RELATIONSHIP BETWEEN FATTY PANCREAS AND CHOLECYSTOLITHIASIS USING ENDOSCOPIC ULTRASOUND EXAMINATION; A CASE CONTROL STUDY

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Abstract

Background and Aims: Fatty pancreas, which can be evaluated with radiological methods, is a frequently overlooked finding. The aim of this study was to use endoscopic ultrasound (EUS) to evaluate whether there was a relationship between fatty pancreas and cholecystolithiasis, similar to the relationship between fatty liver and cholecystolithiasis, which has been previously shown in literature.

Methods: The study included 50 cases with calcular gall bladder disease and 50 subjects without. All cases underwent EUS evaluation due to different indications. Besides routine patient evaluation, pancreatic and liver echogenicity was graded in comparesion to the spleen at the time of EUS using a specified grading scheme.

Results: In this case-control study, we found no significant difference between the two groups regarding patient's gender or age. Fatty pancreas was significantly higher in patients with calcular GB disease (34%) than the control group (12%) P- value:0.009. Similarly, fatty liver was significantly higher in patients with GB stones (46%) than in the control group (14%) P- value:0.001 and presence of diabetes or hypertension was strongly associated with GB stones P- value <0.05

Conclusion: Using EUS in the present study has revealed higher rates of fatty liver and fatty pancreas in cholecystolithiasis cases than control group. Large-scale longitudinal studies with large number population will be able better evaluate the relationship between cholecystolithiasis and fatty pancreas.

Keywords: Fatty pancreas, Cholecystolithiasis, Endoscopic Ultrasound Examination.

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1. INTRODUCTION

Fatty pancreas, as fatty tissue infiltration of the pancreas parenchyma, was first described in 1933 by Ogilvie as a greater fat ratio determined in the pancreas of obese cadavers than that determined in normal-weight cadavers (17% vs. 9%) (1). In a study by Olsen in 1978, in which 394 autopsies were evaluated, it was reported that fatty liver increased with age (2). An autopsy study by Stamm in 1984 supported the findings of Olsen and also

noted that more than 25% of cases with fatty pancreas had type 2 diabetes and an increased risk of future atherosclerosis (3). The current commonly used names of pancreatic steatosis, pancreatic lipomatosis, and fatty pancreas describe an accumulation of pancreatic fat tissue (4). Various causes, such as obesity, type 2 diabetes, and excessive alcohol intake, have been shown to have a role in the etiology of pancreatic steatosis (5, 6). A non-alcoholic fatty pancreas is often seen in cases of non-alcoholic fatty liver disease (NAFLD). These patients have an increased risk of developing metabolic syndrome (7, 8). In some retrospective

studies of an extensive population, increased hepatic fat content and NAFLD is an independent risk factor for Cholecystolithiasis (9). There is currently no biomarker that clinically determines pancreatic steatosis. As various imaging modalities are available to quantify fat accumulation in particular organs, scientific interest has focused on fat accumulation outside subcutaneous adipose tissue (9-11). EUS provides detailed imaging of the whole pancreas to identify echotexture, space-occupying lesions, and pancreatic duct abnormalities (10). In addition, it allows a comparison of the echogenicity of the pancreas with those of the adjacent organs (11, 12). Also,The accuracy of EUS is great in detection of occult biliary pathology as the median distance between EUS scope and the GB is minimal allowing full GB visualization, So this study aimed to investigate whether there was any relationship between fatty pancreas and Cholecystolithiasis using EUS.

2. MATERIALS AND METHODS

This case-control study included cases referred to the EUS evaluation at the hepatology gastroenterology unit in the specialized medical hospital at Mansoura University within the period from January 2020 to December 2020. The study included 50 cases determined with Calcular GB disease on EUS examination and a control group of 50 individuals who had EUS with normal GB at the time of EUS examination. Patients who used more than 20 gm of alcohol daily or those with altered anatomy preventing access to the pancreas were excluded from the study. EUS was carried out using a curvi-linear PENTAX echoendoscope (EG-3870 UTK) equipped with a linear scan transducer attached to a Hitachi Avius sonography machine. Pancreatic parenchyma was examined, and echogenicity was compared to the spleen. The pancreas was considered normal if isoechoic or slightly hyperechoic compared to spleen and considered fatty if moderately or severely hyperechoic compared to spleen by an experienced endo sonographer (13). and the presence of fatty liver was assessed. Hepatic echogenicity was also graded compared to the spleen(14). GB was entirely examined either from gastric antrum or duodenal bulb views using the echoendoscope to assess the presense of GB calculi.

Approval for the study was granted by the local ethics committee, and all procedures were applied in accordance with the Helsinki Declaration. Written informed consent was obtained from participants after assuring confidentiality.

STATISTICAL ANALYSIS:

Categorical variables were expressed as group percentages and were compared for independent samples using Chi-square test. Continuous data were presented as mean (standerd deviation, SD) and were compared using Mann-Whitney U Test. Correlations between different variables of interest were done using

Spearman's rank correlation test. The statistical significance level was set at <0.05. Statistical analyses were performed using SPSS software version 23.

3. RESULTS

In this case-control study, we compared 50 patients with GB stones (case group) to 50 individuals with normal GB (control group) at the time of EUS examination; the mean age of the case group was 53.00(±12.64), sixty-six % of them were Female gender. While the mean age of individuals in the control group was 49.46(±8.61), 72% were Female gender. Table 1 demonstrates patients' demographic characteristics and comorbidities with and without GB stones. We found no significant difference between the two groups regarding gender and age; fatty pancreas was significantly higher in patients with GB stones (34%) than in the control group (12%) P- value:0.009, fatty liver was also significantly higher in patients with GB stones (46%) than in the control group (14%) P-value:0.001, presence of diabetes or hypertension strongly associated with GB stones P- value <0.05.

Table (1): comparison between two groups regarding demographic and laboratory and EUS data.

		Normal	Cholecystolithiasis	P-value
Age Mean(±SD)		49.46(±8.61)	53.00(±12.64)	0.09
Gender	Male	14 (28.0%)	17 (34%)	0.517
	Female	36 (72.0%)	33 (66.0%)	
Special_habits	No	40 (80%)	36 (72%)	0.356
	Smoking	9 (18%)	10 (20%)	
	Ex Smoking	1 (2%)	4 (8%)	
History of Diabetes	Yes	6 (12.0%)	14 (28.0%)	0.046*
	No	44(88%)	36(72%)	
Body Mass Index Mean(±SD)		28.18(±6.42)	28.69(±5.32)	0.893
Hypertension	Yes	1 (2%)	10 (20%)	0.004*
	No	49(98%)	40(80%)	
Patient with fatty liver & fatty pancreas	Yes	5 (10%)	13 (26%)	0.037*
	No	45(90%)	37(74%)	
Fatty liver	Yes	7 (14%)	23 (46%)	0.001*
	No	43(86%)	27(54%)	
Fatty pancreas	Yes	6 (12%)	17 (34%)	0.009*
	No	44(88%)	33(66%)	
cancer pancreas	Yes	9(18%)	18(36%)	0.043*

	No	41(82%)	32(64%)	
Triglycerids_mg Mean(±SD)		178.60(±59.78)	194.40(±49.49)	0.079
HDL_mg Mean(±SD)		51.2400(±3.29)	47.72(±3.84)	0.001*
Cholesterol_mg Mean(±SD)		211.36(±33.91)	222.30(±31.71)	0.112
AST Mean(±SD)		30.10(±30.82)	51.28(±72.79)	0.081
ALT Mean(±SD)		34.24(±59.87)	52.74(±97.22)	0.253
Albumin Mean(±SD)		3.99(±.53)	3.87(±.57)	0.152

Table (2): Different variables were correlated with the presence of cholelithiasis using Spearman's rank correlation test.

	R	**P-value**
Patient with fatty liver & fatty pancreas	0.208	0.038*
Fatty Liver	0.349	0.001*
Fatty Pancreas	0.261	0.009*
Diabetes	0.200	0.001*
Hypertension	0.288	0.004*
Body Mass Index	0.014	0.894

Different variables were correlated with the presence of cholelithiasis using Spearman's rank correlation test.

4. DISCUSSION

EUS is a valuable tool in the evaluation of the pancreas and G.B; several trials studied the relationship between fatty liver and G.B stones, and there is an apparent lack of studies examining the relationship between G.B stones and fatty pancreas; it was a good idea for us to conduct the present study, which aimed to evaluate the relationship between G.B stones and fatty pancreas.

In the current study, We found that Egyptian people with gallstones were more likely to have a fatty pancreas; this association occurred mainly in diabetics and hypertensive patients. This finding is consistent with Ulasoglu et al who also found that gall bladder stones were highly associated with fatty pancreas p-value: 0.087.

The strong correlation of cholecystolithiasis with NAFLD and fatty pancreas in patients who underwent cholecystectomy has been reported in a previous study (15). The pancreas and gallbladder originate from the same endodermal pouch and are bound via the common bile duct and Wirsung channel. As in biliary pancreatitis, the inflammatory storm or low-level ongoing inflammation in obesity may simultaneously affect both organs. Moreover, age and obesity as the shared risk factors may explain the simultaneous increase in fatty pancreas and cholecystolithiasis.

In the current study, we found that fatty liver was significantly higher in patients with GB stones (46%) than in the control group (14%) P-value:0.001 This finding is consistent with the results of other studies (16, 17). In a prospective observational study, Qiao et al (18) found that gallstones were strongly associated with NAFLD in a Chinese population. However, other studies found no statistically significant associations between NAFLD and GD (19, 20). The discrepant results between studies may be due to differences between study populations, such as income or eating habits (18).

Pantients with cholecystolithiasis had synchronous fatty liver and fatty pancreas highr than patients with normal G.B, this result copes with Ulasoglu et al(21) who also reported higer GB stones in patient with combined fatty liver and fatty pancreas than normal population.

The current study found that diabetes mellitus was significantly higher in patients with gallbladder stones than patients with normal G.B. P-value: 0.046. This finding is consistent with the results of Li and Gao who also found diabetes mellitus was significantly higher in patients with gallbladder stones P-value: 0.007 (22).

Hypertension also was significantly higher in patients with gallbladder stones than patients with normal G.B. P-value: 0.004, Similarily Li and Gao found Hypertension was significantly higher in patients with gallbladder stones than patients with normal G.B P-value: 0.028.

The current study highlights the importance of fatty liver and fatty pancreas and its strong association with gall bladder stones. Finally, larger multicenter, randomized trials are still needed for better evaluation the correlation between the pancreatic steatosis and cholecystolithiasis.

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