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Original Research Article

Laparoscopic versus open cholecystectomy

Norah Ahmed Al Mallohi[1]*, Moatez Khalaf Almofarreh[2], Basil Abdalruhman Alfarrah[3], Mohammed Basheer Albalbisi[4], Abdulrahim Mohammed Alamoudi[4], Mohammed Nasser Sharahili[5], Hanan Mohammed Alsharif[6], Rayan Mubarak M. Alomaim[7], Faris Adnan Mohammed Baawad[4], Abdulaziz Osama Abukhodair[4]

[1]Unaizah College of Medicine, Saudi Arabia
[2]Aljouf University, Saudi Arabia
[3]Almaarefa Colleges, Saudi Arabia
[4]King Abdulaziz University, Saudi Arabia
[5]King Saud bin Abdulaziz University for health sciences, Saudi Arabia
[6]Batterjee Medical College, Saudi Arabia
[7]Royal College of Surgeons, Ireland

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***Correspondence:**
Dr. Norah Ahmed Al Mallohi,
E-mail: norah.almallohi@hotmail.com

ABSTRACT

Background: Laparoscopic cholecystectomy has promptly emerged as a popular alternative to traditional open laparotomy and cholecystectomy. The Objective of the current meta-analysis is to evaluate the effect of Laparoscopic versus open cholecystectomy.
Methods: We conducted this meta-analysis using a comprehensive search of Cochrane database of systematic reviews, PubMed, Medline, EMBASE, and Cochrane central register of controlled trials till 15 March 2018 for studies that evaluated laparoscopic versus open cholecystectomy.
Results: Eleven studies have been included with a total of 80691 patients: 41485 in the laparoscopic and 39206 into the open cholecystectomy groups. Odds ratios were regularly on the side of laparoscopic operation, in terms of respiratory complications (OR=0.32, 95%CI: 0.34-2.64, p<0.0001), mortality (OR=0.19, 95%CI: 0.08-1.05, p<0.0001), and morbidity (OR=0.31, 95%CI: 0.11-0.45, p<0.0001).
Conclusions: Using laparoscopic cholecystectomy decreased morbidity, mortality, and respiratory complications rates. Large-scale and long-term randomized controlled trials in various populations must be carried out in future studies to deliver more significant evidence.

Keywords: Laparoscopic cholecystectomy, Open cholecystectomy, Surgery, Meta-analysis, Morbidity, Mortality

INTRODUCTION

The common indications for laparoscopic cholecystectomy are the same as those for the comparing open procedure. Despite the fact that laparoscopic cholecystectomy was initially saved for thin and young patients, it now is also presented to obese and elderly patients; actually, these concluding patients can advantage much more from surgery through small incisions.[1] Laparoscopic cholecystectomy has rapidly become the procedure of choice for routine gallbladder removal and is currently the most commonly performed major abdominal procedure in Western countries.[2] Trials have presented that laparoscopic cholecystectomy

patients in outpatient settings and those in inpatient settings recover equally well, indicating that a greater proportion of patients should be offered the outpatient modality.[3]

A critical concern for surgeons performing a laparoscopic cholecystectomy is whether and when the technique ought to be changed over to an open cholecystectomy.[4] Change to an open technique ought not to be viewed as a difficulty, and the likelihood that it will demonstrate fundamental or fitting ought to be examined with the patient preoperatively. In many arrangements, transformation rates are higher with emergency operations. Revealed rates range from 1.5% to 15%, with most examinations detailing rates around 5% in elective cases.[5]

Complete contraindications for laparoscopic cholecystectomy comprise an incapability to tolerate uncontrolled coagulopathy and general anesthesia. Patients with congestive heart failure or severe obstructive pulmonary disease might be better assisted with open cholecystectomy if cholecystectomy is completely required as they might not accept carbon dioxide pneumoperitoneum.[6]

The purpose of the current meta-analysis is to review the current literature comparing open and laparoscopic cholecystectomy in terms of morbidity, mortality, and pulmonary disease.

METHODS

Search methodology

We conducted this meta-analysis using a comprehensive search of Cochrane Database of Systematic Reviews, PubMed, MEDLINE, EMBASE, and Cochrane Central Register of Controlled Trials till 15 March 2018 for studies that evaluated laparoscopic versus open cholecystectomy. Reference lists of relevant articles were also searched for appropriate studies. There were no language or publication restrictions.

Data collection

Two reviewers screened abstracts according to predefined study inclusion criteria. Full text articles were retrieved and reviewed if a decision on inclusion could not be made solely based on the abstract. Any disagreements were resolved by consensus between the two reviewers.

Selection criteria

Studies were included in this meta-analysis if they fulfilled the following criteria:

Include a comparative study of LC and OC; and report cholecystectomy in terms of morbidity, mortality, and pulmonary disease. Studies were excluded if they did not meet the inclusion criteria. Flow diagram showing the selection criteria of assessed studies.[7]

Statistical analysis

The present meta-analysis utilized Stata version 12.0 software for statistical analysis. Mean Difference (MD) were calculated for continuous variables. Pooled odds ratios (OR) were calculated for discrete variables. Heterogeneity amongst the trials was determined by means of the Cochran Q value and quantified using the I^2 inconsistency test with a significance set at the P-value <0.10 or I^2 score >50% [8]. Whenever it was possible, results were evaluated either considering all the included studies or considering only the randomized trials.

RESULTS

We recognized 585 citations using the search strategy. Of these, we excluded 222 after examining the title and abstract including removal of duplicates. We retrieved and evaluated 17 articles in more detail, of which 6 articles were excluded, leaving 11 studies [9-19] that were eligible for inclusion (Figure 1). Major characteristics of included studies have been summarized in Table 1.

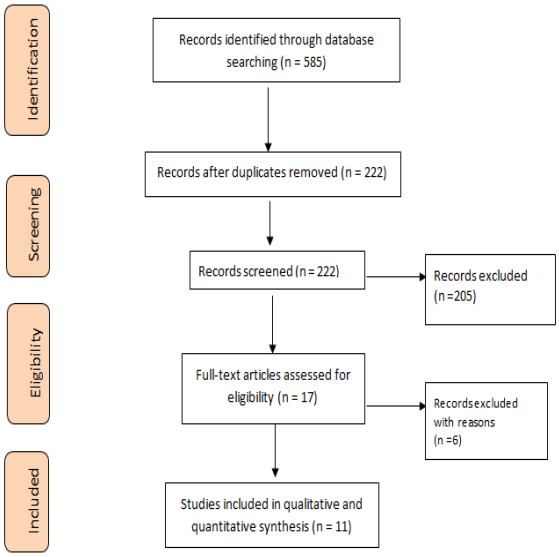

Figure 1: Flow diagram showing the selection criteria of assessed studies.[7]

Ten studies reported morbidity rates. 36718 patients were treated with open cholecystectomy and 31896 with laparoscopic cholecystectomy Table 2. There was no significant difference in heterogeneity among the studies (OR=0.31, 95% CI: 0.11-0.45, p<0.0001).

Five studies reported mortality rates. 38855 patients were treated with open cholecystectomy and 41105 with laparoscopic cholecystectomy Table 3. There was no significant difference in heterogeneity among the studies (OR=0.19, 95% CI: 0.08-1.05, p<0.0001).

Table 1: Summary of the included studies.

Study	year	Study design	Number of patients	Open cholecystectomy	Laparoscopic cholecystectomy
Samkoff[9]	1995	Prospective randomized	63920	34189	29731
Eldar[10]	1997	Retrospective with hystorical control-group	243	97	146
Kiviluoto[11]	2001	Retrospective	209	115	94
Tucker[12]	2011	Prospective randomized	11926	2402	9524
Johansson[13]	2005	Prospective randomized	70	35	35
Chau[14]	2002	Retrospective	73	42	31
Pessaux[15]	2001	Prospective non-randomized	139	89	50
Huang[16]	1996	Randomized Control Trial	27	12	15
Lucier[17]	1995	Prospective randomized	3907	2138	1769
Boo[18]	2007	Prospective randomized	33	15	18
Catena[19]	2012	Prospective randomized	144	72	72

Table 2: Morbidity in laparoscopic and open cholecystectomy.

	Laparoscopic		Open		Odds Ratio
Study	**Events**	**Total**	**Events**	**Total**	**95%, CI**
Samkoff[9]	252	29731	1523	34184	0.18 [0.16, 0.21]
Eldar[10]	24	146	25	97	0.57 [0.30, 1.07]
Kiviluoto[11]	1	32	13	31	0.04 [0.01, 0.37]
Johansson[13]	2	35	3	35	0.65 [0.10, 4.13]
Chau[14]	4	31	17	42	0.22 [0.06, 0.74]
Pessaux[15]	9	50	19	89	0.81 [0.33, 1.95]
Huang[16]	0	15	3	12	0.09 [0.00, 1.89]
Lucier[17]	200	1769	354	2138	0.64 [0.53, 0.77]
Boo[18]	0	15	2	18	0.21 [0.01, 4.80]
Catena[19]	24	72	25	72	0.94 [0.47, 1.87]
Total (95% CI)		31896		36718	0.31 [0.11, 0.45]
Total Events	516		1984		

Table 3: Morbidity in laparoscopic and open cholecystectomy.

	Laparoscopic		Open		Odds Ratio
Study	**Events**	**Total**	**Events**	**Total**	**95%, CI**
Samkoff[9]	252	29731	1523	34184	0.18 [0.16, 0.21]
Tucker[12]	67	9524	65	2402	0.25 [0.18, 0.36]
Chau[14]	0	31	3	42	0.18 [0.01, 3.60]
Pessaux[15]	0	50	4	89	0.19 [0.01, 3.57]
Lucier[17]	16	1769	116	2138	0.16 [0.09, 0.27]
Total (95% CI)		41105		38855	0.19 [0.08, 1.05]
Total events	335		1711		

Table 4: Respiratory complications in laparoscopic and open cholecystectomy.

	Laparoscopic		Open		Odds Ratio
Study	Events	Total	Events	Total	95%, CI
Samkoff[9]	1	50	2	89	0.89 [0.08, 10.04]
Eldar[10]	6	146	7	97	0.55 [0.18, 1.69]
Kiviluoto[11]	0	32	1	31	0.31 [0.01, 7.98]
Tucker[12]	871	29731	1751	34189	0.56 [0.51, 0.61]
Johansson[13]	0	35	1	35	0.32 [0.01, 8.23]
Chau[14]	1	31	6	42	0.20 [0.02, 1.75]

Continued.

	Laparoscopic		Open		Odds Ratio
Pessaux[15]	0	133	5	131	0.09 [0.00, 1.57]
Huang[16]	0	15	1	12	0.25 [0.01, 6.64]
Lucier[17]	25	1769	64	2138	0.46 [0.29, 0.74]
Boo[18]	0	15	1	18	0.38 [0.01, 9.93]
Catena[19]	4	72	5	72	0.79 [0.20, 3.06]
Total (95% CI)		32029		36854	0.32 [0.34, 2.64]
Total events	908		1844		

All studies reported data on respiratory complications. There was no significant difference in heterogeneity between the studies (I^2=0%) (Table 4). With the random effect model there were a reduction in pneumonia during the post-operative course with the laparoscopic approach (OR=0.32, 95%CI: 0.34-2.64, p<0.0001).

DISCUSSION

One study which provide homogeneity of patients and randomization of procedures, were in favor of laparoscopic cholecystectomy. Correspondingly, the results favored laparoscopic cholecystectomy in cholecystolithiasis, acute cholecystitis was relative homogeneity of the study populations of two studies, whereas both preferred the laparoscopic technique.[14-16] The current meta-analysis demonstrated that the overall morbidity rate was decreased with laparoscopic cholecystectomy when the intervention was performed in the same admission. Though cholecystectomy has a comparatively low operative mortality of 0.4–0.6% post-operative mortality is allied with emergency admission, co-morbid cardiorespiratory disease, and advanced age.[20,21] The current analysis presented the positive impact on mortality of laparoscopic cholecystectomy. In fact mortality rate was decreased by laparoscopic procedures.

The greater part of studies was of poor methodological quality, which can bias the outcomes for either technique. One study was of high methodological quality, accomplishing seven of 8 NOS stars. The authors tentatively included 139 patients with cholecystitis over a 7-year time period. They found a steady pattern for the laparoscopic arm considering the result measures of this study, even though statistical significance was not extended. Three examinations, which encompassed patients with comparable ASA score or potentially cardiopulmonary sickness, all reduced mortality, morbidity and rate of heart and respiratory difficulties.[14-16]

Initial evidence proposes diminished inflammatory reaction in laparoscopic cases when contrasted with open procedure, which may unfavorably influence aspiratory function.[22,23] This relation turns out to be more essential in the elderly, where useful reserves are diminished, and recurrent co-morbidities make postoperative recovery more complex.[24]

In the present analysis, respiratory complications were decreased by the use of laparoscopy. It seems that the bile leakage rate had no relation with the technique. Moreover, the positive impact on mortality of laparoscopic cholecystectomy. In fact mortality rate was decreased by laparoscopic technique. Recommendations for the prevention of bile duct injuries include early conversion of laparoscopic cholecystectomy to open cholecystectomy and the use of the critical view technique.[25]

Early laparoscopic cholecystectomy is recommended in mild cholecystitis. Early or delayed cholecystectomy might be certain for moderate cholecystitis however, early laparoscopic procedure ought to be completed only by highly experienced surgeons and promptly terminated by conversion to open procedure if operative conditions make anatomical identification difficult.

CONCLUSION

Using laparoscopic cholecystectomy decreased morbidity, mortality, and respiratory complications rates. Large-scale and long-term randomized controlled trials in various populations must be carried out in future studies to deliver more significant evidence. Severe hemorrhage and bile leakage rate are not influenced by the technique. Cholecystectomy in acute cholecystitis ought to be tried by laparoscopy at first.

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