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Gallstone recurrence after minimally-invasive cholecystolithotomy with gallbladder reservation: a follow-up of 720 cases

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Abstract. – OBJECTIVE: To discuss the hazards of cholecystolithiasis recrudesce after cholecystolithotomy with gallbladder reservation; To provide a theoretical basis for reducing the recurrence rate of gallstone.

PATIENS AND METHODS: The patients who were followed up for at least one year after minimally-invasive operation with gallbladder reservation because of cholecystolithiasis were selected. In this population, the patients with recurrence after surgery were as the case group, those patients with no recurrence after surgery were as the control group. Through collection of general data of selected cases, relevant information of Ultrasound Examinations of gallbladder and history data of the patients questionnaires were completed. Relevant factors of gallstone recurrence of patients, were observed through statistic analysis. Main factors go as follows: gender, age, nation, career, BMI, whether or not the patient had the history of chronic superficial gastritis, and regulation of gallbladder emptying function, family history, etc. The information of selected cases is complete.

RESULTS AND CONCLUSIONS: The main hazards of cholecystolithiasis recurrence were BMI, family history of gallstone disease, and emptying function of gallbladder.

Key Words:
Cholecystolithiasis, Cholecystolithotomy with gallbladder reservation, Hazard, Case-control study.

Introduction

Gallstone disease is one of the most prevalent gastrointestinal diseases with a substantial burden to health care systems that is supposed to increase in aged populations at risk[1,2]. The pathogenesis of gallstone disease involves adhesions forming between the inflamed gallbladder and an adjacent part of the gastrointestinal tract. Subsequently, large stones within the gallbladder cause pressure necrosis, resulting in formation of a cholecyst-enteric fistula, which allows gallstones direct access to the gut. Diehl[3] reported that cholesterol gallstones account for 80-90% of the gallstones found at cholecystectomy in Western societies. Etiology and pathogenesis of cholesterol gallstones are still not well defined, but three mechanisms are of major importance, cholesterol supersaturation, gallbladder hypomotility and kinetic, pro-nucleating or anti-nucleating factors[4]. The multifactorial pathogenesis of cholesterol gallstone has been widely accepted, and the relative significance of various factors remains to be clarified.

In 1988, Kellett et al[5] first described a technique of transperitoneal, endoscopic, percutaneous cholecystolithotomy for the treatment of gallstones. Recurrence is a major problem with all forms of gallstone treatment that leave the gallbladder in situ. Stone recurrence after bile acid therapy occurs in approximately 50% of patients within five years and then reaches a plateau of 61% by the 11th year[6,7].

In this report, we present 720 cases cholecystolithiasis after minimally-invasive cholecystolithotomy with gallbladder reservation, who were admitted from January 2009 to January 2012 in our hospital. By single factor Logistic regression analysis, we evaluated the main hazards of cholecystolithiasis recurrence.

Patients and Methods

Our hospital had admitted 720 cases cholecystolithiasis after minimally-invasive cholecystolithotomy with gallbladder reservation from January 2009 to January 2012. 22 cases were underwent laparoscopic cholecystectomy because cystic duct stones can not be removed completely. 8 patients were underwent cholecystectomy be-

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Table I. General information.

		Case group	Control group				
		N=68	N=204	χ^2	*p*	OR	95%CI
gender	male	29	83	0.081	0.776	1.084	0.622-1.890
	female	39	121				
age	18-40	27	91	0.449	0.480	0.818	0.468-1.430
	40-65	41	113				

Table II. Relations of BMI and gallstone recurrence.

	Case group	Control group				
	N=68	N=204	χ^2	*p*	OR	95%CI
Nomal	32	64	5.495	0.019	1.944	1.110~1.152
Obesity	36	140				3.406~3.461

Table III. Relations of gallbladder emptying function and stone recurrence.

Index	Case group	Control group	*t*	*p*
FV (ML)	60.17 ± 9.23	41.62 ± 7.58	14.975	0.000
RV (ML)	25.13 ± 6.32	12.18 ± 7.46	12.855	0.000
E (%)	57.28 ± 7.68	69.13 ± 2.37	12.526	0.000

cause of acute cholecystitis. Five cases were removed gallstone by duodenoscopy because of concurrent choledocholithiasis. 15 cases had not been examined the gastrointestinal hormones before operation. 29 cases failed to followed up. 68 patients were diagnosised stone recurrence by B ultrasound in more than 1 year follow-up period.

We collected 68 cases of gallstone recurrence in patients as case group. 204 cases from other 573 cases as a control group randomly (Table I). We investigated the same questionnaire to all of the cases. Topics covered include the general situation, diet, behavior, family history of cholelithiasis and other indicators.

Statistical Analysis

Comparisons among means of groups were determined by one-way analysis of variance post hoc with Bonferroni correction. Analyses were performed with SPSS (SPSS Inc., Chicago, IL, USA). p values < 0.05 were considered statistically significant.

Results

Relations of BMI and stone recurrence

Obese patients showed the highest proportion of gallstone recurrence after cholecystolithotomy (Table II).

Relations of gallbladder emptying function and stone recurrence .

Case group's fasting gallbladder volume, postprandial minimal gallbladder residual volume were higher than control group, but gallbladder emptying rate is lower than control group (Table III).

Relations of family history of cholelithiasis and gallstone recurrence.

Gallstone recurrence after surgery was significantly higher to the patients who had family history of cholelithiasis, and OR = 3.454 (Table IV).

Relations of diet and gallstone recurrence

Case group who had greasy food was higher than the control group in stone recurrence (p > 0.05), but the difference was not statistically signif-

Table IV. Relations of family history of cholelithiasis and gallstone recurrence.

	Family history of cholelithiasis						
	Yes (%)	No (%)	Total	χ^2	*p*	OR	95%CI
Case Group	42 (61.7)	26 (38.3)	68	19.109	0.000	3.454	1.952-6,114
Control Group	65 (31.8)	139 (68.2)	204				
Total	107	165	272				

Table V. Relations of diet and gallstone recurrence.

	Grease food						
	Yes (%)	No (%)	Total	χ^2	*p*	OR	95%CI
Case group	28 (41.1)	40 (58.9)	68	2.945	0.086	1.641	0.930-2.897
Control group	61 (29.9)	143 (70.1)	204				
Total	89	183	272				

icant. Case group 1.208 times higher than the control group in the risk of recurrence after surgery is 1.208 times that of the control group, but the difference was not statistically significant (Table V). Which indicated that relations of diet with gallstone recurrence was no significant correlation.

Discussion

Since the first description of PC (percutaneous cholecystolithotomy) in 1985, the procedure has been performed in symptomatic patients who were deemed to be poor operative risk for laparoscopic cholecystectomy and, in those circumstances, where the gallbladder is severely adherent to the liver. However, long-term follow-up of these patients indicate there is a 41% recurrence of gall-stones, of which 21% required a cholecystectomy[8]. Stones are most commonly impacted in the terminal ileum but also rarely impact in the duodenum causing gastric outlet obstruction[9]. Irrespective of advancements in non-operative management, > 90% of Bouveret's cases still require urgent surgery[10]. Therefore, the simple removal of gallstones may not be sufficient due to continual production of mucin by the functioning gall-bladder mucosa.

Courvoisier[11] published the first large series of 131 cases of gallstone ileus in 1890, with a mortality of 44% from 125 operations. More recently, reported mortality associated with gallstone ileus varies from 12-27%[12]. In comparison, the mortality rate for small bowel obstruction secondary to adhesions ranges from 7-10% and the mortality rate for colonic obstruction ranges from 3-17%[13,14].

Recurrence is a major problem with all forms of gallstone treatment that leave the gallbladder *in situ*. Stone recurrence after bile acid therapy occurs in approximately 50% of patients within five years and then reaches a plateau of 61% by the 11th year[6,7]. The recurrence is often preceded by sludge formation[15].

The factors determining stone recurrence remain unclear. In the present study, we made a follow-up of 720 cases gallstone recurrence, and the risk covered includes the general situation, diet, behavior, family history of cholelithiasis and other indicators. We concluded that possible risk factors associated with gallstone recurrence go as follows: gender, age, nation, career, BMI, whether or not the patient had the history of chronic superficial gastritis, and regulation of gallbladder emptying function, family history, etc. However, it is still important to follow up these patients with ultrasound to monitor new gallstone formation.

Conclusions

In the present study, possible risk factors associated with gallstone recurrence go as follows: gender, age, nation, career, BMI, whether or not the patient had the history of chronic superficial gastritis, and regulation of gallbladder emptying function, family history, etc.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

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