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광범위한 만성 췌장염을 동반한 그루브 췌장염과 동반하지 않은 그루브 췌장염의 비교

Comparison between groove pancreatitis and groove pancreatitis with extensive chronic pancreatitis

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이 논문을 의학석사 학위 논문으로 제출함

2018년 12월

울 산 대 학 교 대 학 원

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전제혁

전제혁의 의학석사학위 논문을 인준함

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Abstract

Comparison between groove pancreatitis and groove pancreatitis with extensive chronic pancreatitis

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Background and Aims

Groove pancreatitis (GP) refers to a type of chronic pancreatitis (CP) that primarily affects the groove area of the pancreas while the rest of the organ remains largely intact. However, it is often observed that GP is suspected to be involved in the pancreas body and tail. And according to the study published in 2014, complete clinical success was achieved in 70.7% patients without surgical treatment. Therefore, we retrospectively analyzed and compared the patients who had pancreatitis in the groove area (GP) and the patients who had pancreatitis in the pancreas body and tail as well as mainly involved in the groove area (GP with CP).

Methods

We investigated patients who referred to GP, paraduodenal pancreatitis, cystic dystrophy of heterotopic pancreas on imaging or pathologic examination at Asan Medical Center in Seoul between January 1, 2000 and May 31, 2017. We investigated how many of 44 GP progressed to GP with CP and whether they had previously been diagnosed with GP among 15 GP with CP.

Results

A total of 59 patients were identified during the study period, including 44 GP and 15 GP with CP. Baseline characteristics of both groups were not statistically significant except for age, and GP patients were younger than GP with CP. Although not statistically significant, the proportion of alcohol intake and diabetic patients was also lower than GP with CP. Multidetector computed tomography (MDCT) findings showed statistically significant difference in calcifications (GP=29.5%,

GP with CP=66.7%, P=0.015) and main pancreatic duct size (GP=2.2mm, GP with CP=4.5mm, P=0.020). 7 of 44 (15.9%) GP progressed to GP with CP. 5 of 15 GP with CP were initially diagnosed at Asan Medical Center and 3 of 10 (30%) were progressed from GP. 29 patients (65.9%) had less than 2 points in Modified CTSI (CT severity index) and only 1 patient (2.3%) had more than 8 points in GP. Conservative treatment was performed in 34 GP patients (77.3%) and endoscopic treatment was performed in 7 GP patients (15.9%), whereas surgical treatment was performed in 3 GP patients (6.8%).

Conclusions

GP patients were younger than GP with CP. Calcifications and main pancreatic duct sizes on MDCT were less in GP. 7 of 44 GP progressed to GP with CP. This suggests that some GP is not confined to the groove area but can proceed from the groove area to the pancreatic body and tail. Most patients improved with conservative treatment and endoscopic treatment. Only 6.8% of patients underwent surgery.

Key Words: groove pancreatitis, cystic dystrophy of heterotopic pancreas, paraduodenal pancreatitis

목차

표 및 그림 목차

1. Introduction

According to the study of Potet and Duclert published in 1970, the presence of focal pancreatic disease localized in an area comprising the C-loop of the duodenum and the head of the pancreas was described [1]. In 1991, Becker and Mischke defined this areas as a "groove" and they suggested the term "groove pancreatitis" which was well received [2]. They also classified groove pancreatitis (GP) as pure groove pancreatitis, segmental pancreatitis of the head and chronic pancreatitis with groove involvement (Figure 1) [3]. GP is also known as paraduodenal pancreatitis [4], paraduodenal wall cyst [5], cystic dystrophy of heterotopic pancreas [3, 5], duodenal dystrophy [6], pancreatic hamartoma of the duodenum [7], and myoadenomatosis [8]. GP's clinical importance is that GP mimic groove carcinoma (GC). GC refers to pancreatic cancer occurring in an anatomic area between the head of the pancreas, duodenum, and common bile duct [9]. In 2018, we recommend that EUS-FNA should be considered because of the high likelihood of GC in Multidetector CT (MDCT) with mass-like lesion and CA 19-9 elevation in comparison with cystic lesion and calcification on MDCT [10]. GP refers to a type of chronic pancreatitis (CP) that primarily affects the groove area of the pancreas while the rest of the organ remains largely intact [11]. However, it is often observed that GP is suspected to be involved in the pancreas body and tail. Therefore, we retrospectively analyzed and compared the patients who had pancreatitis in the groove area (GP) and the patients who had pancreatitis in the pancreas body and tail as well as mainly involved in the groove area (GP with CP).

2. Materials and Methods

1) Patients and data collection

A retrospective study was performed on patients diagnosed as having GP, GP with CP and GC at Asan Medical Center from January 1, 2000, to May 31, 2017. A total of 44 GP and 15 GP with CP patients were retrospectively analyzed. MDCT findings, baseline characteristics, laboratory test results of GP and GP with CP patients were compared. All patient medical records were systematically reviewed by our medical staff. The study was approved by the Asan Medical Center Institutional Review Board

(IRB no. S2018-1891-0001).

2) Inclusion criteria

A total of 36 GC, 44 GP and 15 GP with CP patients were identified on the basis of a combination of radiologic imaging and pathologic findings after Endoscopy, Endoscopic ultrasound-fine needle aspiration (EUS-FNA) and surgery. MDCT findings were suspicious for GC or GP when there were focal lesions, such as mass-like lesions or cystic lesions, in the pancreatic groove. Then, magnetic resonance imaging (MRI) and/or endoscopic ultrasound (EUS) were performed. The findings of CP in CT or magnetic resonance cholangiopancreatography (MRCP) include pancreatic duct enlargement, pancreatic duct stones, atrophy or edema of the pancreatic gland, pseudocyst, and parenchymal parenchymal changes.[12] CT and MRCP are reasonably sensitive for detection of advanced chronic pancreatitis, but sensitivity is low.[13] Therefore, in this study, the distinction between GP and GP with CP was differentiated by calcification of pancreatic body and tail. Excluding those who were found to have GC through histologic examination, others were diagnosed as having GP and followed up for at least 240 days. The mean follow-up period for GP and GP with CP patients was 1687.6 (±1375.2 standard deviation [SD]) and 1855.5 (±1339.6 standard deviation [SD]) days.

3) Exclusion criteria

Patients who were suspected to have GP based on radiologic examination were excluded if they did not have a follow-up of at least 6 months (as mentioned earlier, the shortest follow-up period was 240 days).

4) Alcohol intake

According to the United States nonalcoholic fatty liver guideline, 21 standard drinks per week in men and >14 standard drinks per week in women during the past 2 years have been reported as meaningful drinking [14]. In this paper, heavy drinkers were defined as those who consumed alcohol at an amount and frequency greater than meaningful drinking. Because alcohol is known to be an important risk factor for chronic pancreatitis, GP and GP with CP patients were divided according to alcohol consumption [15].

5) Radiologic Evaluation

In MDCT, soft tissue thickening in the groove area were observed [16]. The largest diameter in common bile duct (CBD) and main pancreatic duct (pancreas head or body) were measured by authors including radiologist. The normal CBD and common hepatic duct (CHD) are generally less than 7 mm in diameter at MR imaging and CT.[17] Dilated pancreatic duct was defined as ≥2.0 mm [18]. MDCT was used to compare how many of the 44 GP patients progressed to GP with CP. The previous images were used to confirm progression from GP among 15 patients with GP and CP.

6) Classification of the various types of groove pancreatitis

Groove pancreatitis is divided into three forms. In 'pure' GP (typical finding of GP), scar tissue is found only in the groove. In segmental GP, the scar tissue expands to the duodenum. In pancreatitis of the head, the scar tissue expands to the duodenal area, determining the duodenal stenosis and displacement of the common bile duct (Figure 1) [3].

7) The Modified CT Severity Index for evaluating acute exacerbation of CP

We sometimes see that major acute exacerbation occurs in the course of CP taking the form of severe AP [19]. The Modified CT Severity Index (The modified CTSI) is a tool used to evaluate acute pancreatitis (AP) and can be used to assess acute exacerbation of CP [20]. Severity was classified as mild when the modified CTSI was 0-2, moderate when 4-6, and severe when 8-10 [20].

8) Statistical analysis

Statistical analyses were conducted with the statistics program IBM SPSS version 19.0 (IBM Corp., Armonk, NY, USA). Categorical variables were compared using Fisher's exact test. Quantitative variables were compared using the Mann-Whitney test. Factors associated with differentiation between GP and GP with CP were evaluated using univariate and multivariate logistic regression analyses. The results were statistically significant when the P value was <0.05.

3. Results

1) Baseline characteristics of groove pancreatitis and groove pancreatitis with chronic pancreatitis

The baseline characteristics of GP and GP with CP were compared. Most GP and GP with CP patients

were male (GP=84.1%, GP with CP=86.7%, P=0.588). The average age of GP with CP patients was higher than that of GP patients (GP=50.8 years, GP with CP=56.4 years, p=0.027). Other factors (alcohol intake, smoking, Diabetes mellitus (DM), Basal metabolic rate (BMI), number of emergency room (ER) visit after admission and clinical symptoms) were not significantly different. Although not statistically significant, The proportion of drinker (heavy drinker + social drinker) in GP with CP patients was 93.2%, which was higher than that of GP patients (86.7%). The proportion of smoker (current smoker and ex-smoker) was also higher in GP with CP patients (93.4% versus 88.6%, p=0.512). The proportion of previous diagnosed DM patients (33.3% versus 20.5%) and newly diagnosed diabetic patients (13.3% versus 9.1%) was higher in patients with GP with CP but no statistically significant (Table 1). Both group's chief complaints was abdominal pain (GP=93.2%, GP with CP=93.3%). 39 GP and GP with CP patients who were followed up at our hospital, only 1 was diagnosed as having GC (Figure 2). The time required to progression GP to GC was 5754 days. GP and GP with CP patients were followed by telephone. We could confirm the life and death of 49 people. 10 of the 59 patients were not contacted, and 3 of the 49 died. (Causes of death include alcoholic ketoacidosis, suicide, and diabetic ketoacidosis)

2) Laboratory findings of groove pancreatitis and groove pancreatitis with chronic pancreatitis

The laboratory findings of GP and GP with CP patients were compared. There was no statistically significant difference except for alkaline phosphatase (GP=74.5 IU/L, GP with CP=120.0 IU/L, p=0.032). Although not statistically significant, HbA1c in GP with CP was higher than GP (6.5% versus 5.7%, p=0.173). Amylase (GP=108.0 U/L, GP with CP=79.0 U/L, p=0.265) and Lipase (GP=108.3 U/L, GP with CP=73.0 U/L, p=0.263) in GP were higher than GP with CP, but not statistically significant (Table 2).

3) Multidetector computed tomography findings of groove pancreatitis and groove pancreatitis with chronic pancreatitis

We compared the MDCT findings between GP with CP and GP. Groove enhancement, mass-like lesions and cystic lesions on groove area did not differ between two groups. However, calcifications (GP=29.5%, GP with CP=66.7%, p=0.015) was significantly different. Lymphadenopathy and

common bile duct size were not significantly different. But main pancreatic duct size (GP=2.2 mm versus GP with CP=4.5 mm, p=0.02) was significantly different (Table 2).

4) Univariate and multivariate logistic regression analyses of factors associated discrimination between GP and GP with CP

Univariate logistic regression analysis was performed to investigate the factors associated with differentiation between GP and GP with CP. Calcifications (p=0.015) and main pancreatic duct size (p=0.020) on MDCT were statistically significant. These factors were chosen as independent variables and included in multivariate logistic regression analysis. However, in the multivariate logistic regression equation, these factors were not associated with discrimination between GP and GP with CP (Table 3).

5) Univariate and multivariate logistic regression analysis of factors associated discrimination between GP limited to groove area and GP progress to pancreas body & tail

7 of 44 (15.6%) GP progressed to GP with CP (Figure 3). The rest did not progress from GP to GP with CP (Figure 4). 5 of 15 GP with CP were initially diagnosed at Asan Medical Center and 3 of 10 (30%) were progressed from GP. Among 44 GP patients, 37 patients who did not progress to GP with CP and 7 patients who had progressed to GP with CP were compared. Univariate logistic regression analysis was performed to investigate the factors associated with differentiation between GP limited to groove area and GP progress to pancreas body & tail. Main pancreatic duct size (p=0.044) and common bile duct size (p=0.030) on MDCT were statistically significant. These factors were chosen as independent variables and included in multivariate logistic regression analysis. However, in the multivariate logistic regression analysis, these were not statistically significant (Table 4).

6) Cause, classification and severity of GP and GP with CP

The cause, classification, modified CTSI score and severity of GP and GP with CP were compared. There was no statistical difference between the two groups. Alcohol was the most common etiology of GP and GP with CP (GP= 79.5%, GP with CP= 93.3%). In ‘pure’ GP (typical finding of GP) was 81.8% of GP and 93.3% of GP with CP. In segmental GP was 6.8% of GP and 0.0% of GP with CP. In pancreatitis of the head was 11.4% of GP and 6.7% of GP with CP. According to the modified CTSI

score, mild GP was 65.9% of GP and 60.0% of GP with CP, moderate GP was 31.8% of GP and 33.3% of GP with CP and severe GP was only 2.3% of GP and 6.7% of GP with CP (Table 5).

7) Treatments & NRS score of GP and GP with CP

Treatments & NRS score of GP and GP with CP were compared. Conservative treatment was 77.3% for GP and 60% for GP with CP. Endoscopic treatment was 15.9% of GP and 26.7% of GP with CP. Surgical treatment was only 6.8% of GP and 6.7% of GP with CP. Of the 4 patients who underwent surgery with GP and GP with CP, 3 patients underwent pancreatoduodenectomy due to rule out GC. There was no statistically significant difference in treatment between GP and GP with CP. Two patients with GP and one patient with GP with CP received 수additional treatment for pancreatic duct after conservative treatment (2 patient received pancreatic duct stent and 1 patient received EUS-guided pancreaticogastrostomy) (Table 6). We compared the NRS pain score before and after treatment, and most recently on outpatient record or telephone contact. NRS score before treatment was 4.6 of GP and 5.9 of GP with CP (p=0.034) and NRS score after treatment was 0.3 of GP and 0.5 of GP with CP (p=0.217) (Table 6).

8) Detailed treatment of GP and GP with CP

Endoscopic treatment was performed in 15.9% of GP. Looking at the endoscopic treatment in detail, main pancreatic duct stent was performed in 3 of 7 patients and common bile duct stent was performed in 4 patients. EUS-guided pseudocyst drainage was performed in 1 patient and EUS-guided pancreaticogastrostomy was done in 1 patient. Percutaneous transhepatic biliary drainage (PTBD) was performed in 1 patient. Surgery was done in 6.8% of GP. Two patients underwent pancreatoduodenectomy because the possibility of pancreatic cancer was not excluded. 1 patient had duodenal obstruction underwent gastrojejunostomy. Of 34 GP patients who received conservative treatment, 3 patients required further treatment such as pancreatic duct stent but only 1 patient underwent pancreatoduodenectomy due to relieve CP- related pain (Table 6).

4. Discussion

According to GP's definition, GP is a type of CP that primarily affects the groove area of the pancreas

while the rest of the organ remains largely intact [11]. Differential diagnosis between GP and GC is very important because it relates to the patient's survival. The authors of this study reported in previous papers that there is a mass-like lesion on MDCT and when CA 19-9 value is elevated, GC is suspected and EUS-FNA is recommended [10]. In the course of the study, we suspected that some GP progressed to GP with CP and unlike the previous paper published in 2014, we confirmed that most GP patients were treated without surgical treatment. The authors referred the medical records of patients diagnosed with GP, 7 of 44 (15.6%) GP progressed to GP with CP (Figure 3). 5 of 15 GP with CP were initially diagnosed at Asan Medical Center and 3 of 10 (30%) were progressed from GP. Multivariate logistic regression analysis was performed to investigate the factors associated with differentiation between GP limited to groove area, pancreas head and GP progress to pancreas body & tail. In the multivariate logistic regression analysis, we could not find factors to distinguish between two groups (Table 4). The fact that there is no statistical significant difference between the groups limited to GP and those who proceeded to GP with CP suggests that GP may progressed to GP with CP. Also, as shown in Table 2, there were statistical differences in calcification and main pancreatic duct size between GP and GP with CP. This suggests that as GP with CP progresses from GP, the pancreatic duct size is enlarged and calcification increases. Age, calcification, and main pancreatic duct size were statistically significantly different between GP and GP with CP (Table 1, 2). Therefore, we need to consider modifications to the definition of GP, which mainly affects only the groove area of the pancreas. However, further studies are needed on factors that progress from GP to GP with CP.

The underling pathophysiological mechanism of GP has not yet been elucidated. One of the most frequently reported mechanism is altered pancreatic secretion through Santorini’s duct (SD) related to aggression caused by alcohol [11]. According to the study of Muraki et al published in 2017, 3 mechanisms related to the development of GP had been suggested [21]. First, a disturbance of pancreatic outflow is caused only by an occlusion or dysfunction at the minor papilla, accessory (Santorini) duct dilatation may not occur, because secretion and alternatively flow through the Wirsung duct and exit the major papilla. An obstruction or dysfunction of both the accessory papilla and Santorini duct may contribute to terminal Santorini duct dilatation prompting localized

pancreatitis and an absence of functional outflow of pancreatic secretion into the duodenal lumen. Second, if stricture or obstruction involves the Wirsung duct, the outflow of pancreatic secretion is diverted into the Santorini duct and this is referred as “functional” divisum. This rechanneled outflow also induces increased pressure in the accessory duct and the duct rupture and localized pancreatitis occurs. Third, “functional” divisum is induced due to incarceration stones at the papilla/ampulla of vater [21]. In addition, peptic ulcers have been postulated as potential triggers of GP [22]. Further research is needed to determine the cause of GP.

Surgery is considered the treatment of choice in GP if symptoms do not improve, when there is a suspicion of malignancy or there are complications [11]. But according to the study of Arvanitakis et al published in 2014, after a median follow-up 54 months, complete clinical success was achieved in 70.7% patients without surgical treatment [23]. In this study, 44 GP and 15 GP with CP patients were compared. In GP patients, 93.2% were treated without surgery. In GP with CP patients, 93.3% were treated without surgery. Conservative treatment was 77.3% for GP and 60% for GP with CP. Endoscopic treatment was 15.9% of GP and 26.7% of GP with CP. Patients with GP with CP required more endoscopic treatment than patients with GP. The first reason for the appropriate treatment without surgery compared with the previous study is that the differentiation of GC and GP is facilitated due to the development of imaging technology such as MRI and EUS. According to our study published 2018, we recommend that EUS-FNA should be considered because of the high likelihood of GC in MDCT with mass-like lesion and CA 19-9 elevation in comparison with cystic lesion and calcification on MDCT.[10] In the MRI findings of the GP, enlarged mass mostly in pancreatic head and a widening of the space between the distal pancreatic and common bile ducts and duodenal lumen can be observed. In the MRI findings of the GC, sheet like mass between head of pancreas and C-loop of duodenum can be observed. GC is hypointense on T1 weighted images and can be hypo-, iso- or slightly hyperintense on T2 images [24]. The second reason is that the severity of the GP patient who visited our clinic was not high. The patients with severe acute exacerbations were 2.3% in GP and 6.7% in GP with CP. There is a possibility that the complications were not occurred because the severity was not high. Therefore, operation was not needed. Additional studies should be

considered in severe GP patients.

According to our study, the mean follow-up period for GP patients was 1687.6 (±1375.2 standard deviation [SD]) days. Of 36 GP patients who were followed up at our hospital, only 1 was diagnosed as having GC (the time required distinguishing between GC and GP was 5754 days) [10]. However, Patriti et al published in 2012, a case of cystic dystrophy of the duodenal wall in heterotopic pancreas complicated with pancreatic adenocarcinoma is described. MDCT, MRI and EUS failed to show preoperatively, the locally advanced adenocarcinoma raising reasonable doubts on the effectiveness and safety of conservative treatments for paraduodenal pancreatitis [25]. But according to our study, we compared GC (n=10) and GP (n=13) in 23 patients who underwent EUS-FNA. The diagnostic sensitivity, specificity, positive predictive value, negative predictive value, and accuracy of EUS-FNA were 90.00%, 100%, 100%, 92.86% and 95.65%, respectively [10]. Of the 4 patients who underwent surgery with GP and CP with CP, 3 patients underwent surgery due to GC suspicion. Therefore, it can be concluded that the frequency of unnecessary surgery can be reduced by judging the results of CT, EUS, EUS-FNA, MRI and CA 19-9.

The first major limitation of this study is its retrospective nature. A limitation of a retrospective cohort study is that certain factors cited in the historical record are less accurate and less detailed than data collected in prospective studies. Second, although we included a relative large number of GP patients compared to existing literature, these collected results should still be interpreted with caution in the relatively small sample of an uncommon disease. Therefore, it will be necessary to perform comparisons after enrolling a large number of patients through multicenter studies.

5. Conclusion

GP refers to a type of CP that primarily affects groove area of the pancreas, while the rest of the organ remains largely intact. But some GP is not confined to the groove area but can proceed from the groove area to the pancreatic body and tail. GP patients were younger than GP with CP. Calcifications and main pancreatic duct sizes on MDCT were less in GP. 7 of 44 GP progressed to GP with CP. This suggests that some GP is not confined to the groove area but can proceed from the groove area to the

pancreatic body and tail. Most patients improved with conservative treatment and endoscopic treatment without surgery.

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CONFLICTS OF INTEREST

The authors report no potential conflicts of interest related to this article.

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Table 1 Baseline Characteristics of Patients

	GP N=44	GP with CP N=15	P-value
Age, mean ± SD, (years)	50.8 ± 9.6	56.40 ± 8.3	0.027
Male, n (%)	37/44 (84.1)	13/15 (86.7)	0.588
Alcohol intake			
Heavy drinker	33/44 (75.0)	12/15 (80.0)	0.490
Social drinker	8/44 (18.2)	1/15 (6.7)	
Nondrinker	1/44 (2.3)	1/15 (6.7)	
Abstinent	2/44 (4.5)	1/15 (6.7)	
Smoking			
Current smoker	36/44 (81.8)	13/15 (86.7)	0.512
Ex-smoker	3/44 (6.8)	1/15 (6.7)	
Nonsmoker	5/44 (11.4)	1/15 (6.7)	
Diabetes mellitus (DM)			
DM	9/44 (20.5)	5/15 (33.3)	0.404
Non-DM	31/44 (70.5)	8/15 (53.3)	
Newly diagnosed DM	4/44 (9.1)	2/15 (13.3)	
BMI (kg/m^2)	21.35 ± 2.90	21.85 ± 3.60	0,782
Number of ER visit after admission median (IQR)	0.0 ± 1.0	1.0 ± 3.3	0.100
Clinical Symptoms			
Abdominal pain	41/44 (93.2)	14/15 (93.3)	0.735
Nausea, Vomiting	8/44 (18.2)	3/15 (20.0)	0.574
Jaundice	2/44 (4.5)	1/15 (6.7)	0.593
Weight loss	10/44 (22.7)	2/15 (13.3)	0.354
Steatorrhea	0/44 (0.0)	0/15 (0.0)	N/A

GP, groove pancreatitis; CP, chronic pancreatitis; SD, standard deviation; DM, diabetes mellitus; BMI, basal metabolic rate; ER, emergency room; IQR, interquartile range; N/A, not applicable

Table 2 Multidetector CT (MDCT) findings and laboratory findings of patients

MDCT findings	GP N=44	GP with CP N=15	P value
Groove enhancement			
PE (peripheral enhancing)	5/44 (11.4)	2/15 (13.3)	0.909
IE (isoenhancing)	9/44 (20.5)	2/15 (13.3)	
HE (hypoenhancing)	24/44 (54.5)	8/15 (53.3)	
FP (focal patchy enhancing)	6/44 (13.6)	3/15 (20.0)	
Mass-like lesions on groove area	7/44 (15.9)	2/15 (13.3)	0.999
Cystic lesions on groove area	33/44 (75.0)	11/15 (73.3)	0.999
Calcifications	13/44 (29.5)	10/15 (66.7)	0.015
Lymphadenopathy	19/44 (43.2)	6/15 (40.0)	0.999
Main pancreatic duct size (mm)			
Median (interquartile range, IQR)	2.2 (2.3)	4.5 (3.8)	0.020
Common bile duct size (mm)			
Median (IQR)	7.0 (4.3)	7.3 (5.7)	0.413
Laboratory findings	**GP N=44**	**GP with CP N=15**	**P value**
WBC (4~10*10^3/mm^3), median (IQR)	7.2 (3.9)	7.3 (4.0)	0.514
AST (~40 IU/L), median (IQR)	28.0 (28.3)	30.0 (92.6)	0.325
ALT (~40 IU/L), median (IQR)	26.0 (29.3)	33.0 (35.3)	0.433
ALP (40~120 IU/L), median (IQR)	74.5 (103.0)	120.0 (342.5)	0.032
rGTP (5~36 IU/L), median (IQR)	62.5 (224.8)	65.0 (786.7)	0.269
Total bilirubin (0.2~1.2mg/dL), median (IQR)	0.6 (3.1)	0.9 (3.8)	0.072
Amylase (30~110 U/L), median (IQR)	108.0 (270.7)	79.0 (260.8)	0.265
Lipase (13~60 U/L), median (IQR)	108.3 (474.9)	73.0 (727.4)	0.233
Cholesterol (0~199 mg/dL), median (IQR)	167.0 (71.0)	145.0 (63.0)	0.226
CRP (0~0.6 mg/dL), median (IQR)	0.3 (1.7)	0.5 (4.4)	0.182
CA19-9 (0~73 U/mL), median (IQR)	12.5 (12.2)	11.5 (21.7)	0.797
CEA (0~6 ng/mL), median (IQR)	2.0 (2.1)	2.4 (1.8)	0.323
HbA1c (4~6 %), median (IQR)	5.7 (1.3)	6.5 (2.3)	0.173

MDCT, multidetector computed tomography; PE, peripheral enhancing; IE, isoenhancing; HE, hypoenhancing; FP, focal patchy enhancing; IQR, interquartile range; WBC, white blood cell; AST,

aspartate transaminase; ALT, alanine transaminase; rGTP, gamma-glutamyltransferase; CRP, C-reactive protein; CA19-9, cancer antigen 19-9; CEA; carcinoembryonic antigen; HbA1c, hemoglobin A1c

Table 3 Logistic regression analysis of factors associated discrimination between GP and GP with CP

Variable	Univariate			Multivariate		
	OR	95% CI	P value	OR	95% CI	P value
Age	1.065	0.999-1.136	0.056			
Sex (male)	1.230	0.226-6.690	0.811			
Alcohol intake	0.326	0.019-5.554	0.438			
Smoking	1.795	0.193-16.729	0.608			
Diabetes mellitus (DM)	2.087	0.626-6.952	0.231			
Clinical Symptoms						
Jaundice	1.500	0.126-17.831	0.748			
Weight loss	0.523	0.101-2.716	0.441			
MDCT findings						
Calcifications	4.769	1.361-16.709	0.015	3.191	0.816-12.463	0.095
Main pancreatic duct size	1.285	1.041-1.586	0.020	1.194	0.954-1.494	0.122
Common bile duct size	1.066	0.946-1.200	0.295			
Laboratory findings						
ALP	1.003	0.999-1.006	0.193			
Total bilirubin	1.061	0.906-1.243	0.464			
CRP	1.219	0.968-1.535	0.093			
HbA1c	1.372	0.905-2.081	0.136			

MDCT, multidetector computed tomography; ALT, alanine transaminase; CRP, C-reactive protein; HbA1c, hemoglobin A1c

Table 4 Logistic regression analysis of factors associated discrimination between GP limited to groove area and GP progress to pancreas body & tail

Variable	Univariate			Multivariate		
	OR	95% CI	P value	OR	95% CI	P value
Age	1.023	0.943-1.110	0.587			
Sex (male)	1.161	0.118-11.472	0.898			
Smoking	1.400	0.144-13.568	0.772			
Diabetes mellitus (DM)	2.025	0.384-10.688	0.406			
Follow up period	1.000	1.000-1.001	0.182			
MDCT findings						
Mass-like lesion	0.391	0.059-2.589	0.330			
Cystic lesions of groove	1.244	0.205-7.556	0.812			
Calcifications	0.241	0.045-1.287	0.096			
Lymphadenopathy	1.016	0.199-5.196	0.985			
Main pancreatic duct size	1.374	1.008-1.873	0.044	1.234	0.869-1.752	0.239
Common bile duct size	1.224	1.020-1.469	0.030	1.173	0.962-1.430	0.115
Laboratory findings						
WBC	0.533	0.261-1.084	0.082			
Total bilirubin	0.621	0.125-3.073	0.559			
Amylase	1.001	0.998-1.003	0.657			
Lipase	1.000	0.999-1.002	0.484			
CRP	0.509	0.108-2.402	0.394			
HbA1c	1.393	0.763-2.543	0.280			

MDCT, multidetector computed tomography; WBC, white blood cell; CRP, C-reactive protein; HbA1c, hemoglobin A1c

Table 5 Cause, classification and severity of GP and GP with CP

	GP N=44	GP with CP N=15	P-value
Cause			
Alcohol	35/44 (79.5)	14/15 (93.3)	
Gallstone	0/44 (0.0)	0/15 (0.0)	
Genetic	1/44 (2.3)	0/15 (0.0)	0.816
Idiopathic	7/44 (15.9)	1/15 (6.7)	
P. divisum	1/44 (2.3)	0/15 (0.0)	
Classification			
Typical finding of GP	36/44 (81.8)	14/15 (93.3)	
Segmental head pancreatitis	3/44 (6.8)	0/15 (0.0)	0.506
Pancreatitis of the head	5/44 (11.4)	1/15 (6.7)	
Modified CTSI score			
2	29/44 (65.9)	9/15 (60.0)	
4	14/44 (31.8)	3/15 (20.0)	
6	0/44 (0.0)	2/15 (13.3)	0.218
8	1/44 (2.3)	1/15 (6.7)	
10	0/44 (0.0)	0/15 (0.0)	
Severity			
mild	29/44 (65.9)	9/15 (60.0)	
moderate	14/44 (31.8)	5/15 (33.3)	0.595
severe	1/44 (2.3)	1/15 (6.7)	

GP, Groove pancreatitis; P. divisum, Pancreas divisum; CTSI, Computer tomography severity index

Table 6 Treatments & NRS score of GP and GP with CP

	GP N=44	GP with CP N=15	P-value
Conservative treatment	34/44 (77.3)	9/15 (60.0)	
Endoscopic treatment	7/44 (15.9)	4/15 (26.7)	
Main pancreatic duct stent	3/44 (6.8)	4/15 (26.7)	
Common bile duct stent	4/44 (9.1)	1/15 (6.7)	
EUS-guided Pseudocyst drainage	1/44 (2.3)	0/15 (0.0)	
EUS-guided Pancreaticogastrostomy	1/44 (2.3)	0/15 (0.0)	0.283
PTBD	1/44 (2.3)	0/15 (0.0)	
PCD	0/44 (0.0)	1/15 (6.7)	
Surgical treatment	3/44 (6.8)	1/15 (6.7)	
Pancreatoduodenectomy	2/44 (4.5)	1/15 (6.7)	
Gastroenterostomy	1/44 (2.3)	0/15 (0.0)	
Furhter treatment after conservative treatment			
Main pancreatic duct stent	1/34 (2.9)	1/9 (11.1)	N/A
EUS-guided Pancreaticogastrostomy	1/34 (2.9)	0/9 (0.0)	
Pancreatoduodenectomy	1/34 (2.9)	0/9 (0.0)	
NRS score before treatment	4.6 ± 2.2	5.9 ± 2.7	0.034
NRS score after treatment	0.3 ± 0.7	0.5 ± 0.6	0.217

EUS, Endoscopic Ultrasonography; PTBD, Percutaneous transhepatic biliary drainage; PCD, Pigtail catheter drainage; NRS, Numeric rating scale; N/A, not applicable

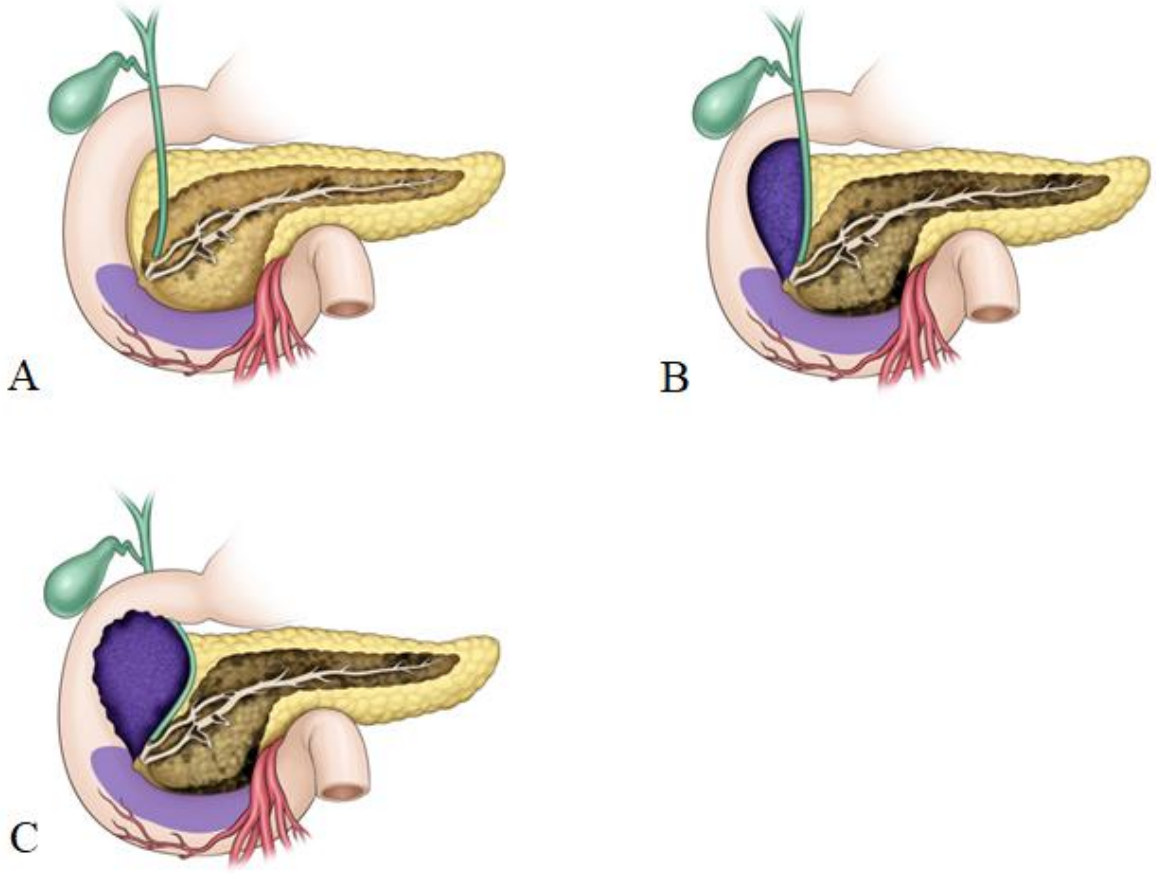

Figure 1. Classification of groove pancreatitis

A: Pure groove pancreatitis; typical finding of groove pancreatitis (purple area).

B: Segmental pancreatitis of the head; the scar tissue (dark blue) expands towards the duodenum.

C: Chronic pancreatitis with groove involvement; the scar tissue (dark blue) expands to the duodenal area, determining duodenal stenosis and displacement of the common bile duct.

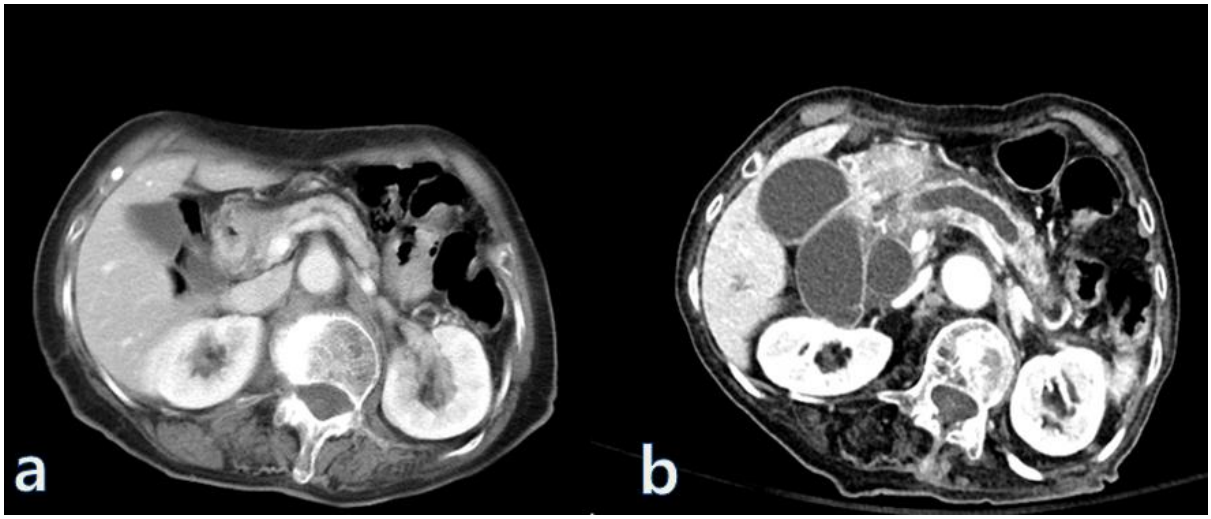

Figure 2. Groove pancreatitis progress to groove carcinoma. (a) Axial arterial-phase CT image showing suspicious low density was observed in the pancreas head adjacent to the 2nd portion of the duodenum. (b) After 7 years, axial arterial-phase CT image showing pancreas head's 3cm sized ill-defined low echogenic lesion was suspected and pancreatic duct and bile duct dilatation were observed. Groove carcinoma was confirmed by EUS-FNA (Endoscopic ultrasound-fine needle aspiration).

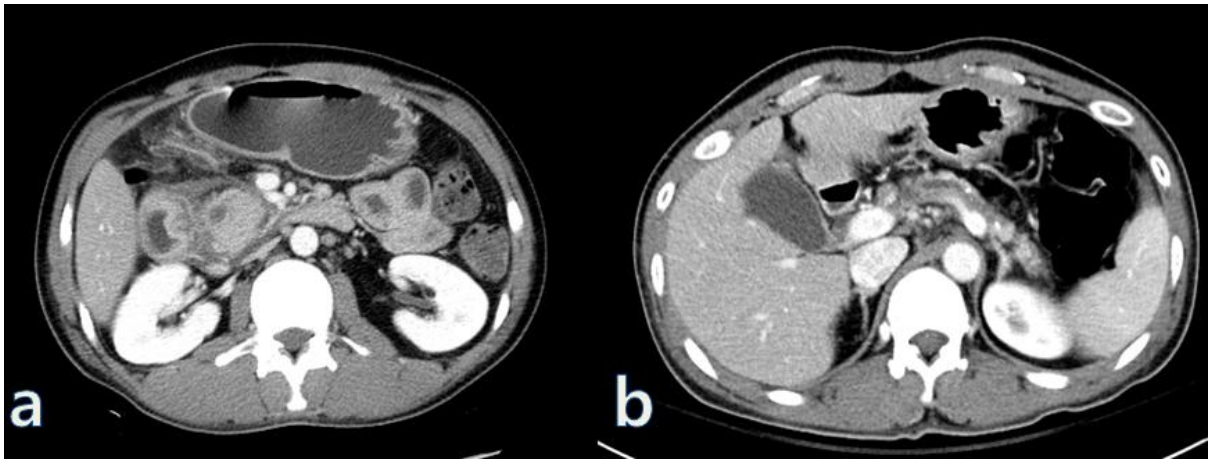

Figure 3. Groove pancreatitis progress to groove pancreatitis with extensive chronic pancreatitis (a) Axial arterial-phase CT image showing ill-defined low attenuating lesion in the pancreas head adjacent to the duodenal second portion. (b) After 9 years, axial arterial-phase CT image showing several calcifications in pancreas body and tail and pancreatic duct dilatation.

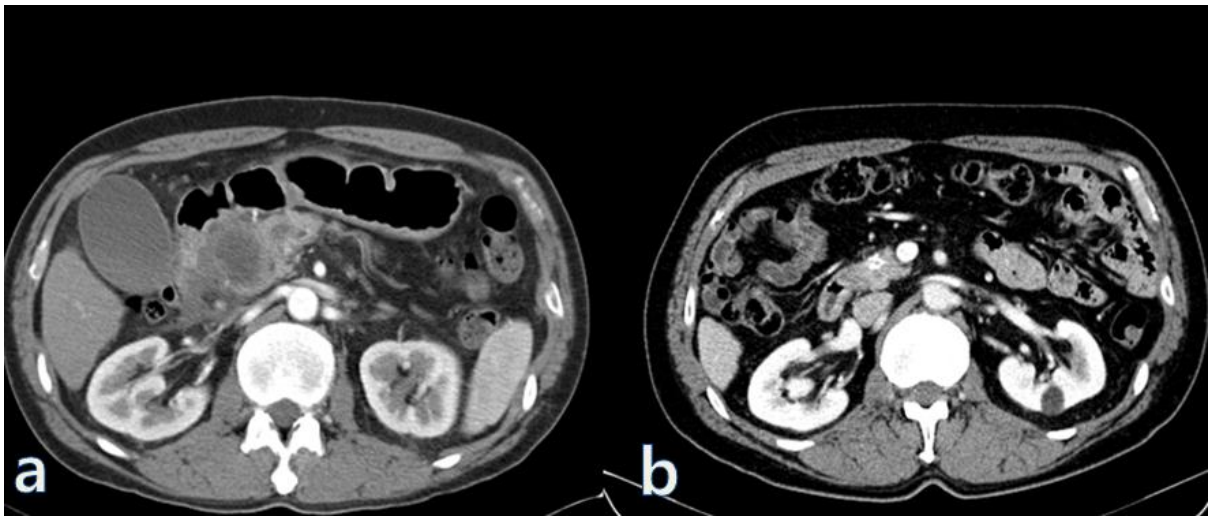

Figure 4. Groove pancreatitis did not progress to groove pancreatitis with extensive chronic pancreatitis (a) Axial arterial-phase CT image showing peripancreatic fluid collection and cystic lesion between duodenum and pancreatic head. (b) After 5 years, axial arterial-phase CT image showing calcified lesions thought to be due to chronic pancreatitis were observed in the head of the pancreas.

광범위한 만성 췌장염을 동반한 그루브 췌장염과 동반하지 않은 그루브 췌장염의 비교

연구 배경 및 목적

그루브 췌장염은 췌장의 그루브 부위에 주로 발생하고 나머지 췌장은 거의 그대로 유지되는 만성 췌장염입니다. 그러나 그루브 췌장염의 경우에도 췌장의 몸과 꼬리에도 영향을 미치는 경우를 종종 볼 수 있습니다. 또한, 2014 년에 발표된 연구에 따르면 그루브 췌장염 환자 중 70.7% 만이 수술을 받지 않고 호전이 되었습니다. 이에 저자들은 그루브에만 주로 관찰되는 그루브 췌장염 (GP) 과 그루브 뿐만이 아니고 췌장의 몸과 꼬리로 광범위하게 진행된 것으로 판단되는 그루브 췌장염 (GP with CP) 로 나누어 후향적으로 비교 분석하였다.

방법

2000년 1월 1일부터 2017년 5월 31일까지 서울아산병원에 입원한 환자 중 groove pancreatitis, paraduodenal pancreatitis, cystic dystrophy of heterotopic pancreas 로 영상검사 또는 조직학적 검사에서 진단된 환자를 대상으로 연구를 진행하였습니다. 44명의 GP 환자 중 몇 명이 GP with CP 로 진행 하였는지, 15명의 GP with CP 환자 중 몇 명이 GP 에서 진행하였는지를 조사하였습니다. 모든 GP, GP with CP 환자의 진단방법과 치료에 대해 조사하였습니다.

결과

연구 기간 동안 총 44 명의 GP 와 15 명의 GP with CP 환자가 포함 된 총 59 명이 확인되었다. 두 군의 기초 특성은 연령을 제외하고 통계적으로 유의하지 않았고, GP 환자는 GP with CP 환자보다 젊었다. 통계적으로 유의하지는 않았지만, 알코올 섭취와 당뇨병 환자의 비율은 GP with CP 환자가 더 낮았다. 컴퓨터 단층촬영 (CT) 결과는 석회화 (GP = 29.5 %, GP = 66.7 %, P = 0.015) 와 주 췌관 크기 (GP = 2.2mm, CP = 4.5mm, P =

0.020) 에서 통계적으로 유의한 차이를 보였다. 44명 중 7명의 환자 (15.9 %)에서 GP 에서 GP with CP 로 진행되었다. GP with CP 로 진단된 15 명 중 5 명은 아산 병원에서 처음으로 진단 받았고, GP with CP 환자 10 명 중 3 명 (30 %)은 GP에서 진행되었다. 수정된 CT Severity Index score 에서는 29 명 의 GP (65.9 %) 의 환자가 2 점 미만이었고 8 점 이상인 환자는 GP 환자 중 1 명 (2.3 %) 이었다. GP 환자 중 34 명 (77.3 %) 에서 보존적 치료를 시행하였고, GP 환자 7 명 (15.9 %)에서 내시경 치료를 시행하였으며, 오직 3 명 (6.8 %)에서만 외과적 치료를 시행 하였다.

결론

GP 환자는 GP with CP 환자 보다 젊었다. CT 에서 석회화와 주췌관의 크기는 GP 에서 GP with CP 보다 적었다. 44명의 GP 환자 중 7명이 GP with CP 로 진행하였다. 이는 일부 GP는 그루브 영역에 국한되지 않고 그루브 영역에서 췌장의 몸체 및 꼬리까지 진행할 수 있음을 시사한다. 대부분의 환자들은 보존적 치료와 내시경 치료로 호전되었다. 환자의 6.8 % 만이 수술을 받았다.

중심 단어: groove pancreatitis, cystic dystrophy of heterotopic pancreas, paraduodenal pancreatitis