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Clinical Trials Study

Transient elastography with controlled attenuation parameter for the diagnosis of colorectal polyps in patients with nonalcoholic fatty liver disease

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Abstract

BACKGROUND

The severity of nonalcoholic fatty liver disease (NAFLD) and lipid metabolism are related to the occurrence of colorectal polyps. Liver-controlled attenuation parameters (liver-CAPs) have been established to predict the prognosis of hepatic steatosis patients.

AIM

This study was designed to explore the risk factors associated with colorectal polyps in patients with NAFLD by analyzing liver-CAPs and establishing a diagnostic model.

METHODS

Patients who were diagnosed with colorectal polyps in the Department of Gastroenterology of our hospital between June 2021 and April 2022 composed the case group, and those with no important abnormalities composed the control group. The area under the receiver operating characteristic curve (AUROC) was used to predict the diagnostic efficiency. Differences were considered statistically significant when $P < 0.05$.

RESULTS

The median triglyceride (TG) and liver-CAP in the case group were significantly greater than those in the control group (mmol/L, 1.74 vs. 1.05; dB/m, 282 vs. 254, P < 0.05). TG and liver-CAP were found to be independent risk factors for colorectal polyps, with ORs of 2.338 (95%CI, [1.154–4.733]) and 1.019 (95%CI, [1.006–1.033]), respectively (P < 0.05). And there was no difference in the diagnostic efficacy between liver-CAP and TG combined with liver-CAP (TG+CAP) (P > 0.05). When the liver-CAP was greater than 291 dB/m, colorectal polyps were more likely to occur.

CONCLUSION

The levels of TG and liver-CAP in patients with colorectal polyps are significantly greater than those patients without polyps. Liver-CAP alone can be used to diagnose NAFLD with colorectal polyps.

INTRODUCTION

The global incidence of colorectal cancer, a malignant tumor, has significantly increased in recent years[1-3]. Colorectal polyps are precursors of malignant colorectal tumors whose pathogenesis involves multiple factors[1, 4-7], including abnormal lipid metabolism and fatty liver[4-16]. Nonalcoholic fatty liver disease (NAFLD) is considered the main cause of chronic liver disease in most patients[17], and liver-controlled attenuation parameters (liver-CAPs) have been established to predict the prognosis of hepatic steatosis patients[13, 17]. This study retrospectively analyzed liver-CAPs, lipid metabolism, and other indicators in NAFLD patients with colorectal polyps to investigate the correlation between liver-CAP, lipid metabolism, and colorectal polyps in NAFLD patients and to establish a diagnostic model.

MATERIALS AND METHODS

1 Patients

Patients who were diagnosed with colorectal polyps and who underwent electronic colonoscopy at the Department of Gastroenterology of our hospital between June 2021 and April 2022 were selected as the case group. Patients without important abnormalities during the same period were selected as the control group.

2 Inclusion criteria

The inclusion criteria for the patients were as follows: (1) over 18 years old, (2) had undergone electronic enteroscopy during hospitalization, and (3) had NAFLD based on a liver elasticity test.

3 Exclusion criteria

The exclusion criteria for the patients included the following: (1) incomplete bowel preparation or colon examination for various reasons; (2) history of inflammatory bowel disease, intestinal tuberculosis, familial adenomatous polyposis, melanosis of the colon, colorectal cancer, intestinal lymphoma, or other intestinal diseases; (3) prior liver diseases other than alcoholic fatty liver diseases, such as viral liver disease, autoimmune liver disease, genetic metabolic liver disease, or cirrhosis; (4) history of malignant tumor, metabolic syndrome, chronic kidney disease, severe infection, or other systemic diseases; and (5) use of drugs such as lipid-regulating drugs, hormones, or immunosuppressants.

4 Clinical parameters

After admission, general data, medical history, liver-CAP, TG, total cholesterol (TC), low-density lipoprotein (LDL), and other indicators were collected. Colonoscopies were performed by qualified senior physicians. All participants were tested for liver-CAP using FibroScan 502 Touch (Echosens). The cutoff values for the degree of lipidosis diagnosed with hepatic CAP ≥ 11%, ≥ 34%, and ≥ 67% were 238, 259, and 292 dB/m, respectively.

5 Statistical analysis

SPSS (version 26.0) and GraphPad (version 8.0.1.244) were used for the statistical analysis of all the data. The median values and both the 25th and 75th percentiles were associated with continuous variables. Frequencies and percentiles were associated with

categorical variables. Continuous variables were compared between groups using the independent t test or Mann–Whitney U test. Multivariate analysis was performed by logistic regression, and the area under the receiver operating characteristic curve (AUROC) was used to evaluate the diagnostic efficacy. The Jorden index was calculated to obtain the cutoff value. The DeLong method was used to compare the diagnostic efficiency among the models. Differences were considered statistically significant when $P < 0.05$. The statistical review of the study was performed by Li-Feng Dong from Beijing ChuiYangLiu Hospital.

The study was approved by the Human Ethics Committee of Beijing ChuiYangLiu Hospital. The requirement for informed consent from patients was waived (NO. 2024-002KY).

RESULTS

1 Comparison of general indexes between the case group and control group

Based on the inclusion criteria, 120 patients (76 males, accounting for 63%) were included in the case group, and 52 patients (26 males, accounting for 50%) were included in the control group. There were no statistically significant differences in terms of sex ratio, age, body mass index (BMI), TC, or LDL between the two groups. The median TG concentration in the case group was significantly greater than that in the control group (mmol/L, 1.74 vs. 1.05, $P < 0.05$). The level of liver-CAP in the case group was significantly greater than that in the control group (dB/m, 282 vs. 254, $P < 0.05$) (**Table 1**).

2 Logistic multivariate analysis of colorectal polyps

Logistic multivariate analysis and forest map description were used to analyze TG and liver-CAP levels (**Fig. 1**). TG and liver-CAP were identified as independent risk factors for colorectal polyps, with ORs of 2.338 (95%CI, [1.154–4.733]) and 1.019 (95%CI, [1.006–1.033]), respectively ($P < 0.05$).

3 Comparison of ROC curves and DeLong tests between liver-CAP and TG+CAP for the diagnosis of colorectal polyps

ROC analysis was performed on liver-CAP and TG+CAP samples (**Fig. 2**). The diagnosis of colorectal polyps with liver-CAP had an AUROC of 0.683, a sensitivity of 0.408, a specificity of 0.942, and a cutoff value of 291 dB/m. When the liver-CAP was greater than 291 dB/m, the probability of developing colorectal polyps increased. The diagnosis of colorectal polyps with TG+CAP had an AUROC of 0.756, a sensitivity of 0.731, a specificity of 0.694, and a cutoff value of 0.704. Taken together, the prediction probability was calculated to be 0.704.

The DeLong method was used to compare the diagnostic efficacy of liver-CAP and TG+CAP (**Table 2**). No difference was observed between liver-CAP and TG+CAP in diagnosing colorectal polyps in NAFLD patients, despite the lower AUROC of liver-CAP than that of TG+CAP. Hence, the diagnostic efficacy in both groups was considered the same.

DISCUSSION

Colorectal polyps gradually develop into colorectal cancer, which can substantially impact quality of life and reduce the survival rate of patients without early intervention. Therefore, early detection and treatment of colorectal polyps are essential for improving the prognosis of colorectal cancer patients and their quality of life[1, 2, 4-6].

Many studies have reported that NAFLD is a risk factor for colorectal polyps[4-16]. For example, the detection rate of hyperplastic polyps in the NAFLD group was significantly greater than that in the control group, and NAFLD was associated with an increased risk of hyperplastic polyps[18]. Domestic studies have also validated that colorectal adenomatous polyps are positively correlated with NAFLD[16].

Shear wave quantified ultrasound diagnosis of liver function—liver elasticity examination—is a clinically established noninvasive method for liver evaluation. Likewise, liver-CAP can determine the prognosis of patients with hepatic steatosis and fatty liver[17].

In this study, the occurrence of colorectal polyps was predicted by the liver-CAP in patients with NAFLD. Some studies have reported that the level of liver-CAP in patients with colorectal polyps was significantly greater than that in patients with noncolorectal polyps[13], and we have also confirmed it in this study. Additionally, this study demonstrated that the diagnostic efficacy of TG+CAP was relatively similar to that of liver-CAP alone.

Compared with TG+CAP, liver-CAP had greater specificity in diagnosing colorectal polyps in NAFLD patients (0.942 vs. 0.694) and was simple, rapid, and noninvasive. The findings of this study could assist patients and attending physicians in better managing fatty liver, as we reported that liver-CAPs greater than 291 dB/m increased the likelihood of developing colorectal polyps. This threshold value is close to the threshold value of liver elasticity for the diagnosis of severe steatosis (292 dB/m) and could be a promising alternative diagnostic option for patients.

In this work, the correlations between colorectal polyps, liver-CAP, and lipid metabolism in patients with NAFLD were analyzed, and receiver operating characteristic (ROC) analysis indicated that colorectal polyps were more common in patients with NAFLD when liver-CAP was greater than 291 dB/m or when the TG+CAP index was greater than 0.704. In this study, liver-CAP was used as an indicator to predict the occurrence of colorectal polyps. Compared with those of the TG+CAP group, the AUROC (0.683) and sensitivity (0.408) in the TG+CAP group were lower, but the specificity was greater (0.942). Additionally, the diagnostic efficiency of liver-CAP alone was relatively similar to that of TG+CAP. However, further studies with larger sample sizes are still needed to verify the findings of this study.

There were several limitations to this study. This was a cross-sectional and retrospective study, and the sequence and specific time points at which fatty liver, lipid metabolism, and colorectal polyps occurred could not be distinguished. In addition, the small sample size and the place of residence of the enrolled patients could have affected the research results. Hence, it is necessary to expand the sample size and develop a prospective scheme to further verify the findings of this study.

CONCLUSION

In summary, this study revealed the correlation of both fatty liver-CAP and TG with the occurrence of colorectal polyps. In clinical practice, the findings of this study could facilitate diagnosis and treatment of colorectal polyps as well as the provision of better informed advice to patients, such as dietary plans and lifestyle information. Overall, the findings of this study could improve our understanding of colorectal polyps and fatty liver, enable detection of colorectal polyps as early as possible, and help to reduce the degree of fatty liver degeneration encountered in patients.

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