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Day-Case versus Inpatient Laparoscopic Cholecystectomy: An Updated Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 6 April 2026 and was last updated on 6 April 2026.

INTRODUCTION

Review question / Objective To systematically compare the safety and effectiveness of day-case (ambulatory) laparoscopic cholecystectomy versus inpatient (overnight stay) laparoscopic cholecystectomy in adults with benign gallbladder disease, updating the evidence from the Cochrane review (2013) and Xiong et al. (2020), with regard to complication rates, 30-day readmission, reoperation, mortality, postoperative pain, patient satisfaction, and cost.

Rationale The most recent Cochrane systematic review (Vaughan/Gurusamy 2013) on this topic was last updated with searches conducted in September 2012, over 13 years ago, and included only 6 RCTs with 492 patients. The latest non-Cochrane meta-analysis (Xiong et al. 2020) searched through February 2019, now more than 6 years old. Since then, multiple large-scale studies have been published, including Ayyaz 2024 (N=184,252 from England national data), Cheewatanakornkul 2023 (N=2,296 with propensity score matching), and Keeratibharat 2024. The post-COVID-19 emphasis on hospital bed efficiency has further increased the clinical relevance of day-case surgery. An updated systematic review incorporating these new data is urgently needed to inform current clinical practice and hospital policy.

Condition being studied Symptomatic benign gallbladder disease (cholelithiasis, gallbladder polyps) requiring elective laparoscopic cholecystectomy. Day-case LC is defined as planned same-day admission and discharge (<24 hours, including 23-hour observation models). Inpatient LC is defined as planned overnight hospital stay (at least one night).

METHODS

Search strategy A comprehensive search will be conducted in PubMed/MEDLINE, Embase (Ovid), and Cochrane Library (CENTRAL) from January 2000 to April 2026. Search terms combine MeSH headings and free-text terms for three concepts:

(1) laparoscopic cholecystectomy; (2) day-case/ambulatory/outpatient/same-day surgery; (3) inpatient/overnight/hospitalization. No language restrictions will be applied. Reference lists of included studies and previous systematic reviews will be hand-searched. ClinicalTrials.gov and WHO ICTRP will be searched for unpublished trials.

Participant or population Adult patients (aged 18 years or older) with symptomatic benign gallbladder disease undergoing elective laparoscopic cholecystectomy. No restrictions on ASA grade or BMI.

Intervention Day-case (ambulatory) laparoscopic cholecystectomy: planned same-day admission and discharge within 24 hours, including 23-hour observation models.

Comparator Inpatient (conventional) laparoscopic cholecystectomy: planned hospital admission with at least one overnight stay.

Study designs to be included Randomized controlled trials (RCTs), prospective comparative studies, retrospective cohort/case-control studies (including propensity score matched studies), and large registry/database studies with comparative data between day-case and inpatient groups.

Eligibility criteria Inclusion: (1) Comparative studies (any design) of day-case vs inpatient LC; (2) Adult patients (>=18 years); (3) Elective LC for benign gallbladder disease; (4) Reporting at least one clinical outcome. Exclusion: (1) Emergency cholecystectomy; (2) Single-arm studies without a comparator group; (3) Open cholecystectomy; (4) Pediatric studies (<18 years); (5) Conference abstracts without full text; (6) Reviews, editorials, letters; (7) Duplicate publications (retain most complete dataset).

Information sources Electronic databases: PubMed/MEDLINE, Embase (Ovid), Cochrane CENTRAL. Supplementary sources: reference lists of included studies and published systematic reviews, Google Scholar (first 200 results), ClinicalTrials.gov, WHO ICTRP.

Main outcome(s) Primary outcomes: (1) Overall complication rate; (2) 30-day readmission rate; (3) 30-day reoperation rate; (4) Perioperative mortality.

Additional outcome(s) Secondary outcomes: (1) Unplanned admission/failed day-case rate; (2) Bile duct injury rate; (3) Surgical site infection rate; (4) Conversion to open surgery rate; (5) Postoperative pain scores (VAS); (6) Patient satisfaction; (7) Operative time; (8) Total cost; (9) Time to return to normal activities.

Data management Literature search results will be exported to EndNote for deduplication. Screening will be conducted independently by two reviewers. Data will be extracted into a standardized Excel spreadsheet. Disagreements will be resolved by consensus.

Quality assessment / Risk of bias analysis RCTs will be assessed using the Cochrane Risk of Bias tool (RoB 2.0) across five domains: randomization process, deviations from intended interventions, missing outcome data, measurement of the outcome, and selection of reported results. Observational studies will be assessed using the Newcastle-Ottawa Scale (NOS, 0-9 stars). Studies scoring >=7 stars will be classified as high quality, 5-6 as moderate, and <=4 as low quality. The overall certainty of evidence for each primary outcome will be evaluated using the GRADE framework.

Strategy of data synthesis Meta-analyses will be performed using a random-effects model (restricted maximum likelihood, REML) with Hartung-Knapp-Sidik-Jonkman (HKSJ) correction. Dichotomous outcomes will be reported as risk ratios (RR) with 95% confidence intervals; continuous outcomes as mean differences (MD) or standardized mean differences (SMD). Heterogeneity will be assessed using the Cochran Q test (P=10 studies are available. Trim-and-fill analysis will be performed if publication bias is detected. All analyses will be conducted using R software (meta and metafor packages).

Subgroup analysis Pre-specified subgroup analyses: (1) Study design: RCTs vs observational studies; (2) Geographic region: Europe vs North America vs Asia vs others; (3) Publication era: 2000-2010 vs 2011-2020 vs 2021-2026; (4) ASA classification: ASA I-II only vs including ASA III; (5) Sample size: =100 per group; (6) Day-case definition: strict same-day (<12h) vs including 23-hour observation.

Sensitivity analysis Sensitivity analyses will include: (1) Leave-one-out analysis; (2) Excluding high risk of bias studies (RoB 2.0 high risk or NOS <=4); (3) Restricting to RCTs only; (4) Fixed-effect vs random-effects model comparison; (5) Trim-and-fill method for publication bias adjustment; (6) Excluding studies where the inpatient group comprised failed day-case discharges rather than planned inpatient admissions; (7) Alternative

methods for rare events (Peto OR vs continuity correction).

Language restriction No language restriction. Studies in English and Chinese will be directly reviewed; studies in other languages with English abstracts containing extractable data will also be considered.

Country(ies) involved China - Department of Hepatobiliary Surgery, Affiliated Haikou Hospital of Xiangya Medical College, Central South University, Haikou.

Other relevant information This review serves as an update to the Cochrane systematic review by Vaughan et al. (2013, CD006798, last searched September 2012) and the meta-analysis by Xiong et al. (2020, BioMed Research International, last searched February 2019).

Keywords Day-case; Ambulatory; Outpatient; Laparoscopic cholecystectomy; Inpatient; Same-day discharge; Systematic review; Meta-analysis.

Dissemination plans The results will be submitted for publication in an international peer-reviewed journal (target: Medicine, Baltimore). Findings will also be presented at relevant surgical conferences.

Contributions of each author

Author 1 - Yong Zhang - Conceptualization, methodology, literature search, data extraction, statistical analysis, writing of the original draft, and review and editing of the final manuscript.
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