Laparoscopic hepatectomy for treating recurrent Intrahepatic bile duct stones: A review and meta-analysis

fei liu (704338221@qq.com)

The First Affiliated Hospital of Chengdu Medical College: Chengdu Medical College The First Affiliated Hospital https://orcid.org/0000-0001-7455-5920

Hong-Qiang Yang

The First Affiliated Hospital of Chengdu Medical College: Chengdu Medical College The First Affiliated Hospital

Qiang Wu

The First Affiliated Hospital of Chengdu Medical College: Chengdu Medical College The First Affiliated Hospital

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Research Article

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Abstract

Objective Laparoscopic hepatectomy(LH) has been a controversial topic for patients with prior upper abdominal surgery,especially for the patients with recurrent intrahepatic bile duct(IHD) stones.The purpose of this meta-analysis is to systematically evaluate the efficacy and safety of laparoscopic hepatectomy(LH) and open hepatectomy(OH) in patients with recurrent Intrahepatic bile duct stones which who have had at least one biliary tract surgery in the past.

Methods Retrieving all satisfied reports from the time the repository was built to December 2020. Literature published in English.After selecting the literature, extracting the data and evaluating the quality according to the Cochrane systematic evaluation method, the extracted data were statistically analyzed using RevMan 5.4 software.Continuity variables were calculated by mean difference (MD) and 95% confidence interval (CI), while dichotomous variables were calculated by 95% CI odds ratio (0R).

Results Through screening, we finally obtained one RCT study, but this study did not met our predetermined selection criteria. Therefore, no suitable studies were identifified for inclusion in this review.

Conclusion We found no RCT evidence - supportive or otherwise - for the use of Laparoscopic hepatectomy for people with recurrent intrahepatic bile duct stones. We concluded that there is an urgent need for well conducted RCTs in this area

1. Introduction

Intrahepatic bile duct（IHD） stone is prevalent in Southeast Asia, especially in south and southwest China, but the incidence is low in western countries [1].It has a high postoperative recurrence rate and the risk of further developing into cholangiocarcinoma, which has been a difficult problem for the health and economic development of residents in this area.For the treatment of IHD, surgery is the main method, and hepatectomy is considered to be the most effective treatment method. The treatment aims for IHD are to removing lesions, to removing calculi, to correcting stenosis, to establish ample drainage of the obstructed biliary system,and to preventing recurrence[2].In recent years, with the development and maturity of laparoscopic technology, the efficacy and safety of laparoscopic hepatectomy in the treatment of primary IHD has been gradually acknowledged.[3].

However, the high recurrence rate of IHD after operation has always been a difficult problem for biliary surgeons.The main treatment of recurrent IHD is still to remove the diseased liver,But for patients with a history of biliary surgery, postoperative abdominal adhesions and long-term bile duct inflammation stimulate serious intraperitoneal structure disorders,made the reoperation is difficult and dangerous.Therefore, the surgical treatment mostly adopts the traditional open surgical method.In recent years, laparoscopic hepatectomy for the treatment of recurrent intrahepatic bile duct stones has been reported, but there is still a lack of evidence-based medical evidence for its effectiveness and safety. It is still in the exploration stage [4].

Therefore, we conducted this meta-analysis to evaluate the safety and feasibility of laparoscopic hepatectomy in the treatment of patients with recurrent intrahepatic bile duct stones.

2. Methods

2.1 Study search selection

We searched four English language databases(PubMed, Web of Science, The Cochrane Library and Embase) .The language is restricted to English. Search terms include but not limited to: “Laparoscopic hepatectomy,”“ Open hepatectomy,”“Recurrent hepatolithiasis,”“Recurrent Intrahepatic bile duct stones,”“liver resection,”“reoperation”. All references retrieved were manually retrieved to expand the scope of the search and, if the inclusion criteria were met, were included in the study.

The study was conducted in accordance with the Principles of Cochrane systematic review.

2.2 Study selection

The selection of literature was completed independently by two researchers, and the differences in the screening process were resolved through consultation, and a third party was introduced when necessary.All the retrieved literatures were preliminarily screened by reading "title-Abstract", and the full text was carefully read and screened one by one through the preliminary screening.

2.3 Inclusion and exclusion criteria

The inclusion criteria of this study were as follows: 1) The study type was RCT (randomly divided into laparoscopy group and laparotomy group), regardless of whether the blind method was adopted;2) The patient is a patient with definite diagnosis of intrahepatic bile duct stones, whether or not accompanied by extrahepatic bile duct stones, and has had at least one biliary tract operation in the past;3) The differences in treatment between laparoscopic and open hepatectomy were compared.4) Provided at least one data of interest in this study;

The exclusion criteria for this study were: 1) repeated reports;2) Study of primary IHD;3) Tumors and other diseases;4) Surgical method: non-hepatectomy;5) Retrospective study, conference papers, reviews, case reports, abstracts, letters, etc.;6) There is no original data of interest in this study;7)Not English.

2.4 Data extraction and quality assessment

The extraction of data was independently completed by two researchers. Differences arising from the extraction process were settled through negotiation, and a third party would make a ruling when necessary.The extracted data included: Author, year of publication, language, number of participants, age, sex, and whether additional surgery was performed;The clinical data of interest included operative time, intraoperative blood loss, length of hospital stay, and incidence of postoperative complications.The Cochrane Bias Risk Assessment Scale was used to evaluate the quality of the study, which was

independently completed by two researchers. Differences in the assessment process were resolved through consultation, and the third party ruled when necessary.The evaluation contents include: (1) Random sequence generation (selection bias);(2)Allocation concealment (selection bias);(3) Blinding of participants and personnel (performance bias);(4) Blinding of outcome assessment (detection bias); (5)Incomplete outcome data (attrition bias);(6)Selective reporting (reporting bias);(7)Other bias.

2.5 statistical analysis

All data were pooled with the Cochrane Collaboration's Review Manager 5.4 (Cochrane Collaboration, Oxford, United Kingdom). Heterogeneity among studies was assessed using the Q test with significance set at P< 0.1, and heterogeneity was quantified using the I^2statistic,According to the heterogeneity test results, fixed effects model or random effects model was selected to merge the data(When I^2 >50%, the random effect model is selected; otherwise, the fixed effect model is selected).Funnel plots were used to signify the publication bias. A P-value less than 0.05 was considered to indicate statistical significance.

3. Results

3.1 Results of the search

A total of 112 references were searched for inclusion in this study Web of Science 39, Embase 22, PubMed 45, Cochrane Library 6 The literature selection process is shown in Figure 1.After screening and full-text assessment, no studies met our inclusion criteria.

3.2 Risk of bias in included studies

We did not include any studies.

3.3 Excluded studies

We have provided here a description of the three excluded studies which were identified from our initial search.

Ding[5] published a randomized controlled study of laparoscopic and open left hepatectomy for the treatment of hepatolitholiasis in 2015. A total of 98 patients were included in this study (n=49 in the LH group and n=49 in the OH group), and the results showed that no fatal complications occurred in the open group and the laparoscopic group.There was no significant difference in complications between the two groups (P>0.05), but the operation time, blood loss and hospitalization time in laparoscopic group were significantly shorter than those in open group (P<;0.05).However, the patients selected in this study were patients with primary hepatolithiasis(patients without previous surgical history), which did not meet the inclusion criteria of our study, so it was not included in our study.The study of Pu[6] and Tian[7] was carried out on patients with recurrentintrahepatic bile duct stones. But the surgical method of these two studies was biliary duct exploration, which did not meet the inclusion criteria of this study, so they were not included in our study.The characteristics of excluded studies was list in Table 1.

3.4 Assessment of publication bias

We didn't include any studies.

4. Discussion

IHD can exist alone or coexist with extrahepatic bile duct stones, which are the most frequent diseases in some parts of China.Long-term calculi and secondary chronic inflammatory stimulation are easy to cause corresponding liver parenchyma atrophy, sclerosis and abscess formation, further development can cause cholestatic cirrhosis or portal hypertension, and even induce cholangiocarcinoma[8,9],.The treatment of intrahepatic bile duct stones is mainly surgical operation, hepatectomy is the main treatment method.Due to the wide range of lesions, it is often necessary to combine such as biliary duct exploration, bile duct jejunal anastomosis and other surgical methods.In recent years, with the development and maturity of laparoscopic technology, the efficacy and safety of laparoscopic hepatectomy in the treatment of primary IHD has been gradually acknowledged.[3].

However, the high postoperative recurrence rate and residual stone rate of intrahepatic bile duct stones, and there is no effective method to prevent postoperative recurrence, making hepatolithiasis become a refractory disease in biliary surgery.Research shows that after surgical treatment of patients with hepatolith 8 years, the recurrence rate is as high as 30.9% [10], which means that most patients often require again even surgical treatment for many times. But,the history of intra-abdominal surgery has been considered a relative contraindication for laparoscopic surgery during the early years of use[11].Although previous studies had shown that laparoscopic repetitive liver resection is safe and feasible in patients with a history of upper abdominal surgery or even a history of hepatectomy, these studies rarely involve the disease of IHD[12-14].Patients with IHD usually have perihepatic adhesions, anatomic distortion of the hilar area and intrahepatic biliary structure, and fibrotic parenchyma,biliary cirrhosis and portal hypertension that may increase the operative diffificulty and risk of complications.This requires the operator to be highly skilled in laparoscopy and surgery.Therefore, for the choice of surgical methods for patients with recurrent hepatolithiasis, the vast majority of doctors still choose the more conservative traditional open surgery.The opposite is that Most patients have great fear of traditional surgery and often refuse to have another operation, which leads to deterioration of the condition and seriously affects the physical and mental health of the patients [15,16].With the popularization of minimally invasive concept, more and more patients are eager to get minimally invasive treatment.Whether patients with recurrent intrahepatic bile duct stones can undergo laparoscopic hepatectomy has become an urgent question to be answered.

We did not find any randomized controlled clinical trials that evaluated the efficacy of laparoscopic hepatectomy in patients with recurrent cholelithiasis.However, based on the development and improvement of laparoscopic technology and laparoscopic auxiliary instruments, laparoscopic hepatectomy has been applied in the treatment of patients with recurrent hepatolithiasis in some large medical centers, and relevant reports have been reported [17-18].We suggest collecting and summarizing

the data of these cases, which has a very high guiding significance for our follow-up clinical randomized controlled studies.

5. Our Conclusions

5.1 Implications for practice

An absence of relevant studies meant that results from this review could not recommend or refute the use of laparoscopic hepatectomy for the treatment of patients with recurrent intrahepatic bile duct stones.

5.2 Implications for research

Large-scale, well-established RCT studies are needed to evaluate the advantages and disadvantages of laparoscopic hepatectomy in the treatment of recurrent recurrent intrahepatic bile duct stones.The experimental design should take into account many factors such as the number of previous operations, the distribution of stones .

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Table

Table 1. The characteristics of excluded studies

The characteristics of excluded studies

study	Reason for exclusion
Ding[5] 2015	Patient selection: primary hepatolithiasis
Pu[6] 2014	Retrospective study; Operation method: laparoscopic biliary duct exploration
Tian[7] 2013	Retrospective study; Operation method: Laparoscopic biliary duct exploration

Figures

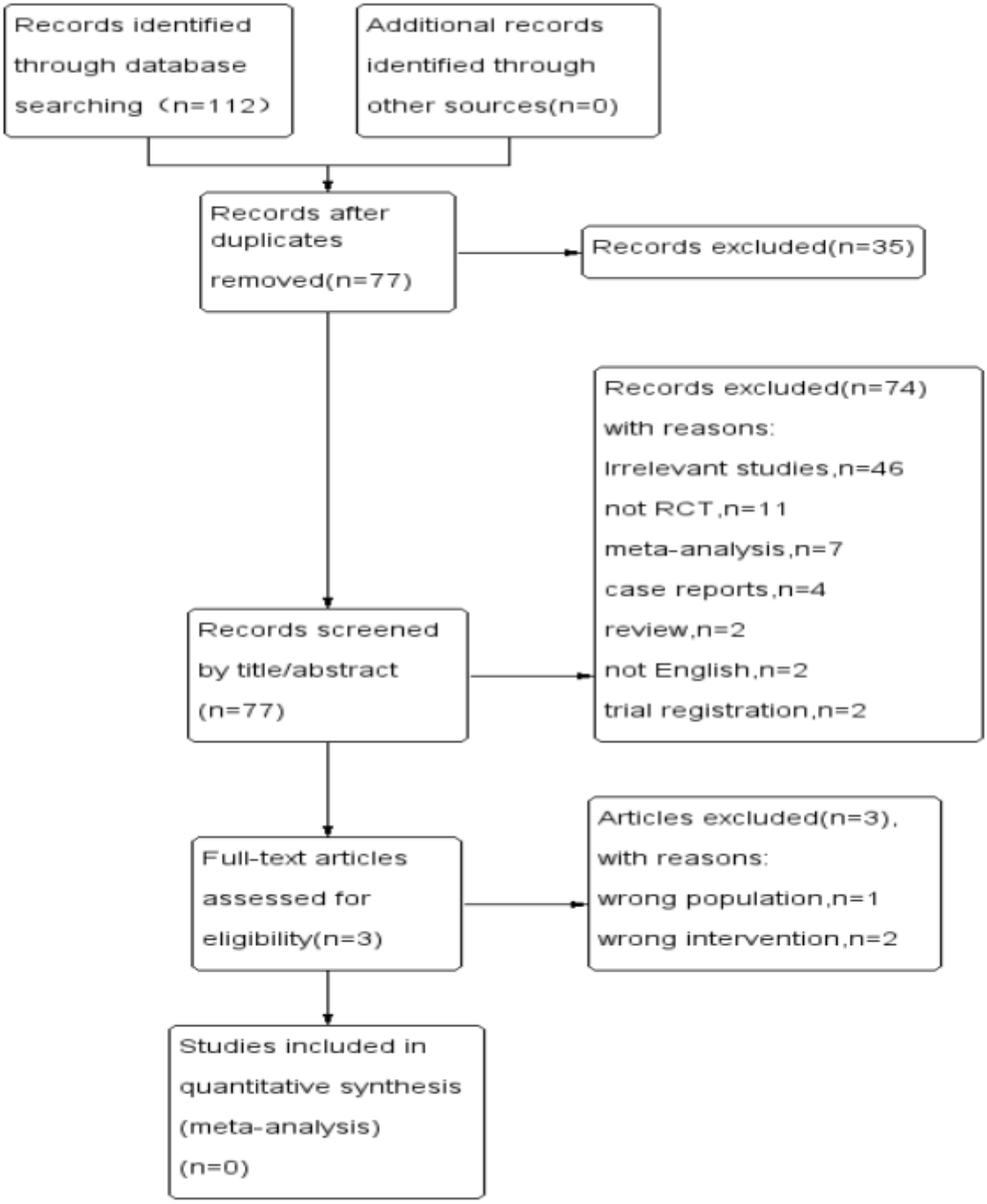

Figure 1. The literature selection process

Figure 1

The literature selection process