Clinical factors associated with the number of gallbladder polyps

Wen-Juan Lu[1], Chang-Sheng Liu[2], Hong-Yan Li[3], Lan-Lan Zang[3], Fan-Zhi Meng[4,5], Jing-Hua Liu[4,5]

[1]Department of Laboratory, Junan County People's Hospital, Linyi, Shandong 276600, China;
[2]Department of Medical Examination, Junan County People's Hospital, Linyi, Shandong 276600, China;
[3]Central Laboratory, Linyi People's Hospital, Linyi, Shandong 276000, China;
[4]Department of Hepatobiliary Surgery, Linyi People's Hospital, Linyi, Shandong 276000, China;
[5]Prof. Cai's Laboratory, Linyi People's Hospital, Linyi, Shandong 276000, China.

Gallbladder polyps (GBPs), which are defined as a pathological change protruding from the gallbladder mucosa, are one of the main causes of hospital admission for cholecystectomy. The incidence of GBPs is 4.2 to 9.5% in China.[1] To date, the etiology of GBPs has not yet been clearly defined. According to previous studies, metabolic status is strongly associated with GBPs.[2] A single polyp is more likely to exhibit a malignant transformation, and large (diameter greater than 10 mm) single polyps should be resected together with the entire gallbladder. However, multiple polyps seem unlikely to transform. Thus, number of GBPs is an important factor that affects the treatment of GBPs. However, clinical factors associated with the number of GBPs are not completely understood; therefore, the aim of the current study is to investigate these factors.

This single-center, retrospective study at the Junan County People's Hospital was performed using data obtained between January 2017 and December 2018. Letters of consent were obtained from all patients, and the study protocol was approved by the Ethics Committee of Junan Country People's Hospital. GBPs were diagnosed with ultrasonography according to the following criteria: (1) a protuberance protruding from the gallbladder mucosa to the gallbladder cavity, (2) the position being fixed and not changing as posture changes, (3) high echo or medium echo without a sound shadow behind, and (4) pedicle or no pedicle. The following inclusion criteria were employed for this study: (1) age between 19 and 90 years, (2) largest diameter of GBPs <10 mm, (3) within 10 years of the discovery of GBPs, and (4) asymptomatic GBPs. The following exclusion criteria were employed: (1) other diseases except for viral hepatitis or diabetes, (2) the largest diameter of GBPs ≥10 mm, and (3) incomplete data. Metabolic syndrome (MS) was defined when three or more of the following criteria were met: (1) overweight and/or obese, that is, body mass index ≥25 kg/m^2; (2) hyperglycemia and fasting blood glucose ≥6.1 mmol/L (110 mg/dL), 2-h plasma glucose ≥7.8 mmol/L (140 mg/dL), and/or diabetes has been diagnosed and treated; (3) systolic/diastolic blood pressure of hypertension ≥140/90 mmHg and/or hypertension has been diagnosed and treated; and (4) dyslipidemia, fasting blood triglyceride ≥1.7 mmol/L (150 mg/dL) and/or fasting blood high-density lipoprotein-cholesterol (HDL-C) <0.9 mmol/L (35 mg/dL) for males or <1.0 mmol/L (39 mg/dL) for females. Statistical analysis was performed using SPSS version 19.0 (SPSS, Inc., Chicago, IL, USA). The results were reported as the mean ± standard deviation, odds ratio (OR), or 95% confidence interval (CI). Variables were compared between single and multiple GBPs using the squares test. Risk factors with P values < 0.05 were added to the logistic regression models. A P value < 0.05 was considered statistically significant.

In total, 1352 patients (826 males and 526 females) were included in the study based on the inclusion/exclusion criteria, including 1002 patients with a single GBP (74.11%, single group) and 350 patients with multiple GBPs (25.89%, multiple group). The clinical characteristics of the patients are shown in Supplementary Table 1, http://links.lww.com/CM9/A295. Among these variables, only gender (male/female) was statistically significant ($\chi^2 = 5.3539$, $P = 0.021$), and females tended to exhibit a high risk for a single GBP. Logistic regression indicates that gender/female was an independent risk factor for the formation of a single GBP (OR = 1.496, 95% CI: 1.106–2.024, $P = 0.009$) [Table 1].

According to laboratory tests [Supplementary Table 2, http://links.lww.com/CM9/A296], the number of patients with hypertriglyceridemia (triglyceride [TG] ≥2.3 mmol/L)

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Correspondence to: Jing-Hua Liu, Department of Hepatobiliary Surgery, Linyi People's Hospital, Linyi, Shandong 276000, China
E-Mail: jinghualiu1982@163.com

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Table 1: Logistic regression analysis of factors associated with the number of gallbladder polyps.

Factors	*B*	SE	Wald	*P*	OR	95% CI
Constant	0.056	0.612	0.008	0.927	1.058	NA
Gender/female	0.403	0.154	6.835	0.009	1.496	1.106–2.024
TG	−0.168	0.074	5.098	0.024	0.845	0.730–0.978
HDL-C	−0.506	0.230	4.828	0.028	0.603	0.384–0.947
GOT	0.034	0.012	8.652	0.003	1.035	1.011–1.058

SE: Standard error; OR: Odds ratio; CI: Confidence intervals; TG: Triglyceride; HDL-C: High-density lipoprotein-cholesterol; GOT: Glutamic oxaloacetic transaminase; NA: Not applicable.

was 71/1002 (7.08%) in the single GBP group and 44/350 (12.57%) in the multiple GBP group, and the difference was statistically significant ($\chi^2 = 10.0298$, $P = 0.022$) [Supplementary Table 2, http://links.lww.com/CM9/A296]. Logistic regression analysis results showed that TG was a protective factor of single GBP (OR = 0.845, 95% CI 0.730–0.978, $P = 0.024$) [Table 1].

The same trend was noted for HDL-C. The number of patients with normal HDL-C was 873/1002 (87.03%) in the single GBP group and 282/350 (80.57%) in the multiple GBP group ($\chi^2 = 7.4478$, $P = 0.038$) [Supplementary Table 2, http://links.lww.com/CM9/A296]. Logistic regression analysis results showed that HDL-C was a risk factor of single GBP (OR = 0.603, 95% CI 0.384–0.947, $P = 0.028$) [Table 1]. Additionally, MS was noted in 58/350 (16.57%) of multiple GBP patients compared with 117/1002 (11.67%) of single GBP patients ($\chi^2 = 5.5152$, $P = 0.018$).

These findings indicate that female patients or patients with low TG and high HDL-C levels tend to have single GBPs. The pathology of multiple GBPs is characterized by cholesterol polyps.[3,4] Cholesteryl ester and triacylglycerol were the main lipids in the gallbladder wall of patients with cholesterol polyps.[5] Bile cholesterol supersaturation is noted in patients with cholesterol polyps.[6] In conclusion, our results suggest that gender, TG, and HDL-C are correlated with the number of GBPs; however, the underlying mechanisms still need to be explored.

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Conflicts of interest

None.

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