early in the same admission and the other option will be to let the inflammation to settle down and perform a delayed resection (after 6 weeks) in elective setting. Current standard procedure for elective surgery in diverticular disease of the left colon is laparoscopic or laparoscopically assisted sigmoid colectomy [9,10]. Immediate emergency laparotomy with Hartmann's procedure or anastomosis with or without loop ileostomy remaining the procedure of choice for free perforation with peritonitis [11].

Apart from clear emergency situations, the timing of elective surgery in relation to acute recurrent diverticulitis is not clear. In view of this, we aimed to perform a comprehensive systematic review and conduct a meta-analysis of outcomes to compare early elective versus delayed elective surgery for acute recurrent diverticulitis.

2. Methods

This systematic review was performed according to an agreed predefined protocol which was registered at Research Registry (Unique Identifying Number: reviewregistry285, available at <http://www.researchregistry.com>). The review was conducted and presented according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement standards [12].

2.1. Eligibility criteria

We included all observational studies and randomised controlled trials (RCTs) investigating outcomes of early versus delayed surgery in patients with acute recurrent diverticulitis. The study population comprised of all adult patients age >16 with acute recurrent diverticulitis without free perforation. The diagnosis of acute diverticulitis was based on the clinical assessment and computed tomography (CT) scan findings. Early elective surgery was considered as the intervention of interest and was defined as surgery less than 6 weeks of admission. Delayed elective surgery was considered as the comparator and was defined as surgery after 6 weeks of admission. The surgical procedures of interest included laparoscopic, laparoscopic-assisted or open sigmoid colectomy or left hemicolectomy with primary anastomosis. We excluded patients who had complicated diverticulitis with free perforation, generalised peritonitis and fistulae.

2.2. Outcome measures

The following outcome measures were considered: surgical site infection, intra-abdominal abscess, anastomotic leak, 30-day mortality, postoperative ileus, postoperative bleeding; ureteric injury, overall morbidity, conversion to open surgery, operative time, and length of stay.

2.3. Literature search strategy

Two authors independently searched the following electronic databases: MEDLINE, EMBASE, CINAHL, and the Cochrane Central Register of Controlled Trials (CENTRAL). The last search was run on 25 May 2017. Thesaurus headings, search operators and limits in each of the above databases were adapted accordingly. The literature search strategy is outlined in Appendix I. In addition, World Health Organization International Clinical Trials Registry (<http://apps.who.int/trialsearch/>), ClinicalTrials.gov (<http://clinicaltrials.gov/>) and ISRCTN Register (<http://www.isrctn.com/>) were searched for details of ongoing and unpublished studies. The bibliographic lists of relevant articles and reviews were interrogated for further potentially eligible studies. No language restrictions were applied in our search strategies.

2.4. Study selection

The title and abstract of articles identified from the literature searches were assessed independently by two authors. The full-texts of relevant reports were retrieved and those articles that met the eligibility criteria of our review were selected. Any discrepancies in study selection were resolved by discussion between the authors. An independent third author was consulted in the event of disagreement.

2.5. Data collection

We created an electronic data extraction spreadsheet which was pilot-tested in randomly selected articles and was adjusted accordingly. Our data extraction spreadsheet included: study-related data (first author, year of publication, country of origin of the corresponding author, journal in which the study was published, study design, study size and clinical condition of the study participants), baseline demographic and clinical information of the study populations (age, gender, ASA score, Hinchey classification of diverticulitis, diagnosis basis, timing of surgery and type of surgical procedure) and primary and secondary outcome data. Data collection was performed independently by two authors and disagreements were resolved by discussion. If no agreement could be reached a third author was consulted.

2.6. Methodological quality and risk of bias assessment

Two authors independently assessed the methodological quality and risk of bias of the included articles using the Newcastle-Ottawa scale (NOS) [13]. The NOS uses a star system with a maximum of nine stars to evaluate a study in three domains (8 items): the selection of the study groups, the comparability of the groups and the ascertainment of outcome of interest. For each item of the scale, we judged each study as low risk (one star awarded) or high risk (no star awarded). We determined studies that received a score of nine stars to be of low risk of bias, studies that scored seven or eight stars to be of moderate risk, and those that scored six or less to be of high risk of bias. Disagreements were resolved by discussion between the reviewers. If no agreement could be reached, a third author acted as an adjudicator. A risk of bias graph was constructed to

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