As seen on ultrasound, CT and MRI, pancreatic carcinoma typically presents as a focally enlarged mass in the pancreas and/or dilatation of the main pancreatic duct. Some other solid, tumor-like lesions in the pancreatic head may have similar imaging findings and be indistinguishable from pancreatic carcinoma. We retrospectively review the patients who have the solid, tumor-like lesions at pancreatic head in our hospital in recent years. In this article, we herein report four cases of four different etiologies. The etiologies of these lesions in the pancreatic head include inflammatory and infectious diseases, congenital anomaly, and lymphoproliferative processes. The causes and the imaging findings of these lesions are depicted. Because the distinctive diagnosis between pseudotumors and pancreatic head carcinoma is difficult, clinical information, imaging examination and histopathologic examination should combine together for elucidating the nature of the masses in the pancreatic head.

Key words: Pancreatitis; Castleman disease; Pancreas, neoplasms; Tuberculosis; Pancreas, abnormalities

Pancreatic carcinoma is the most common pancreatic neoplasm and represents 80-90% of all pancreatic tumors [1]. Among pancreatic carcinomas, two thirds arise in the pancreatic head [1]. Because pancreatic carcinoma has an extremely poor prognosis, early diagnosis and treatment is important [2]. Seen on ultrasound, CT and MRI, pancreatic carcinoma typically presents as a focally enlarged mass in the pancreas and/or dilatation of the main pancreatic duct [2, 3]. Some other solid, tumor-like lesions in the pancreatic head may have similar imaging findings and may be indistinguishable from pancreatic carcinoma.

Accordingly, in this study, we retrospectively reviewed the 16 patients who had the solid, tumor-like lesions in the pancreatic head in our hospital in recent years. The etiologies of these tumor-like lesions in the pancreatic head include inflammatory and infectious diseases, congenital anomaly, and lymphoproliferative processes. Twelve in sixteen patients had chronic pancreatitis; two had annular pancreas; one had tuberculosis of the pancreas and one had Castleman disease. The causes and the imaging findings of these tumor-like lesions are depicted.

CHRONIC PANCREATITIS

Case report:

A 46-year-old man had fatty liver. An incidental finding of a pancreatic head mass was found on follow-up abdominal sonography. Abdominal sonography (Fig. 1a) showed a well-defined, hypoechoic focal mass in the pancreatic head. CT (Fig. 1b) and MRI (Fig. 1c, 1d) showed a well-enhanced, solid, focal mass in the pancreatic head with mild dilatation of the pancreatic duct. The contour of the pancreas was distinct. No calcification or cyst was found. The peri-pancreatic fat plane was clear. Pylorus-preserving pancreaticoduodenectomy was performed under the impression of pancreatic carcinoma but the pathology showed chronic pancreatitis.
Discussion:

Chronic pancreatitis of the pancreatic head sometimes presents as a focal mass without calcification or cystic change [4]. Images can be indistinguishable from pancreatic carcinoma [4]. Because of the radiologic diagnosis of probable pancreatic carcinoma, most of the patients undergo surgery [5]. Such focal pancreatitis seems to present at early stage of chronic pancreatitis [5]. Early stage of chronic pancreatitis can present as focal enlargement of the pancreas, followed by diffuse enlargement in 70% of cases [4]. Calcification due to chronic pancreatitis, one of the characteristic presentations, takes 1-3 years to become visible radiologically [4]. ERCP, the most accurate tool to differentiate pancreatitis and pancreatic carcinoma, may fail in cases that are at early stage of focal pancreatitis [5]. Endoscopic ultrasound may detect changes of mild chronic pancreatitis that may not be detectable from other imaging modalities [6]. Therefore, careful research with different imaging modalities is mandatory.

ISOLATED TUBERCULOSIS OF THE PANCREAS

Case report:

A 36-year-old male patient was admitted to our hospital after several months of intermittent epigastralgia and jaundice. Chest radiography was unremarkable. Abdominal sonography (Fig. 2a) showed a hypoechoic, irregular, lobulated mass at the pancreatic head, and dilatation of the biliary and pancreatic ducts.

Figure 1. A 46-year-old man with chronic pancreatitis. a. Transverse abdominal sonography shows a well-defined, hypoechoic focal mass in the pancreatic head. b. Contrast-enhanced CT scan shows well enhancement of the solid focal mass (arrows). c. Non-contrast enhanced T1WI MRI shows a homogeneous focal mass of low signal intensity in the pancreatic head (arrows). d. Contrast-enhanced T1WI MRI shows good enhancement of the focal mass (arrows).
CT scan (Fig. 2b, 2c) showed an inhomogeneous, well-enhanced, focal mass at the pancreatic head. Dilatation of the biliary tract and pancreatic duct was also noted. There were no enlarged lymph node in neighboring areas. Endoscopic retrograde cholangiopancreatography (ERCP) (not shown) revealed distal stenosis of the common bile duct and main pancreatic duct with a smooth margin of the ducts and prestenotic dilatation. Because pancreatic carcinoma was highly suspected, pylorus-preserving pancreaticoduodenectomy was performed. Histopathologic examination of the pancreas showed caseating granulomatous inflammation, which was highly suggestive of a tuberculous origin. Polymerase chain reaction-based assay specific for Mycobacterium tuberculosis revealed a positive result.

**Discussion:**

Isolated tuberculosis of the pancreas is extremely rare [7]. The incidence of pancreatic involvement in autopsy cases who died of disseminated tuberculosis is between 2 and 4.7% [7]. A relevant previous history of tuberculosis, or tuberculosis at other sites could suggest pancreatic tuberculosis. The radiologic findings are not specific except that helical CT may raise the possibility of pancreatic tuberculosis [8]. Pancreatic tuberculosis on helical CT shows a hypodense mass with a rim and septa enhancements in the maximum vascular enhancement phase [8]. In our case, a similar imaging finding was present. If pancreatic tuberculosis is suspected, percutaneous fine needle biopsy is helpful [8]. Staining for acid-fast bacilli and culture for mycobacteria are the most commonly used

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**Figure 2.** A 36-year-old man with isolated tuberculosis of the pancreas. **a.** Abdominal sonography shows a hypoechoic irregular lobulated mass of the pancreatic head. **b.** Non-contrast enhanced CT scan shows an iso- to hypo-dense focal mass in the pancreatic head (arrows) and dilatation of CBD. **c.** Contrast-enhanced CT scan shows an enhanced mass in the pancreatic head (arrows) with some hypodense areas.
methods during histopathologic examination. However, they are insufficient in clinical application. Polymerase chain reaction-based assays specific for Mycobacterium tuberculosis give the most accurate and most rapid result [8]. Early diagnosis is important to avoid improper treatment and disseminating spread.

**ANNULAR PANCREAS**

**Case report:**

A 60-year-old male patient had a history of intermittent epigastric pain for 2 months and jaundice for one month. This was associated with poor appetite and loss of body weight. CT scan (Fig. 3a, 3b) showed an enlarged focal mass at the pancreatic head, isodense to the pancreatic tissue, and encircling the descending duodenum. Dilatations of the biliary tract and pancreatic duct were also noted. Endoscopic retrograde cholangiopancreatography (ERCP) (Fig. 3c) revealed a circumferential pancreatic duct completely encircling the descending duodenum and dilatation of the common bile duct. MR images (Fig. 3d) delineated an enlarged focal mass at the pancreatic head encircling the descending duodenum. The patient had a pylorus-preserving pancreaticoduodenectomy. Histopathologic examination of the specimen showed annular pancreas and chronic pancreatitis.

**Discussion:**

Annular pancreas is a very rare, congenital anomaly in which the enlarged pancreatic head encircles the duodenum partially or completely, in particular, the descending duodenum [9]. The exact mechanism is still unclear. The presenting symptoms

![Figure 3. A 60-year-old man with annular pancreas. a. Non-contrast enhanced CT scan shows an isodense focal mass in the pancreatic head (arrows) completely encircling the descending duodenum. b. Post-ERCP contrast-enhanced CT scan shows the ENBD tube (arrows) is in the duodenum surrounded by the focal mass of the pancreatic head. c. Endoscopic retrograde cholangiopancreatography (ERCP) reveals a circumferential pancreatic duct completely encircling the descending duodenum. d. Contrast-enhanced T1WI MRI shows a focal mass in the pancreatic head (arrows) completely encircling the descending duodenum.](image-url)
are vomiting, and hematemesis [9]. Annular pancreas is sometimes associated with acute or chronic pancreatitis [9]. Various imaging modalities can help establishing the correct diagnosis [9]. An upper gastrointestinal series is utilized to evaluate the degree of duodenal obstruction [9]. CT scan and MRI can depict the enlarged pancreatic head encircling the duodenum partially or completely [9]. ERCP can help the physician to make a definitive diagnosis with findings of a circumferential pancreatic duct in the pancreatic head, encircling the duodenum [9]. Careful preoperative imaging examinations can help avoiding the surgical intervention.

CASTLEMAN DISEASE OF THE PANCREAS

Case report:
A 56-year-old woman had a medical history of chronic hepatitis. An incidental mass in the pancreatic head area was identified on follow-up abdominal sonography. Laboratory findings showed elevated GOT and GPT. Abdominal sonography (not shown) revealed a well-defined, hypoechoic focal mass in the pancreatic head area. CT scan (Fig. 4a, 4b) and MRI (Fig. 4c, 4d) showed a solid focal mass in the pancreatic head area without biliary and pancreatic ductal dilatation. The lesion had a more homogeneous and intense enhancement than the pancreatic parenchyma. The contour of the pancreas was distinct. No calcification or cyst were found. The peripancreatic fat plane was clear. The inferior vena cava was compressed posteriorly by the mass.

The patient did not receive any specific treatment for the focal mass. During the next two years of follow-up including imaging examinations, the mass gradually reduced in size and finally disappeared.

Figure 4. A 60-year-old man with Castleman disease. a. Non-enhanced CT scan shows an isodense focal mass in the pancreatic head area (arrows). b. Contrast-enhanced CT scan shows an intensely enhanced mass in the pancreatic head area (arrows). c. TIWI MRI shows a homogeneous hypointense focal mass in the pancreatic head area (arrows). d. Contrast-enhanced TIWI MRI shows good enhancement of the focal mass (arrows).
Discussion:

Even without histopathologic examination of the focal mass in the pancreatic head area of this patient, the imaging findings and the course of the mass were highly suggestive of Castleman disease.

Castleman disease is a rare lymphoproliferative disorder [10]. It is characterized by angiofollicular lymph node hyperplasia [10]. Two clinicopathological types have been classified: localized and disseminated [10]. The course of the localized type is usually benign and that of the disseminated type is usually malignant [10]. Castleman disease is most commonly seen in the mediastinum, but may occur at extrathoracic locations in the neck, axilla, mesentery, pelvis, adrenal, retroperitoneum and pancreas [10]. Pancreatic involvement of Castleman disease is extremely rare with only two cases having been reported [11].

In the localized type of Castleman disease of the abdomen, clinical findings include asymptomatic presentation, abdominal pain, a palpable abdominal mass, or mild fever [12]. Ultrasonography shows a well-defined, homogeneous hypoechoic mass [12]. CT scan usually shows a well-defined, intra-abdominal mass with homogeneous and marked enhancement [12]. Small foci of calcification may be seen [12]. MRI usually shows a hypointense mass on T1WI and a hyperintense mass on T2WI [12]. In disseminated disease of the abdomen, radiologic findings are not specific and include diffuse lymphadenopathy, hepatosplenomegaly, ascites and thickening of the retroperitoneal fascia [12]. In the differential diagnosis of an enhancing mass in the abdomen and pelvis, Castleman disease should be considered [12].

CONCLUSION

Despite the presence of many known characteristics of pancreatic head pseudotumors, the distinction between them and pancreatic head carcinoma is still difficult. Clinical information should be helpful in making a diagnosis, but the histopathologic examination remains the gold standard for elucidating the nature of the masses in the pancreatic head.

REFERENCES

胰臟癌的模仿者：長在胰臟頭部的偽腫瘤

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在超音波，電腦斷層，及磁振造影的檢查，胰臟癌典型的表現是局部變大之腫塊，可能伴隨有胰管變粗。然而，其他實質性，長在胰臟頭部的偽腫瘤病變，也可能與胰臟癌有著類似的影像特徵，而很難與胰臟癌作區分。我們回顧整理最近幾年在我們醫院所遇到長在胰臟頭部的偽腫瘤。在此篇文章，我們要報告分屬四種不同成因的四個病例。這些胰臟頭部偽腫瘤的形成原因包括了發炎性或感染性疾病，先天性異常及淋巴增生性疾病。並且討論這些胰臟頭部偽腫瘤的成因及影像發現。因為要鑑別診斷這些胰臟頭部偽腫瘤與胰臟癌仍然困難，因此要統合臨床資料，影像檢查與病理解剖檢查，才能得到最正確的診斷。

關鍵詞：胰臟炎，卡斯特雷曼氏症，胰臟腫瘤，結核菌感染，胰臟異常