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Alimentary Tract

Day surgery versus overnight stay laparoscopic cholecystectomy: A systematic review and meta-analysis

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ABSTRACT

Background: Laparoscopic cholecystectomies are being increasingly performed as a day surgery procedure.
Aim: To systematically assess the safety and efficacy of laparoscopic cholecystectomy as a day surgery procedure compared to overnight stay.
Methods: Randomized controlled trials and clinical controlled trials involving day surgery laparoscopic cholecystectomy were included in a systematic literature search. Two authors independently assessed the studies for inclusion and extracted the data. A meta-analysis was conducted to estimate the safety and feasibility of day surgery compared to overnight stay laparoscopic cholecystectomy.
Results: Twelve studies were selected for our meta-analysis. The meta-analysis showed that there was no significant difference between the two groups on morbidity ($P = 0.65$). The mean in-hospital admission and readmission rates were 13.1% and 2.4% in the day surgery group, respectively. The two groups had similar prolonged hospitalization ($P = 0.27$), readmission rate ($P = 0.58$) and consultation rate ($P = 0.73$). In addition, there was no significant difference in the visual analogue scale score, postoperative nausea and vomiting scale, time to return to activity and work between the two groups ($P > 0.05$).
Conclusions: Currently available evidence demonstrates that laparoscopic cholecystectomy can be performed safely in selected patients as a day surgery procedure, though further studies are needed.

1. Introduction

Laparoscopic cholecystectomy (LC) is currently accepted as the "gold standard" treatment for the management of symptomatic gallstones and acute cholecystitis and is routinely performed in clinical practice [1]. Many studies have demonstrated that LC is safe and minimally invasive, with a mortality rate less than 0.2% and a morbidity rate less than 3% [2]. With the refinement of surgical techniques and perioperative management in laparoscopic surgery during the last decades, the average hospital stay for LC has been reduced to 2 days for urgent LC and approximately one day for elective LC [3]. The short hospitalization and good safety of LC make day surgery possible. Over the past decades, day surgery has been developed in many countries to overcome inpatient bed shortages and reduce hospital costs. In addition, day surgery also increases patient satisfaction and helps reduce waiting time [4]. Several studies have confirmed the relative safety of LC as an outpatient procedure, which has a mortality rate of 0.2% and morbidity rate of 3.6% [5]. For these reasons, in the USA, 50% of all LCs are performed as day surgery procedures [4]. However, this is not universally accepted and this concept is still debated in many other countries due to high unplanned admission, readmission rate and complications such as bleeding, bile injury and postoperative pain [6]. Many randomized controlled trials (RCTs) and clinical controlled trials (CCTs) have evaluated the feasibility, safety and efficacy of this procedure, however, the clinical results remain inconsistent. Thus, we conducted a systematic review and meta-analysis including all the trials to evaluate the safety, feasibility and efficacy of LC as a day surgery procedure again.

2. Materials and methods

2.1. Systematic literature search

A systematic literature search was independently conducted by two authors. They searched the following databases up to October

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1, 2014: the Cochrane Central Register of Controlled Trials, Embase, Science Citation Index (Web of Knowledge), and PubMed. The search strategies were as follows: ("ambulatory care" OR "ambulatory surgical procedures" OR "day case" OR "day surgery" OR "day stay" OR "outpatient" OR "partial hospitalization") AND "Cholecystectomy, Laparoscopic". The literature search was performed and was restricted to human studies. After completing all searches, we merged the search results using Endnote X3 (reference management software) and removed duplicate records. Two independent authors scanned the title and abstract of each record identified by the searches for inclusion. If compliance with inclusion criteria was not clear from the abstract, we retrieved the full text for further assessment.

2.2. Inclusion and exclusion criteria

2.2.1. Types of studies

Both RCTs and CCTs were considered for this review. CCTs were defined as clinical trials without randomization or non-prospective, and included non-randomized controlled trials and historical controlled trials. Cohort studies and case–control studies were excluded.

2.2.2. Types of participants

Patients who were about to undergo LC as a day surgery procedure according to the criteria below for any disease were included in our study. Day-surgery was defined as patient admission, operation and discharge within the same day in our study [4]. Trials including patients with an average age more than 70 years or less than 18 years were excluded.

2.2.3. Types of interventions

We included trials comparing patients who underwent day surgery and overnight stay LC. Overnight stay surgery was defined as a procedure after which the patients were discharged within 24 h [4]. Trials that compared day surgery patients and inpatients were also excluded. Trials in which only economic analysis was compared were excluded.

2.2.4. Types of outcome measures

The primary outcomes of our study were mortality, morbidity, prolonged hospitalization and readmissions. The secondary outcomes were visual analogue scale (VAS) score on postoperative day 1, postoperative nausea and vomiting (PONV) scale on postoperative day 1, time to return to activity, time to return to work and consultation rate.

Prolonged hospitalization referred to that day surgery patients required admission and overnight-stay patients required more than two days hospitalization. Consultation meant a patient seeking a review by a doctor, but who did not require readmission.

2.3. Data collection and analysis

2.3.1. Selection of studies

Any disagreement during study selection and data extraction was resolved by discussion and referral to a third author for adjudication.

2.3.2. Data extraction

Two authors extracted data on a standard form that included population characteristics, intraoperative parameters, and information regarding the outcome measures in each trial. In the case of missing data, we contacted the original investigators to request further information.

2.4. Assessment of methodology quality

Two authors assessed the methodological quality of the trials independently. The Jadad [7] score was used to assess the quality of RCTs, with a cumulative score of >3 indicating high quality. The Newcastle-Ottawa scale [8] was used to assess the quality of CCTs, with a score $\geq$5 indicating high quality.

2.5. Statistical analysis

We pooled the synchronized extraction results as estimates of overall treatment effects in the meta-analysis using Review Manager for Windows version 5.3 (The Cochrane Collaboration, Oxford, England). The estimated effect measures were risk ratio (RR) for dichotomous data and weighted mean difference (WMD) for continuous data; both reported with 95% confidence interval (CI). We checked all results for clinical and statistical heterogeneity. Clinical heterogeneity was evaluated by assessing study populations and interventions, definition of outcome measures, concomitant treatment, and perioperative management. Heterogeneity was determined using the χ^2 test with significance set at $P = 0.05$, and I^2 statistics were used for the evaluation of statistical heterogeneity ($I^2 \geq 50\%$ indicating presence of heterogeneity) [9]. We used a fixed-effects model to synthesize the data when heterogeneity was absent, otherwise a random-effects model was used for synthesizing the data. Data were presented as forest plots and the funnel plot was used to assess publication bias. Sensitivity analyses were carried out by including RCTs only with high quality.

3. Results

3.1. Description of included trials

We identified a total of 3212 records through the search strategy. Twelve studies, including seven RCTs [10–16] and five CCTs [17–21] met the criteria for inclusion in the meta-analysis (Fig. 1). These studies were published between 1996 and 2013, with the sample ranging from 28 to 427. There were a total of 1430 patients, including 650 day surgery patients and 780 overnight stay patients. Details of the included studies are shown in Table 1. The methodological quality of all the included trials is displayed in Supplementary Tables S1 and S2. According to the Jadad score, 4 [11–13,15] of the 7 RCTs were of high quality, and 3 trials [10,14,16] were high risk with low quality. Four [17–20] of the 5 CCTs showed a Newcastle-Ottawa scale score of more than 5 and were evaluated as high quality.

3.2. Safety assessment in day surgery patients undergoing LC

3.2.1. Mortality

Only 4 trials [14,17,18,21] reported zero mortality. The remaining eight studies did not state short-term mortality. However, according to the reported morbidity and other outcomes, this indicated that there was no short-term mortality.

3.2.2. Morbidity

All studies except one trial [13] reported postoperative complications. The reported morbidity ranged from 0% to 18.3% in both the day surgery group and the overnight stay group. The overall morbidity was 5.2% in the day surgery group and 6.0% in the overnight stay group. Our meta-analysis showed that there was no significant difference between the two groups (risk ratio [RR] = 0.92, 95% confidence interval [CI]: 0.63–1.33, $P = 0.65$, inconsistency index [I^2] = 0; Fig. 2).