

Relationship Between Pancreatic Cysts and Cysts in Other Organs in Patients Undergoing Medical Checkup

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Objective: We investigated the association between pancreatic cysts and cystic diseases of other organs using abdominal ultrasonography in patients undergoing medical checkup.

Methods: Between April 2021 and March 2022, 4496 patients had a comprehensive medical checkup at our hospital, which included abdominal ultrasonography.

Results: Among 4496 patients, 172 (3.8%), 1592 (35.4%), and 1425 (31.7%) had pancreatic, liver, and renal cysts, respectively. Multivariate analysis revealed that the significant factors were female sex and the presence of renal cysts.

Conclusion: Pancreatic cysts were more common in females. Renal cysts are relatively commonly detected on abdominal ultrasonography. If renal cysts are detected, comorbidities with pancreatic cysts should be considered.

Key words: pancreatic cysts, ultrasonography, medical checkup, renal cyst

INTRODUCTION

Pancreatic cancer has a poor prognosis with 5-year survival rates of 7.9% and 7.5% for males and females, respectively. This is in comparison to 62.0% and 66.9% 5-year survival rates for all cancers in males and females, respectively [1]. The high-risk factors for pancreatic cancer include advanced age, positive family history, diabetes, obesity, and a history of chronic pancreatitis and pancreatic cysts [2].

Many pancreatic cysts are discovered incidentally on abdominal ultrasonography, such as during a medical checkup. With appropriate further examination and regular follow-up of patients with pancreatic cysts identified on abdominal ultrasonography, pancreatic cancer may be detected early [3–8].

Abdominal ultrasound and Magnetic Resonance Imaging (MRI) are performed when screening for pancreatic cysts, and liver and renal cysts may be simultaneously detected. Generally, pancreatic cysts are neoplastic and differ in nature from liver and renal cysts.

As there have been no reports examining whether pancreatic cysts are common in patients with hepatic or renal cysts, we investigated the association between pancreatic cysts and cystic diseases of other organs using abdominal ultrasonography in patients undergoing health checkup at our hospital.

PATIENTS AND METHODS

From April 1 2021, to March 31 2022, 4496 people (2544 males, 1952 females) underwent abdominal ultrasonography at the Tokai University Hachioji Hospital Medical Checkup Center. The sex, age, and abdominal ultrasonographic findings were recorded.

Abdominal ultrasonography was performed according to the examination manual recommended by the Japanese Society for Gastrointestinal Cancer Screening [9]. An Aplio SSA-660A ultrasonic device manufactured by Toshiba and a 3.5 MHz convex type probe or an 8.0 MHz linear type probe were used. In the manual, the judgment differs for each organ depending on the size and number of cysts and internal properties of that organ. However, in this study, the judgment was made based on the presence or absence of cystic findings.

The t-test and the Pearson chi-square test were used to compare the means and the ratios between the two groups, respectively. Factors associated with cyst frequency were analyzed using a nominal logistic multivariate analysis. JMP12 (JMP International Offices, Tokyo, Japan) was used for statistical analysis, and a p-value < 0.05 was considered statistically significant.

All participants read informed consent for the use of their health records for analysis. This study was approved by the Ethics Committee of Tokai University (No. 22R-128) and was conducted in accordance with

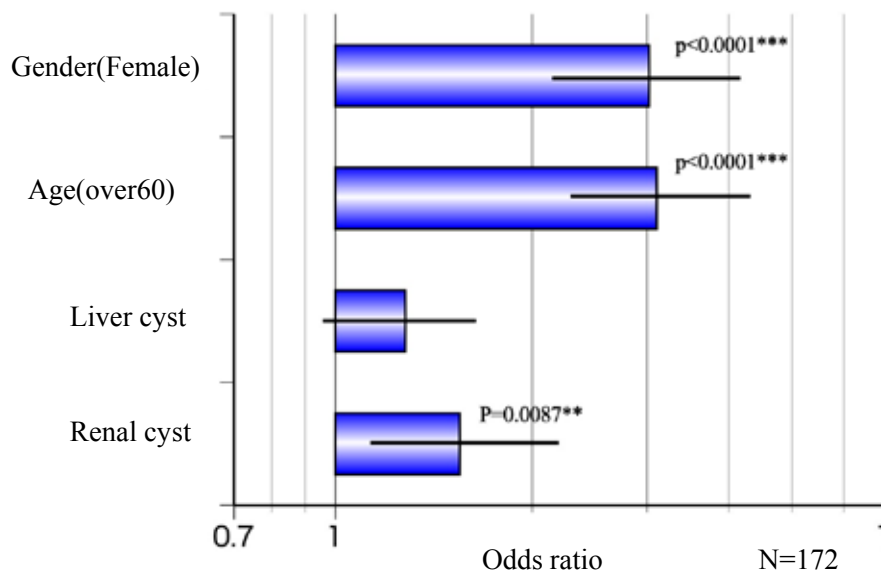


Figure Examination of factors related to comorbidity of pancreatic cyst (nominal logistic analysis)

the Declaration of Helsinki.

RESULTS

Among the 4496 patients (2544 males (56.6%), 1952 females (43.4%)), pancreatic cysts were identified in 172 (3.8%). Sixty males (34.9%) and 112 females (65.1%) had pancreatic cysts. The average age of all the patients was 55.5 ± 10.5 years, whereas the average age of those with pancreatic cysts was 63.1 ± 10.3 years (8 years difference). There were 1592 patients (35.4%) with liver cyst, including 919 (57.8%) males and 673 (42.2%) females. The mean age of those with liver cyst was 58.2 ± 9.8 years (4 years older from those with no liver cyst). There were 1425 patients (31.7%) with renal cyst; 980 (38.5%) males and 445 (22.8%) females. The mean age of those with renal cyst was 58.2 ± 10.3 years (8 years older from those with no renal cyst).

Of the 172 patients with pancreatic cysts, 77 (44.8%) had liver cysts and 75 (43.6%) had renal cysts. Of the 1592 patients with liver cysts, 76 (4.8%) had pancreatic cysts, and of the 1425 patients with renal cysts, 172 (12.1%) had pancreatic cysts, and 37 (0.8%) had all cysts. The frequency of complications for each cyst was high; however, in those with liver cysts, the complications of pancreatic cysts were similar to those in the group without cysts.

In addition to age and sex, liver and renal cysts were considered as factors related to the onset of pancreatic cysts, and multivariate analysis was performed using nominal logistic analysis. As a result, sex and renal cysts were extracted as significant factors (female 2.37 times; odds ratio 3.13, $p < 0.0001$, renal cysts 3.18 times; odds ratio 1.55, $p = 0.0087$) (Figure).

DISCUSSION

Most pancreatic cysts are considered branch-type Intra Papillary Mucosal Neoplasm (IPMN), which are cystic epithelial tumors that produce mucus. IPMN is caused by the multistage expression of genetic abnormalities in the pancreatic ductal epithelium [10]. Liver cysts are caused by the cystic transformation of the intrahepatic bile duct epithelium, which does not

communicate with the biliary tract [11]. Renal cysts are caused by renal ischemia, fibrosis of the medullary stroma, and fragility of the basement membrane due to age-related arteriosclerosis [12]. Malignant transformation is generally not observed in liver and renal cysts. From a histological and embryological point of view, no association was found between pancreatic, liver, and renal cysts.

In this study, pancreatic cysts were only associated with renal cysts and not with liver cysts. Liver cysts are caused by the cystification of the intrahepatic bile duct epithelium; therefore, they can occur at a relatively young age. Age-related gene mutations and arteriosclerosis are believed to cause renal and pancreatic cysts.

Similar to pancreatic cancer, pancreatic cysts were originally thought to be common in older males. Recently, however, there have been reports that they are more common in females than in males, and similar results were obtained in this study [13].

Based on this study, renal cysts were a relatively common disease accounting for 31.7% of all cases. Periodic abdominal ultrasonography is considered useful in assessing pancreatic cyst complications in patients with renal cysts. Detailed examination of comorbidities is limited because of the medical economy and burden on the patient. However, to a certain extent, it is possible to supplement it by regular follow-up, synchronizing this with health checkup, improving patient adherence, and the early detection of comorbidities.

A limitation of this study is that only the presence or absence of cysts was examined. There is a possibility that non-neoplastic pancreatic and neoplastic liver/renal cysts may have been included.

CONCLUSIONS

Our analysis reveals that females were 2.37 times more likely to have pancreatic cysts than males, and those with renal cysts were 3.18 times more likely than those without renal cysts. Renal cysts are a disease that are relatively frequently noted in 31.7% of cases and follow-up for complications of pancreatic cysts is considered useful.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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