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Complications of laparoscopic cholecystectomy in the ageing patient

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Abstract

Aim: to determine the safety of simple laparoscopic cholecystectomy in ageing patients.
Method: the outcome of patients between 60 and 70 years of age and patients over 70 who underwent laparoscopic cholecystectomy for symptomatic non-malignant gallbladder disease was comparatively analysed. All patients over 60 years of age with symptomatic gallbladder disease and without cholecholithiasis, septic shock, diffuse peritonitis, gallbladder malignancy, portal hypertension or contraindication for general anaesthesia were selected for simple laparoscopic cholecystectomy ($n = 158$). This group represents over 80% of all elderly patients undergoing biliary surgery at our department over this period. Group A ($n = 97$) included patients from 60 to 69 years of age. Group B ($n = 61$) comprised patients over 70 years.
Results: there was no difference in sex distribution between groups. Operative time and conversion rates were similar in both groups. The overall morbidity rate was 14.5%, with no statistically significant increase in group B (11% for group A *vs* 20 % for group B). No perioperative mortality occurred. Recurrent biliary surgery was required in two patients from group B (3%). Postoperative endoscopic retrograde cholangiography and sphincterotomy was done in four patients from group A (4%). The mean postoperative stay was longer for older patients (group A, 3.1 (2.5) days; group B, 4.2 (4.3) days; $P = 0.05$).
Conclusion: simple laparoscopic cholecystectomy is safe in the aged, even for patients over 70. This procedure is associated with a short hospital stay and low rates of re-admission and recurrent biliary surgery.

Keywords: *laparoscopic cholecystectomy, age, ageing patients, complications*

Introduction

Laparoscopic cholecystectomy is now the treatment of choice for symptomatic cholelithiasis [1].

Age is one of the critical factors affecting the mortality and morbidity rates after open cholecystectomy for both acute and chronic cholecystitis [2, 3]. Several series of open cholecystectomy [4, 5] report death as a complication occurring almost exclusively in patients over 60 years of age [6]. Smith and Max [7] found that the morbidity-mortality rate after open cholecystectomy was 25% for patients aged 60-69 as opposed to 50% for patients over 70.

Ageing patients with symptomatic cholelithiasis frequently have associated medical disorders. They may be at higher risk of postoperative complications. Age has been identified as the only significant factor increasing the morbidity rate after laparoscopic cholecystectomy in a recent retrospective multivariate analysis [8]. Evaluation of the results of the laparoscopic approach in the aged would allow our patients and ourselves to make decisions on the most appropriate treatment for symptomatic cholelithiasis.

We have assessed the outcome of laparoscopic cholecystectomy in patients over 70 and compared with those between 60 and 69 who underwent laparoscopic cholecystectomy in our institution over the same period.

Patients and methods

Ageing patients who presented with jaundice, choledocholithiasis, diffuse peritonitis, septic shock or biliary malignancy were not considered for simple laparoscopic cholecystectomy. Patients with portal hypertension or any contraindication for general anaesthesia were also excluded. A four-trochar technique (as described elsewhere [9]) was used for the cholecystectomy. Compression stockings and low molecular weight heparin were used in most cases for prevention of postoperative thrombo-embolic disease [10]. Intra-operative cholangiography (IOC) was used on a selective basis [9].

Analysis of the postoperative outcome included intraoperative and postoperative complications, operation

time, conversion rate to open cholecystectomy, recurrent biliary tract surgery, postoperative endoscopic retrograde cholangiography (ERC), death within 30 days after surgery and length of postoperative hospital stay. Since all patients were entered on an intention-to-treat basis, patients converted to open cholecystectomy were not excluded from the analysis. Patients were systematically followed after surgery at our outpatient clinic by surgeons who were not aware of patients being included in the ongoing study. Sixteen individuals (10%) were lost to follow-up after the 1 year visit. Complications were stratified using a four-grade classification [11] after data collection.

Data on all patients were prospectively collected by one of the investigators and entered into a database using a Intel 486 computer and Rsigma software package (Horus Hardware SA, Spain). Patients over 60 were divided into two groups: group A comprised patients between 60 and 69 and group B comprised patients over 70 years. Morbidity rate was calculated using the overall number of complications instead of the number of patients with this outcome. Based on a previous report comparing the outcome of open cholecystectomy in patients over 60 [7], an increase in the mortality-morbidity rate from 25% in group A to 50% in group B was predicted. Our sample size would allow us to detect such a difference with a one-sided 5% significance and a power of 91%. Quantitative data are presented as mean values (with standard deviations). Qualitative data are presented as percentages. χ^2, Fisher's exact, Student's t and Mann-Whitney U tests were used as appropriate. Statistical significance was defined as $P < 0.05$.

Results

Until January 1995, laparoscopic cholecystectomy was attempted on 158 individuals aged over 60 at our department. The average age was 64 years for patients in group A ($n = 97$) and 75 years in group B ($n = 61$). Sex distribution was similar in both groups (group A, 76% female, $n = 74$; group B, 79% female, $n = 48$). In both groups the most common associated medical disorders were heart disease, diabetes mellitus and cirrhosis (Table 1). Older patients had a higher frequency of heart disease. Biliary colic was the commonest presenting symptom, followed by acute cholecystitis and acute pancreatitis (Table 2). Ultrasound examination was routinely used in the assessment of the biliary tract. Cholelithiasis was found in 156 cases (99%) and gallbladder polyps in two (1%).

IOC identified common bile duct (CBD) stones in two individuals from group A (1%). They were considered suitable candidates for postoperative ERC and stone extraction; laparoscopic cholecystectomy was therefore completed. Two patients in group B (3%) were converted to open surgery for exploration of a dilated CBD. T-tube drainage and choledochoduodenostomy were used to close the duct. Overall, 20 patients were converted to laparotomy. Younger individuals had a lower conversion rate, although no statistical significance was found (group A rate, 10%; group B rate, 16%). In both groups, the most frequent cause of conversion was a difficult dissection of the area due to adhesions and/or fibrotic gallbladders (9% for group A; 13% for group B), followed by CBD exploration (0 for group A; 3% for group B) and bleeding from the cystic artery (1% for group A; 0 for group B). Operative time was not prolonged in older patients: the mean duration of laparoscopic cholecystectomy for patients under 70 years was 101 (40) min, whereas for patients over 70 it was 97 (32) min.

Table 1. Preoperative findings

	No. (and %) of patients		
	Group A	Group B	P
Obesity (BMI > 27.2)	42 (43)	34 (56)	NS
Prior abdominal surgery	21 (22)	16 (26)	NS
Heart disease	16 (16)	21 (34)	< 0.05
Lung disease	2 (2)	5 (8)	NS
Diabetes mellitus	13 (13)	5 (8)	NS
Cirrhosis	9 (9)	9 (15)	NS

BMI, body mass index; NS, not significant.

Complications are shown in Table 3. Most of them occurred intraoperatively or within 30 days of surgery (19 out of 23; 83%). The overall morbidity rate was 14.5%. Patients over 70 years of age had a higher morbidity rate compared with the younger group, but this difference did not achieve statistical significance. Minor complications (lower urinary tract infections, umbilical wound infections and haematoma) occurred within the first 7 days and were diagnosed before discharge or at the first postoperative visit (7 days after surgery) and required neither re-admission nor prolonged convalescence.

Non-fatal pulmonary embolism was the only serious medical complication among patients in group B and in

Table 2. Presenting symptoms

	No. (and %) of patients		
	Group A	Group B	P
Biliary colic	74 (76)	42 (69)	NS
Acute cholecystitis	19 (20)	13 (21)	NS
Acute pancreatitis	4 (4)	6 (10)	NS

NS, not significant.

Table 3. Complications of laparoscopic cholecystectomy in the aged

	No. (and %) of patients	
	Group A ($n = 97$)	Group B ($n = 61$)
Grade 1		
Low urinary tract infection	2 (2%)	-
Umbilical wound infection	1 (1%)	2 (3%)
Haematoma	3 (3%)	1 (1.6%)
Postoperative delirium	-	1 (1.6%)
Grade 2a		
Haemorrhage (cystic artery)	1 (1%)	-
Small bowel laceration	-	1 (1.6%)
Laparotomy infection	-	1 (1.6%)
Bile leak	-	2 (3%)
Pulmonary embolism	-	1 (1.6%)
Grade 2b		
Umbilical hernia	2 (2%)	1 (1.6%)
Common bile duct injury	-	1 (1.6%)
Peritonitis (T-tube removal)	-	1 (1.6%)
Retained stones	2 (2%)	-
Grade 3	-	-
Grade 4	-	-
Total[a]	11 (11%)	12 (20%)

[a] No statistically significant difference.

the series as a whole. As previously reported [10], it occurred 2 days after laparoscopic cholecystectomy and was diagnosed by means of chest x-ray and scintigraphic scan; continuous i.v. heparin was administered and the patient recovered. Since then, a protocol combining low molecular weight heparin and transoperative compression of the lower limbs was initiated [10].

Bile leakage occurred in two patients over 70 (3%). The diagnosis of biliary leakage was made by hepatobiliary scintigraphic scan, which showed a patent biliary tract in both cases. A liver bed leak and a duodenal injury were the most likely causes, and the latter was radiologically confirmed. These complications were managed non-operatively because suction drains had been left in place and adequate drainage was demonstrated ultrasonographically. The leaks resolved and the patients were discharged 14 days and 25 days after operation. Retained CBD stones were suspected postoperatively in two patients under 70 years (2%). In both of them IOC had been attempted, resulting in one failure in cannulating the cystic duct and one normal cholangiogram. ERC was successfully used for the diagnosis and retrieval of the stones at days 7 and 95 after laparoscopic cholecystectomy.

Re-operation was required in five patients (3%). In group A two individuals developed umbilical wound hernias which were subsequently repaired. In group B one complete transection of the common hepatic duct and one diffuse peritonitis after T-tube removal required operative treatment. Another patient developed an umbilical hernia requiring re-operation.

The mean postoperative hospital stay for the entire group was 3.4 days. (This includes patients who went on to laparotomy.) The mean hospitalization time was longer in older patients (group A, 3 days; group B, 4 days; $P < 0.05$).

Discussion

Symptomatic benign gallbladder disease is not uncommon in ageing patients. Old age is one of the critical factors affecting the morbidity and mortality rates after biliary surgery [2, 3]. The aim of any therapeutic approach in this age group should be to cure the disease with the fewest number of complications. Moreover, a rapid recovery with the fastest return to normal activity should be achieved since expectancy of life is shorter.

Since the initial description by Mühe [12], age has never been a contraindication for laparoscopic cholecystectomy [13], although the laparoscopic approach was initially reserved for low-risk patients [2]. In our experience, ageing patients represent nearly 50% of the individuals referred for laparoscopic cholecystectomy: 20% of patients undergoing this procedure at our

institution are 70 or older. This age distribution is consistent with that found in recent series of open cholecystectomy [14, 15]. Thus, we feel that our results reflect the current view of the laparoscopic approach for uncomplicated symptomatic cholelithiasis in the aged.

Escarce *et al.* [16] have reported that 30-day mortality levels for elderly patients undergoing simple open cholecystectomy in the pre-laparoscopic era were 1.6 and 1.8%, with and without IOC. Although we had no 30-day postoperative deaths, any significant reduction in mortality cannot be inferred because patients with diffuse peritonitis or septic shock were excluded from the laparoscopic approach and also because of the difference in the number of patients between studies. However, our results confirm that laparoscopic cholecystectomy can be carried out with almost no perioperative mortality in the aged.

Acknowledging the limitations of comparing negative outcomes between studies [17], we have tried to stratify complications [10] to allow future comparison with data from other series. The reported morbidity rate for simple open cholecystectomy (without CBD exploration) in the general population ranges from 5% [18] to 18% [15]. These figures rise to 19% for elderly patients [18]. The overall morbidity rate for both groups is comparable to these figures. Similar results have been reported by Fried *et al.* [17].

Although no statistically significant difference in the morbidity rate between groups was found, complications in the group of patients over 70 were more severe than those in the younger group. This finding is consistent with the reported association between age and a higher morbidity rate after laparoscopic cholecystectomy [8]. Nonetheless, our observed increase in the morbidity rate from 11 to 20% is less than the reported rise from 25 to 50% for the same age groups after open cholecystectomy [7].

Medical complications were rare after laparoscopic cholecystectomy and only one systemic complication occurred: non-fatal pulmonary embolism [10]. Interestingly, no patient developed any respiratory or cardiac complication, whereas technical complications appeared to be increased as opposed to the reported incidence after open cholecystectomy [2]. This observation has been made by others [19-21]. This shift in the nature of postoperative morbidity has been attributed to the learning curve of the procedure. Further reductions in the number of major technical complications should be achieved through improvements in surgical training [22].

CBD injuries are of concern in laparoscopic cholecystectomy. Only one patient sustained this complication (0.2%). No delayed CBD stricture has been identified during the follow-up. This rate is consistent with those reported for laparoscopic cholecystectomy [20, 21] and even for open cholecystectomy [18]. Thus, laparoscopic cholecystectomy is not associated with a higher rate of CBD injuries in the aged, despite the effects of acute and chronic inflammation on anatomical structures.

Recurrent biliary surgery is another important factor in the assessment of outcome after open cholecystectomy. Our figures are slightly higher than those reported for simple cholecystectomy and for cholecystectomy with IOC [16]. The value of routine cholangiography during laparoscopic cholecystectomy remains controversial [23-26] and inconclusive data have been reported on the rate of unsuspected stones in the CBD diagnosed by means of IOC [27, 28]. In our experience, a selective approach yielded good results.

Although postoperative length of stay is an important indicator of resource use [29], it should not be used as a decisive indicator of outcome after surgical treatment. While short convalescence can be achieved in ageing patients [18], increasing age in patients undergoing open cholecystectomy has been associated with increased length of stay [29]. In our study, the mean postoperative hospitalization of both groups is significantly shorter than that reported for simple open cholecystectomy in the general population [15, 29]. However, older patients had a longer hospitalization time, reflecting a higher conversion rate and more severe postoperative complications.

In conclusion, simple laparoscopic cholecystectomy is a safe procedure in the aged with symptomatic benign gallbladder disease. Patients over 70 did not have a significant increase in either morbidity or mortality compared with patients one decade younger. This approach offers a short postoperative hospital stay and a low rate of re-admissions or recurrent surgery for complications. Therefore, laparoscopic cholecystectomy should be considered the treatment of choice in the ageing patient with uncomplicated cholelithiasis.

Key points

- For patients over 70 with symptomatic benign gallbladder disease, laparoscopic cholestectomy is relatively safe.
- Patients over 70 have a higher morbidity than those aged 60-70, with technical complications being the most common cause.
- This procedure requires a short stay in hospital and is associated with low rates of re-admission and recurrent biliary surgery.

References

1. Airan M, Appel M, Berci G, Coburg AJ, *et al.* Retrospective and prospective multi-institutional laparoscopic cholecystectomy study by the Society of American Gastrointestinal Endoscopic Surgeons. Surg Endosc 1992; 6: 169-76.

2. Deziel DJ. Complications of cholecystectomy. Surg Clin N Am 1994; 74: 809-23.

3. McSherry CK, Glenn F. The incidence and causes of death following surgery for non malignant biliary tract disease. Ann Surg 1980; 191: 271-5.

4. Ganey JB, Johnson PA Jr, Prillaman PE, McSwain GR. Cholecystectomy: clinical experience with a large series. Am J Surg 1986; 151: 352-7.

5. Herzog U, Messmer P, Sutter M, Tondelli P. Surgical treatment for cholelithiasis. Surg Gynecol Obstet 1992; 175: 238-42.

6. Macintyre IMC, Wilson RG. Laparoscopic cholecystectomy. Br J Surg 1993; 80: 552-9.

7. Smith N, Max MH. Gallbladder surgery in patients over 60: Is there an increased risk? South Med J 1987; 80: 472-4.

8. Jatzko GR, Lisborg PH, Pertl AM, Stettner HM. Multivariate comparison of complications after laparoscopic cholecystectomy and open cholecystectomy. Ann Surg 1995; 221: 381-6.

9. Mayol J, Tamayo FJ, Ortiz-Oshiro E, Ortega López D, Vincent Hamelin E, Alvarez Fernández-Represa J. Resultados de la colecistectomía laparoscópica en pacientes ancianos. Cir Esp 1995; 55; 45-7.

10. Mayol J, Vincent E, Martinez-Sarmiento J, Ortiz Oshiro E, Diaz Gonzalez J, Tamayo FJ, et al. Pulmonary embolism following laparoscopic cholecystectomy. Surg Endosc 1994; 8: 214-7.

11. Clavies PA, Sanabria JR, Strasberg SM. Proposed classification of complications of surgery with examples of utility in cholecystectomy. Surgery 1992; 111: 518-6.

12. Mühe E. Die erste Cholezystektomie durch das Laparoskop. Langeb Arch Klin Chir 1986; 369: 804.

13. Reddick EJ, Olsen DO. Laparoscopic laser cholecystectomy. Surg Endosc 1989; 3: 131-3.

14. Callagham J. Twenty-five years of gallbladder surgery in a small rural hospital. Am J Surg 1995; 169: 313-5.

15. Davies MG, O'Broin E, Mannion C, McGinley J, Gupta S, Shine MF, Lennon F. Audit of open cholecystectomy in a district general hospital. Br J Surg 1992; 79: 314-6.

16. Escarce JJ, Shea JA, Chen W, Qian Z, Schwartz JS. Outcomes of open cholecystectomy in the elderly: a longitudinal analysis of 21,000 cases in the prelaparoscopic era. Surgery 1995; 117: 156-64.

17. Fried GM, Clas D, Meakins JL. Minimally invasive surgery in the elderly patient. Surg Clin N Am 1994; 74: 375-87.

18. Gilliland TM, Traverso LW. Modern standards for comparison of cholecystectomy with alternative treatments for symptomatic cholelithiasis with emphasis on long term relief of symptoms. Surg Gynecol Obst 1990; 170: 39-44.

19. Branum G, Schmitt C, Baillie J, Suhocki P, Baker M, Davidoff A, et al. Management of major biliary complications after laparoscopic cholecystectomy. Ann Surg 1993; 217: 532-41.

20. Deziel DJ, Millikan WK, Economou SG, Doolas A, Ko ST, Airan MC. Complications of laparoscopic cholecystectomy of 4,292 hospitals and an analysis of 77,604 cases. Am J Surg 1993; 165: 9-14.

21. Southern Surgeons group. A prospective analysis of 1518 laparoscopic cholecystectomies. N Engl J Med N 1991; 324: 1073-8.

22. Yamashita Y, Kurohiji T, Kakegawa T. Evaluation of two training programs for laparoscopic cholecystectomy: incidence of major complications. World J Surg 1994; 18: 279-85.

23. Barkum AN, Barkun JS, Fried GM, Ghitulescu G, Steinmetz O, Pham C, et al. Useful predictors of bile duct stones in patients undergoing laparoscopic cholecystectomy. Ann Surg 1994; 220: 32-9.

24. Berci G, Morgenstern L. Laparoscopic management of common bile duct stones. Surg Endosc 1994; 8: 1168-75.

25. Hainsworth PJ, Rhodes M, Gompertz RHK, Armstrong CP, Lennard TWJ. Imaging of the common bile duct in patients undergoing laparoscopic cholecystectomy. Gut 1994; 35: 991-5.

26. Voyles CR, Sanders DL, Hogan R. Common bile duct evaluation in the era of laparoscopic cholecystectomy. 1050 cases later. Ann Surg 1994; 219: 744-52.

27. Mayol J, Alvarez Fernández-Represa J. Imaging of the common bile duct [Letter]. Gut 1994; 35: 1773.

28. McSherry CK. Laparoscopic management of common bile duct stone [Editorial]. Surg Endosc 1994; 8: 1161-2.

29. Cullen DJ, Apolone G, Greenfiled S, Guadagnoli E, Cleary P. ASA physical status and age predict morbidity after three surgical procedures. Ann Surg 1994; 220: 3-9.

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