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Laparoscopic cholecystectomy versus open cholecystectomy in elderly patients with acute cholecystitis: retrospective study

為患上急性膽囊炎的年老患者進行腹腔鏡膽囊切除術與開放式膽囊切除術的比較：回顧研究

Objective. To study the safety and efficacy of laparoscopic cholecystectomy for acute cholecystitis in elderly patients by comparing the results with open cholecystectomy.
Design. Retrospective study.
Setting. Regional hospital, Hong Kong.
Subjects and methods. Patients aged 75 years or older undergoing laparoscopic cholecystectomy for acute cholecystitis between January 1994 and December 1999 were selected from the database. The comparison group comprised patients from the same age-group who underwent open cholecystectomy for acute cholecystitis during the same period.
Main outcome measures. Operating time, hospital stay, morbidity, and mortality.
Results. Thirty-one patients underwent laparoscopic surgery and 42 had open surgery. The demographic data and co-morbidities were comparable between the two groups. The postoperative hospital stay was significantly shorter for patients undergoing laparoscopy (P=0.03). The overall morbidity rate was significantly lower for patients undergoing laparoscopy (P<0.05). There was, however, no statistical significant difference in the mortality rate. There was no major bile duct injury for patients in either group.
Conclusion. Laparoscopic cholecystectomy is a safe procedure for acute cholecystitis in elderly patients, resulting in fewer complications and shorter hospital stay than open cholecystectomy.

目的：透過與開放式膽囊切除術比較，研究腹腔鏡膽囊切除術的安全性和成效。
設計：回顧研究。
安排：香港一所地區醫院。
患者與方法：從資料庫中選取在1994年1月至1999年12月期間，因急性膽囊炎而要進行腹腔鏡膽囊切除手術的，年齡在75歲或以上的患者。對照組是在同一期間內，因急性膽囊炎而要進行開放式膽囊切除手術的相同年齡的患者。
主要結果測量：手術時間、住院時間、發病率和死亡率。
結果：31名患者進行了腹腔鏡膽囊切除手術，42名患者則進行了開放式膽囊切除手術。兩組的比較發現：人口統計學數據和發病率相約；進行腹腔鏡膽囊切除手術(P=0.03)的患者術後住院時間明顯較短，而且總發病率也明顯較低(P<0.05)。然而，兩組的死亡率在統計學上沒有顯著差別。此外，兩組患者均沒有嚴重的膽管損傷。
結論：對患有急性膽囊炎的年老患者而言，腹腔鏡膽囊切除手術是安全的；它比開放式膽囊切除手術較少引致併發症，而住院時間亦較短。

Key words:
Aged;
Cholecystectomy, laparoscopic;
Cholecystitis

關鍵詞：
年老的；
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Introduction

Acute cholecystitis is a serious surgical emergency for elderly patients. Laparoscopic cholecystectomy (LC) is the gold standard operation for uncomplicated cholecystolithiasis.[1] Several studies have also found that LC is a safe and efficient treatment approach for acute cholecystitis compared with open

cholecystectomy (OC).[2,3] The role of LC in acute cholecystitis in elderly patients, the majority of whom present with co-morbidity, has yet to be defined. Advanced age with concomitant medical conditions may be associated with increased postoperative complications and more frequent conversion to OC. Moreover, quick OC instead of a 'prolonged' laparoscopic procedure is generally the preferred approach. With the increasing age of the population, it is important to know the morbidity and mortality of LC for acute cholecystitis for elderly patients. The objective of this study was to determine the safety and efficacy of LC for acute cholecystitis in elderly patients aged 75 years or older by comparing the results with OC.

Subjects and methods

The database was reviewed for LC for acute cholecystitis between January 1994 and December 1999. Patients aged 75 years or older with acute cholecystitis undergoing LC were selected. Patients in the same age-group undergoing OC for acute cholecystitis during the same period were selected for comparison. Preoperative, intra-operative, and postoperative parameters were analysed and compared.

All the recruited patients were admitted in an emergency with a clinical picture of acute cholecystitis, including right upper quadrant abdominal pain and tenderness. The diagnosis of acute cholecystitis was further confirmed by ultrasound study with evidence of a thickened gallbladder wall and pericholecystic fluid. Patients diagnosed with acute cholangitis and those undergoing elective cholecystectomy with a pathological diagnosis of acute cholecystitis were excluded. All patients who were treated with intravenous antibiotics and early cholecystectomy at the time of admission to hospital, once the diagnosis was made, were selected for the study. Laparoscopic cholecystectomy was performed using a standard four-port technique and an additional port was used when indicated. Diet was resumed when bowel sounds returned.

Statistical methods

Nominal variables were compared using Chi squared test or Fisher's exact test, as appropriate. Ordinal variables were compared using Student's *t* test and Mann-Whitney *U* test, as appropriate. A two-sided level of 0.05 was accepted as significant. Comparisons between groups were on an intention-to-treat basis.

Results

Two hundred and ninety-six patients underwent cholecystectomy for acute cholecystitis from January 1994 to December 1999. During the same period, 10 patients with acute cholecystitis were treated by percutaneous cholecystostomy because their general medical conditions rendered them unsuitable for surgery. Of these 10 patients, six subsequently underwent interval cholecystectomy. Among the group undergoing cholecystectomy, 169 patients underwent LC with 31 patients aged 75 years or older, while 127 patients underwent OC with 42 patients aged 75 years or older. Of the 127 open procedures, 111 were performed by surgeons who were not experienced in laparoscopic surgery, and the majority of these were performed during the early period of the study. The selection of patients for laparoscopic or open surgery entirely depended on the experience of the operating surgeon at performing laparoscopic surgery—the age and medical condition of the patients had no influence on the treatment approach. The other reason for selecting OC instead of LC was previous complicated upper abdominal surgery (16 of 127 patients). Procedures such as omental patch repair of perforated peptic ulcer or truncal vagotomy and pyloroplasty were not considered to be contraindications for LC.

There were two consultants, three senior medical officers, and eight medical officers performing LC and two consultants, five senior medical officers, and nine medical officers performing OC. In the LC group, 22.6% (7/31) of procedures were performed by consultants, 22.6% (7/31) by senior medical officers, and 54.8% (17/31) by medical officers, and 16.7% (7/42), 19.0% (8/42), and 64.3% (27/42) of open procedures were performed by consultants, senior medical officers, and medical officers, respectively. The experience of the surgeons was comparable between the two groups.

The demographic data were comparable between the two groups. There was no statistical difference regarding the history of previous abdominal surgery, co-morbidity, and American Society of Anesthesiologists physical status score (Table 1). Hypertension and diabetes mellitus were the most common medical co-morbidities (Table 2).

Table 1. Patient characteristics

	Laparoscopic cholecystectomy	Open cholecystectomy	P value
Sex (M/F)	20/11	22/20	NS*
Mean age (SD) [years]	79.1 (4.2)	80.7 (4.6)	NS
Mean body weight (SD) [kg]	57.7 (10.9)	57.1 (8.0)	NS
Previous surgery	4 (12.9%)	10 (23.8%)	NS
Co-morbidity	16 (51.6%)	31 (73.8%)	NS
American Society of Anesthesiologists physical status score			
1	5 (16.1%)	0	NS
2	21 (67.7%)	24 (57.1%)	NS
3	4 (12.9%)	15 (35.7%)	NS
4	1 (3.2%)	3 (7.1%)	NS

* NS not significant

Table 2. Medical co-morbidities

	Patients undergoing laparoscopic cholecystectomy No. (%)	Patients undergoing open cholecystectomy No. (%)
Hypertension	9 (29.0)	14 (33.3)
Diabetes mellitus	9 (29.0)	13 (31.0)
Ischaemic heart disease	5 (16.1)	9 (21.4)
Cerebrovascular accident	4 (12.9)	4 (9.5)
Chronic obstructive airways disease	2 (6.5)	2 (4.8)
Renal impairment	0	2 (4.8)
Congestive heart failure	1 (3.2)	1 (2.4)

Table 3. Preoperative parameters

	Patients undergoing laparoscopic cholecystectomy No. (%)	Patients undergoing open cholecystectomy No. (%)	P value
Fever	21 (67.7)	27 (64.3)	NS*
Gallbladder mass	11 (35.5)	14 (33.3)	NS
Leukocytosis	19 (61.3)	32 (76.2)	NS
Deranged liver function	14 (45.2)	12 (28.6)	NS
Preoperative endoscopic retrograde cholangiopancreatography	8 (25.8)	2 (4.8)	<0.05
Intra-operative cholangiography	1 (3.2)	3 (7.1)	NS
Concurrent common bile duct stone	7 (22.6)	1 (2.4)	<0.05
Gallstone			
<1 cm	13 (41.9)	11 (26.2)	NS
≥1 cm	17 (54.8)	28 (66.7)	NS
acalculus	1 (3.2)	3 (7.1)	NS

* NS not significant

On admission to hospital, 67.7% of patients undergoing LC were febrile and 35.5% had a palpable gallbladder mass, while 64.3% were febrile and 33.3% had a palpable gallbladder mass in the OC group. There was no statistical difference regarding leukocytosis (61.3% versus 76.2% for the LC group versus the OC group) and abnormal liver function tests (45.2% versus 28.6% for the LC group versus the OC group). In the LC group, more endoscopic retrograde cholangiopancreatographies (ERCP) [25.8%] were performed and the incidence of common bile duct stone (22.6%) was significantly higher when compared with the OC group (2.4%) [P<0.05]. There was no difference between the two groups regarding the size of the gallstones and the incidence of acalculus cholecystitis (Table 3).

The rate of conversion to an open procedure among the LC group was 35.5% (11/31). The procedure was converted due to uncertain anatomy and slow progress for six patients. For four patients, the conversions were due to a gangrenous and perforated gallbladder, which made cephalic retraction impossible. Only one patient required open conversion for uncontrolled bleeding.

The intra-operative and postoperative parameters are summarised in Table 4. The mean duration between admission to hospital and operation was approximately 2 days, which was comparable between the two groups. The mean operating time was slightly longer for patients in the LC group (92.5 minutes) compared with patients in the OC group (84.8 minutes), but the difference was not statistically significant. More patients (19.0%; 8/42) in the OC group bled more than 500 mL when compared with patients in the LC group (6.5%; 2/31), but the difference was not statistically significant. Placement of a surgical drain was similar between the two groups (24 for patients having LC versus 27 for those having OC). There were significantly fewer patients requiring a nasogastric tube during and after the operation among patients in the LC group than in the OC group (8 versus 29) but this did not have any effect on the time to diet resumption. The mean postoperative hospital stay was 7.2 days for patients

Table 4. Intra-operative and postoperative parameters

	Laparoscopic cholecystectomy	Open cholecystectomy	P value
Duration* (hours)			
Mean	55.4	47.5	NS†
SD	27.5	29.4	NS
Range	12-120	15-142	NS
Mean operation time (SD) [minutes]	92.5 (25.5)	84.8 (41.0)	NS
Blood loss, >500 mL	2 (6.5%)	8 (19.0%)	NS
Drain	24 (77.4%)	27 (64.3%)	NS
Nasogastric tube	8 (25.8%)	29 (69.0%)	<0.01
Mean No. of days to resume diet (SD) [days]	2.2 (0.9)	2.7 (1.5)	NS
Mean No. of days for postoperative stay (SD) [days]	7.2 (3.2)	10.6 (6.1)	0.03

* Time between admission to hospital and operation
† NS not significant

Table 5. Pathology

	Patients undergoing laparoscopic cholecystectomy No. (%)	Patients undergoing open cholecystectomy No. (%)	P value
Acute cholecystitis	9 (29.0)	17 (40.5)	NS*
Acute on chronic cholecystitis	14 (45.2)	10 (23.8)	NS
Gangrene	7 (22.6)	12 (28.6)	NS
Carcinoma	1 (3.2)	3 (7.1)	NS

* NS not significant

Table 6. Complications of surgery

	Patients undergoing laparoscopic cholecystectomy No. (%)	Patients undergoing open cholecystectomy No. (%)	P value
Chest infection	1 (3.2)	6 (14.3)	NS*
Wound infection	1 (3.2)	6 (14.3)	NS
Myocardial infarction	0	4 (9.5)	NS
Cystic stump leakage	2 (6.5)	1 (2.4)	NS
Total	4 (12.9)	17 (40.5)	<0.05

* NS not significant

undergoing LC and 10.6 days for patients undergoing OC. The difference was statistically significant (P=0.03).

The pathology was comparable between the two groups (Table 5). The incidence of carcinoma of the gallbladder in acute cholecystitis was high (3.2% in the LC group and 7.1% in the OC group) among elderly patients.

The overall complication rate was 12.9% among patients in the LC group and 40.5% among patients in the OC group. The difference was statistically significant (P<0.05) [Table 6]. Most of the complications were minor such as chest and wound infections. Two patients in the LC group and one in the OC group had surgery complicated by cystic stump leakage, which was confirmed at postoperative ERCP. All three patients were successfully treated by endoprosthesis placement and percutaneous drainage of the intra-abdominal collection under ultrasound guidance. In the OC group, four patients had postoperative complications of myocardial infarction, two of whom eventually died. There was no statistical difference in the morbidity rate between patients in the conversion group (27.3%) and the OC group (40.4%).

There was no statistical difference in the mortality rate between patients in the LC group (0%) and those in the OC group (7.1%; 3/42). Of the three patients who died, two had postoperative myocardial infarction. The third patient had a background history of liver cirrhosis and bled profusely during the operation requiring extensive blood transfusion. This patient died of disseminated intravascular coagulopathy.

Discussion

Life expectancy has been steadily increasing during the past few decades. Factors contributing to these demographic changes include improvements in primary prevention, advances in acute medical care, and progress in pharmaceutical and biomedical technology.

The term 'elderly' is used in the medical literature to describe people older than 65 years. With an increasing life expectancy of more than 65 years, it is becoming harder to define the real 'old' and therefore 'high-risk' group of patients from the viewpoint of modern medicine. From statistics for Hong Kong between 1998 and 1999, 10.5% of the total population is older than 65 years and the overall life expectancy is 77.2 years for men and 82.6 years for women.[4] Patients aged 75 years or older therefore probably reflect the real high-risk group of surgical patients in developed countries. Two hundred and ninety-six patients underwent cholecystectomy for acute cholecystitis at the Department of Surgery at the Pamela Youde Nethersole Eastern Hospital between 1994 and 1999. The mean age was 60.4 years and almost half of the patients (48.3%) were 65 years or older. This is why patients aged 75 years or older were selected for this study to review the results of LC in elderly patients with acute cholecystitis.

The prevalence of cholelithiasis and the incidence of complications would be expected to increase with age, therefore biliary surgery is performed more frequently for elderly patients. There is no doubt that LC is the treatment of choice for elderly patients with symptomatic cholelithiasis since the outcomes are better than those of OC in terms of lower morbidity rate and shorter hospital stay.[5] A clear advantage of LC over OC for acute cholecystitis has been demonstrated in a randomised trial.[6] There is, however, quite marked regional and international variation in the practice of LC for acute cholecystitis. In clinical practice, patients with acute cholecystitis are substantially less likely to undergo LC than those with non-acute disease.[7] Such a low LC rate may be a reflection of the technical difficulty of the procedure, concern about increased risks of bile duct injury, and inexperience with advanced laparoscopic surgery. Given this background and the high prevalence of co-morbidity, elderly patients admitted in an emergency are less likely to undergo LC.[8] For elderly patients with acute cholecystitis in New England, US, the use of LC varies widely from 30.3% to 75.5%.[7] Despite the frequent co-morbidity of

patients, however, LC is still recommended as a safe procedure for elderly people with acute cholecystitis. Yet when compared with a younger age-group, elderly people are at higher risk for conversion, delayed recovery, and prolonged hospital stay.[9]

At the Department of Surgery at the Pamela Youde Nethersole Eastern Hospital, practice for surgery for acute cholecystitis is gained by treating early cholecystectomy. Laparoscopic cholecystectomy was introduced into the department in 1992, initially for elective cholelithiasis. This indication extended to acute cholecystitis in 1994. It has been demonstrated in randomised controlled trials that early LC for acute cholecystitis is feasible, safe, and beneficial in terms of shorter hospital stay compared with delayed LC.[10,11] With the development of laparoscopic skills and the advent of laparoscopic technology such as digital cameras, high-resolution monitors, ultrasonic dissectors, and various endoscopic staplers, advanced laparoscopic procedures have become feasible. Nowadays, LC is the first choice of treatment for all patients with acute cholecystitis at the Pamela Youde Nethersole Eastern Hospital. More surgeons have mastered the skills necessary for LC in acute cholecystitis during the study period, reflected by the decreasing rate of OC for acute cholecystitis from 65.2% in 1994 to 9.3% in 1999.

For elderly patients, many of whom have limited cardiopulmonary reserves, LC could increase the morbidity and mortality of surgery.[12] Although Behrman et al[13] demonstrated no incidences of hypotension and hypercarbia during the procedure in their series, they still recommend that LC is undertaken with caution for the elderly population with acute cholecystitis, who have a low threshold for either early conversion or primary OC.[13] In consideration of the limited cardiopulmonary reserves in elderly patients, we usually adjust the pneumoperitoneum pressure limit to 10 mm Hg instead of the 12 mm Hg normally used for younger patients. Due to the relatively lax muscle tone of elderly people, it is possible to obtain an adequate operating view using a pressure of 10 mm Hg.

Old age and acute cholecystitis are associated with a high conversion rate from LC to OC. The incidence of complications with OC increases with age, however.[14] Surgeons are concerned that the high conversion rate for elderly patients with acute cholecystitis may result in unacceptable high morbidity and mortality rates due to complications from both LC and OC. A study has shown, however, that morbidity rates for LC among elderly people were no higher than those among the younger age-group, both for elective and acute surgery.[15] Lujan et al[5] even demonstrated that the morbidity rate for LC among elderly people with acute cholecystitis is significantly lower than that for OC in the same population. Even though the conversion rate was higher for acute cholecystitis, the postoperative course of the conversion group was similar to that of patients undergoing OC, which is consistent with these results.[2]

One of the possible disadvantages of LC in acute cholecystitis is longer operating time when compared with OC.[3] It has been questioned whether there are any consequences of the prolonged operating and anaesthetic time. Firstly, operating time depends on the experience of the surgeon and the availability of advanced laparoscopic instruments. With the increasing experience of surgeons at performing laparoscopic surgery, it has been shown that the operating time is comparable between OC and LC for acute cholecystitis.[6] It has also been demonstrated in this study that, with a similar level of experience of the operating surgeons, the operating time is comparable between OC and LC.

Bile duct injury is another concern associated with LC in acute cholecystitis. The frequency of bile duct injury is 0.1% to 0.2% for OC and 0.3% to 0.6% for LC.[16] The incidence of bile duct injury in acute cholecystitis was reported to be higher in early studies.[17] The most common cause of major bile duct injury is mistaking the common bile duct for the cystic duct. In acute cholecystitis, the cystic duct is oedematous, shortened, and usually lying close to common bile duct, thereby endangering it. With increased knowledge and experience, however, the incidence of major bile duct injury at LC for acute cholecystitis is not particularly higher than that for elective surgery. In this study, there was no major bile duct injury for patients in either the LC or OC group.

Bile leakage (without overt bile duct injury) is the most common biliary tract complication of LC. Bile usually leaks from the cystic duct stump or accessory duct of Lushka. Sometimes, it is difficult to apply absorbable clips on a thickened cystic duct, as it may cause subsequent loosening and bile leakage. Using catgut ligature for the cystic duct stump is more reliable in the acute situation. Among patients in the LC group, the cystic duct stump was managed with an absorbable polydioxanone self-locking clip (PDS Absolok, AP401; Ethicon, Norderstedt, Germany) in the early study period, and this practice was changed to use catgut ligation (CATGUT plain, ETHI-ENDO-NAHT, EH 7326; Ethicon, Brussels, Belgium) in 1998. Among patients undergoing OC, the cystic duct stump was ligated with absorbable sutures (2/0 Vicryl; Ethicon, Brussels, Belgium). There were three cystic stump leakages in this series—two (6.5%) in patients in the LC group (one absorbable clip, one catgut ligature) and one (2.4%) in a patient in the OC group. Reoperation, however, is seldom required as this complication usually settles with endoprosthesis placement and percutaneous drainage of any intra-abdominal collection if a drain has not been inserted during surgery.

The prevalence of common bile duct stones identified during LC is less than 5%,[14] a considerably lower rate than that documented for OC (7%-15%).[18] The incidence of co-existing common bile duct stones is higher in acute cholecystitis and elderly patients. The true incidence of ductal stones, however, depends on whether preoperative or intra-operative cholangiography is routinely performed.

In this series, the incidence of ductal stones was significantly higher for patients in the LC group (22.6%) compared with those in the OC group (2.4%). This could be explained by the higher percentage of preoperative ERCP or intra-operative cholangiography for patients in the LC group (29.0%; eight preoperative ERCP and one intra-operative cholangiography) when compared with patients in the OC group (11.9%; two preoperative ERCP and three intra-operative cholangiography). More ductal stones may have been detected in patients in the OC group if more preoperative or intra-operative cholangiographies had been performed. These non-comparable data are the drawbacks of this retrospective study.

In the era of laparoscopic surgery, with increasing experience and the advent of new technology, old age is no longer a contraindication for LC for acute cholecystitis. This study demonstrates that the laparoscopic approach is more beneficial than the open surgery approach in terms of shorter hospital stay and lower morbidity rate. There is no major bile duct injury for patients in either the LC or OC group. Of course, the bias related to retrospective review and the small number of patients involved have to be taken into account while interpreting the results.

Conclusion

Laparoscopic cholecystectomy is a safe procedure for acute cholecystitis in elderly patients with a lower morbidity rate and shorter hospital stay than OC.

References

1. Cuschieri A, Dubois F, Mouiel J, et al. The European experience with laparoscopic cholecystectomy. Am J Surg 1991;161:385-7.
2. Eldar S, Sabo E, Nash E, Abrahamson J, Matter I. Laparoscopic versus open cholecystectomy in acute cholecystitis. Surg Laparosc Endosc 1997;7:407-14.
3. Lujan JA, Parrilla P, Robles R, Marin P, Torralba JA, Garcia-Ayllon J. Laparoscopic cholecystectomy vs open cholecystectomy in the treatment of acute cholecystitis: a prospective study. Arch Surg 1998;133:173-5.
4. Annual report 1998-1999. Hong Kong: Department of Health.
5. Lujan JA, Sanchez-Bueno F, Parrilla P, Robles R, Torralba JA, Gonzalez-Costea R. Laparoscopic vs. open cholecystectomy in patients aged 65 and older. Surg Laparosc Endosc 1998;8:208-10.
6. Kiviluoto T, Siren J, Luukkonen P, Kivilaakso E. Randomised trial of laparoscopic versus open cholecystectomy for acute and gangrenous cholecystitis. Lancet 1998;351:321-5.
7. Laycock WS, Siewers AE, Birkmeyer CM, Wennberg DE, Birkmeyer JD. Variation in the use of laparoscopic cholecystectomy for elderly patients with acute cholecystitis. Arch Surg 2000;135:457-62.
8. Hannan EL, Imperato PJ, Nenner RP, Starr H. Laparoscopic and open cholecystectomy in New York State: mortality, complications, and choice of procedure. Surgery 1999;125:223-31.
9. Lo CM, Lai EC, Fan ST, Liu CL, Wong J. Laparoscopic cholecystectomy for acute cholecystitis in the elderly. World J Surg 1996;20:983-7.
10. Lo CM, Liu CL, Fan ST, Lai EC, Wong J. Prospective randomized study of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. Ann Surg 1998;227:461-7.
11. Lai PB, Kwong KH, Leung KL, et al. Randomized trial of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. Br J Surg 1998;85:764-7.
12. Westerband A, Van De Water J, Amzallag M, et al. Cardiovascular changes during laparoscopic cholecystectomy. Surg Gynecol Obstet 1992;175:535-8.
13. Behrman SW, Melvin WS, Babb ME, Johnson J, Ellison EC. Laparoscopic cholecystectomy in the geriatric population. Am Surg 1996;62:386-90.
14. The Southern Surgeons Club. A prospective analysis of 1518 laparoscopic cholecystectomies. N Engl J Med 1991;324:1073-8.
15. Tagle FM, Lavergne J, Barkin JS, Unger SW. Laparoscopic cholecystectomy in the elderly. Surg Endosc 1997;11:636-8.
16. Strasberg SM, Hertl M, Soper NJ. An analysis of the problem of biliary injury during laparoscopic cholecystectomy. J Am Coll Surg 1995;180:101-25.
17. Kum CK, Goh PM, Isaac JR, Tekant Y, Ngoi SS. Laparoscopic cholecystectomy for acute cholecystitis. Br J Surg 1994;81:1651-4.
18. Perissat J, Huibregtse K, Keane FB, Russell RC, Neoptolemos JP. Management of bile duct stones in the era of laparoscopic cholecystectomy. Br J Surg 1994;81:799-810.