



Gastrointestinal Imaging Case Report

## Groove pancreatitis: A unique case of focal pancreatitis

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### ABSTRACT

Groove pancreatitis (GP) is an unusual form of chronic segmental pancreatitis that affects the “pancreatic groove” between the pancreatic head, the duodenum, and the common bile duct, also known as the groove area. Becker initially reported GP in 1973, and the term was given by Malde DJ *et al.* to define this unique type of segmental pancreatitis. Most physicians are still unfamiliar with an entity. Radiological diagnosis can be arduous since it can be difficult to distinguish it from other conditions affecting the prior mentioned groove area, such as pancreatic head cancer. It is a rare pancreatic condition with a difficult imaging diagnosis that can lead to treatment dilemmas. The hour needs to identify the infinitesimal differences between these two pathological entities, as their management and treatment differ significantly. Here, we present a case of GP in a 21-year-old man and discuss how this entity appears on ultrasonography and computed tomography.

**Keywords:** Groove pancreatitis, Segmental chronic pancreatitis, Pancreaticoduodenal groove, Pure form, Segmental form

### INTRODUCTION

Malde DJ *et al.* proposed the name “groove pancreatitis” (GP) in 1982. They described an unusual form of chronic segmental pancreatitis, which showed marked fibrosis of the “pancreatic groove”, which is an anatomic area between the dorsocranial region of the pancreatic head, the common bile duct (CBD), and the duodenum.<sup>[1]</sup> This chronic pancreatitis results in scar tissue formation in the area described above.<sup>[2]</sup>

This groove represents a postulated space that accommodates the lymphatics and vessels and is surrounded by the 1<sup>st</sup> part of the duodenum anteriorly, the 3<sup>rd</sup> part of the duodenum posteriorly, and the 2<sup>nd</sup> part of the duodenum on the lateral side, the pancreatic head on the medial side.<sup>[3]</sup>

Differentiating the groove pancreatitis and pancreatic head tumors based on radiologic findings are always tricky.<sup>[4]</sup> Patients with GP end up undergoing pancreaticoduodenectomy for suspected pancreatic cancer since specific differentiating imaging findings are lacking.<sup>[5]</sup> Here, we present a case of GP that we have encountered at our radiodiagnosis center in the hope of clarifying the specific imaging findings of GP.

### CASE REPORT

A male patient, 21 years of age, came to the emergency department with complaints of sharp upper abdominal pain irradiating to the back and a few episodes of vomiting. History of excessive

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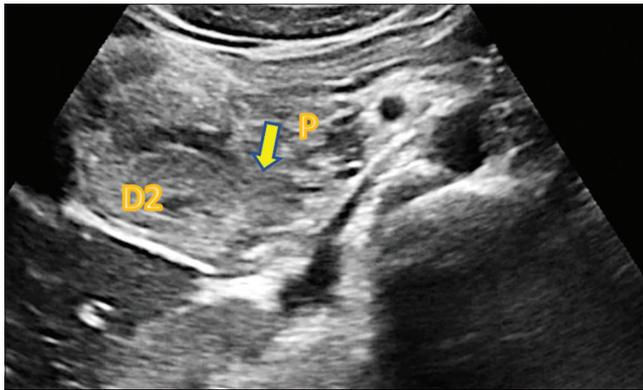
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alcohol consumption was given a day prior with a history of multiple previous such episodes. Pancreatic enzymes were borderline raised.

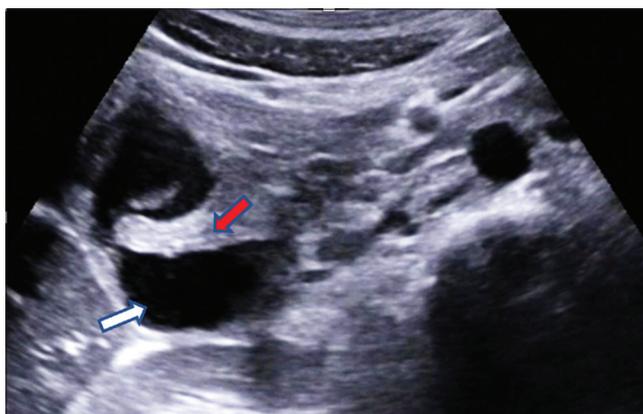
The abdominal ultrasonography (US) was performed.

A hypoechoic lesion was noted in the space bounded by the pancreatic head and duodenum wall, which showed no vascularity on color Doppler [Figure 1]. The division of 2<sup>nd</sup> part of the duodenum appeared to be thickened. Cystic changes were noted in the paraduodenal space, which was compressing over the lumen of the duodenum [Figure 2]. The pancreatic body and tail were unremarkable. Main pancreatic duct and CBD were not dilated. There was no obstruct or encasement of peripancreatic vessels throughout their course.

Later, the patient was referred to the computed tomography (CT) department for a contrast-enhanced abdominal CT. On



**Figure 1:** A 21-year-old male with Groove Pancreatitis. Longitudinal view of the Gray-scale ultrasound demonstrates an ill-defined hypoechoic lesion (yellow arrow) in the groove between the head of the pancreas (P) and the second part of the duodenum (D2) suggestive of paraduodenal pancreatitis.



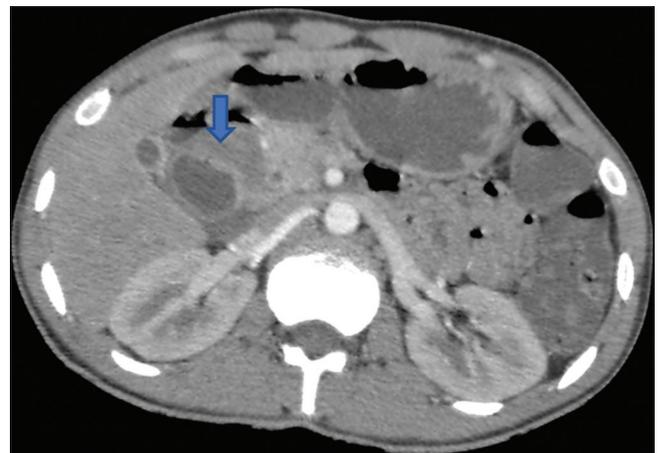
**Figure 2:** A 21-year-old male with Groove Pancreatitis. Longitudinal view of the Gray-scale ultrasound demonstrates an ill-defined cystic component (white arrow) around the 2<sup>nd</sup> part of the duodenum (red arrow) compresses the lumen of the duodenum.

preliminary plain CT, a hypodense soft-tissue density mass sheet-like appearance was noted in the pancreaticoduodenal groove, associated with minimal surrounding inflammatory stranding of the fat and thickening of the duodenal wall.

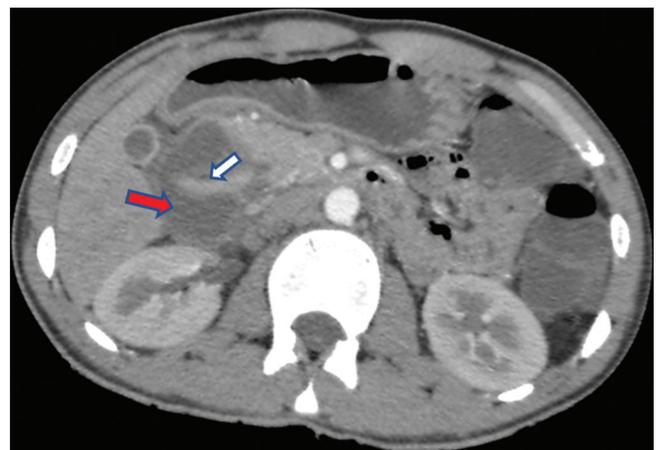
This hypodense lesion showed minimal post-contrast enhancement [Figure 3].

An ill-defined peripherally enhancing cyst was noted in the periphery of the duodenum, which appeared to be compressing over the lumen of the duodenum, causing focal stenosis [Figure 4]. The rest of the pancreatic parenchyma did not show any evidence of pancreatitis.

After contemplating and combining the clinical and imaging findings, the case was interpreted as a case of GP.



**Figure 3:** A 21-year-old male with Groove Pancreatitis. Contrast-enhanced computed tomography at the level of the pancreas demonstrates a hypodense lesion (blue arrow) with minimal enhancement in the pancreaticoduodenal groove.



**Figure 4:** A 21-year-old male with Groove Pancreatitis. Contrast-enhanced computed tomography at the level of the pancreas demonstrates an ill-defined cystic component (red arrow) adjacent to the duodenum, with peripheral enhancement, compressing the duodenal lumen (white arrow).

## DISCUSSION

GP is a kind of segmental pancreatitis that causes post-inflammatory fibrosis in the pancreatic-duodenal groove, as described by Malde DJ *et al.*<sup>[1]</sup>

Three forms of GP were recognized by Becker and Mischke: A pure form, a segmental form, and a non-segmental form.

A “pure” form that affects the previously described groove only, a “segmental” state, in which scarring involves the pancreatic head and a “non-segmental” state, in which chronic pancreatitis involving the whole pancreas parenchyma is present in association with groove involvement.<sup>[4]</sup>

Adsay and Zamboni recently have encompassed the heterotropic pancreas showing cystic dystrophy, duodenum showing pancreatic hamartomatous tissue, myoadenomatosis, cyst of the duodenal wall, and GP under one umbrella term is the “paraduodenal pancreatitis.”<sup>[4]</sup>

The incidence of GP is still vague, because it turns out to be obscure to a large population of doctors and the absence of significant case series.<sup>[3]</sup> The specific cause of this pathology has yet to be determined. Occlusion of the minor papilla is one of the factors discussed. Brunner gland hyperplasia is also thought to be a cause along with stasis of pancreatic enzymes in the dorsal pancreas.

Heterotopic pancreatic variants undergoing inflammation and fibrosis in the groove have been implicated.<sup>[3]</sup>

The most vital link is believed to be a long history of alcohol consumption.<sup>[6]</sup> Chronic alcohol use raises protein content, which causes an increase in pancreatic fluid viscosity, exacerbating the inflammatory response.<sup>[3]</sup>

Upper abdomen pain, weight loss, post-cabul vomiting, and nausea are all symptoms of GP caused by duodenal stenosis. However, jaundice is uncommon.<sup>[7]</sup> Duodenal luminal narrowing, either due to external compression with cystic growth in the duodenal wall or causes recurrent vomiting, which can be a serious concern. Elevated pancreatic enzymes might be present in serum. However, tumor markers are usually standard, but these parameters are nonspecific.<sup>[6]</sup> Exocrine pancreatic insufficiency or diabetes can develop in a few patients.<sup>[8]</sup>

The literature on sonography has rarely described the appearance of GP. The transabdominal US usually shows only a heterogeneous lesion in the groove above with loss of demarcation with the pancreatic head. The US appearance of lesions primarily reflects the stage of pathology.<sup>[9]</sup> Early in the pathology and inflammation predominates over fibrosis, whereas fibrosis has already occurred in late presentation. In the early stages, the hypoechoic bandlike area in the pancreatoduodenal groove will correspond to inflammatory infiltration. In late GP, it may show that the aforementioned hypoechoic area has turned hyperechoic. This

hyperechogenicity is due to myoadenomatoid proliferation and fibrosis in the affected area, which is pathognomonic for GP.<sup>[9]</sup> The pure form will present as a hypoechoic area between the duodenum’s hyperechoic wall and the pancreas’s hyperechoic head. In contrast, the segmental form will also cause inflammatory changes involving the head.<sup>[6]</sup>

The segmental and pure variants of GP produce characteristically different findings on computed tomography. The appearance in the former might range from just fat stranding and inflammatory changes in the groove to an ill-defined soft-tissue density lesion in the track with somewhat demarcation between it and the adjacent structures.<sup>[6]</sup> The latter is much all the more challenging to identify and differentiate from neoplastic lesions, because a rare mass-like appearance of the pancreatic head occurs in this form which involves the groove. The segmental variant and the pancreatic head carcinoma have no clear-cut differentiation on the basis of imaging, and one is easily confused for the other.<sup>[6]</sup> In contrast to enhanced computed tomography, enhancement of the lesion in the above-stated groove is not significant. Still, an increase in the delayed phase might be noted depending on the degree of fibrosis. Cysts, either actual or pseudocysts, might also be observed in the groove or the duodenal wall.

On MRI, GP will also give a sheetlike appearance, it being hypointense on T1-weighted images that are isointense or slightly hyperintense relative to the pancreatic parenchyma on T2-weighted images.<sup>[9]</sup>

The pure form of this segmental pancreatitis has a differential diagnosis of duodenal cancer, cholangiocarcinoma, or acute pancreatitis with phlegmon formation along the groove.<sup>[10]</sup>

MRCP helps distinguish GP from CBD carcinoma, as GP displays smooth CBD tapering and shouldering is infrequent.<sup>[5]</sup>

When a mass like an enlargement is noted in the pancreatic head, it becomes tough to distinguish whether it is a pancreatic head carcinoma or a segmental form of GP. The history and age of the patient usually help in the diagnosis. GP will not show evidence of peripancreatic vessel encasement or obstruction. Pancreatic cancer, on the other hand, is likely to infiltrate along major peripancreatic arteries that are blocked or encased by the said lesion.<sup>[5]</sup>

Most pancreatic adenocarcinomas do not display internal cystic changes, unlike GP. Furthermore, medial duodenal wall thickening, prevalent in GP, is unusual in pancreatic cancer.<sup>[6]</sup> However, CBD shouldering might be present in both pathologies.

According to some researchers, pancreatic head carcinoma will show homogenous enhancement in the arterial phase. In contrast, the GP lesion will show minimal patchy enhancement with an increase in the enhancement in the delayed phase.<sup>[6]</sup>

Endoscopic ultrasound will show smooth tubular stenosis of the CBD with minor irregularities of the central pancreatic duct.<sup>[3]</sup> Endoscopic ultrasound often turns out to be moot in GP as probe insertion is complicated due to duodenal stenosis, and the accuracy of EUS depends on the operator and experience, in addition to the lack of facility in many centers.<sup>[7]</sup>

Duodenal biopsies often turn out to be advantageous the deciding whether tissue is inflammatory or neoplastic but might be non-resultant if the carcinomatous tissue is negligible. Furthermore, fine-needle aspiration may still show spindle cell proliferation with nuclear atypia and high mitotic activity.<sup>[3]</sup>

In our case, the findings that cemented the diagnosis were the lesion's location, the cystic changes surrounding the duodenum, the luminal narrowing of the duodenum, and the minimal post-contrast enhancement of this lesion. The pancreatic duct and CBD were not dilated, suggesting a benign nature. Stable focal masses with this location and characteristics are consistent with a diagnosis of GP (pure form).

Essentially, the treatment of this pancreatitis is conservative. At the same time, surgery is the last resort for cases of untreatable pain or when the possibility of malignancy is not eliminated with pathological analyses.

Even in the most suggestive clinical and imaging findings, the possibility of malignant pathology cannot be ruled out, and patients ultimately undergo pancreaticoduodenectomy.

Hence, the radiologist must carefully and precisely diagnose the most classical cases with the correlation between the clinical features and the imaging features so that unnecessary surgeries can be avoided.

## CONCLUSION

It is challenging to make the diagnosis of GP on imaging. It is essential to have a high index of its suspicion when a pancreatic head abnormality is detected to avoid unnecessary surgical intervention which can be avoided in cases of GP.

## Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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## Conflicts of interest

There are no conflicts of interest.

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