MR and CT Manifestations of Pancreatic Tuberculomas

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Pancreatic tuberculosis is extremely rare and is frequently misdiagnosed. Herein we report on three cases. Two cases had magnetic resonance (MR) examination and showed the unique appearance of tuberculomas. To our knowledge, these are the first two cases to be reported with both computed tomography (CT) and magnetic resonance (MR) documentation. The incidence of primary pancreatic tuberculosis may be increasing; therefore, it should be considered in the differential diagnosis in patients who present with an atypical pancreatic mass and febrile illness. Unique low signal intensities (SIs) on both T1-weighted images (WIs) and T2WIs of tuberculoma and surrounding lymphadenopathy should prompt this diagnosis even though it was primarily an isolated lesion.

Key words: CT, MR, Tuberculoma, Pancreatitis

Tuberculosis is a wide-spectrum illness and can involve any system in the body. It may also express itself as a relatively indolent process or may disseminate rapidly and cause overwhelming infection. Pancreatic tuberculosis, however, is an extremely rare disease which was frequently misdiagnosed [1]. It may be associated with military TB or develop in immunocompromised patients such as those with AIDS. A correct diagnosis can still be easily missed or significantly delayed. With the aid of both computed tomography (CT) and magnetic resonance (MR) image modalities, characteristic signal intensities featuring changes of the tuberculomas help in making a precise diagnosis [2]. We herein report on our experiences with three pancreatic tuberculoma cases.

CASE REPORTS

Case 1

A 43-year-old male complained of epigastric discomfort for months with no associated nausea or vomiting symptoms. His laboratory tests were all normal. He had visited several hospitals for help but all in vain. He had lost 7 kg of body weight within half a year. Two-phase dynamic abdominal CT revealed nodular lesions over the pancreatic head region. A central low-attenuation character with rim-enhanced appearance was determined with contrast study. No other associated organ involvement was noticed. Isolated pancreatic tuberculosis was not our impression until surgical tissue biopsy. No MR images were available at that time.

Case 2

A 71-year-old man suffered from skin itching,
recurrent epigastralgia, general weakness, and periumbilical cramping pain for months. He had a history of old pulmonary TB, diabetes mellitus, and hypertension for years. Anemia, jaundice, and tea-colored urine were noticed after admission. CT showed low-density nodular infiltrating lesions over the pancreatic head and portal hepatic area causing biliary tract dilatation (Fig. 1a, b). Para-aortic lymphadenopathy was also identified below the IMA orifice level. The lesions had low signal intensity on both T1WI (TR/TE/NSA, 15/3.9/5 flip angle 25) and T2WI (TR/TE/NSA, 2000/100/4) (Fig. 1c, d). Dynamic MR images were obtained after gadopentetate dimeglumine contrast mediem injection. Peripheral rim enhancement could barely be observed on 5-min delayed images (Fig. 1e). Pancreatic carcinoma or lymphoma involvement was our impression in the preoperative tentative diagnosis. Meticulous studies were done including chest CT; no interpretation considered the possibility of pancreatic tuberculosis, although the patient was known to have a history of pulmonary TB.

**Case 3**

A 53-year-old female presented with a history of epigastralgia, chest discomfort, and low-grade fever of around 38°C for 2 weeks. The epigastralgia character was consistent without

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**Figure 1.** A 71-year-old man with systemic tuberculosis involvement. a and b. Axial non-contrast and contrast abdominal CT scan showing an enlarged pancreatic head with associated right proximal IHD dilatation a, and peripheral rim enhancement with central low-density nodular content after contrast administration b, c, and d. Low signal intensity appearances of pancreatic head nodular lesions on both T1W (15/3.9/5 flip angle 25) and T2W(2000/100/4) images. e. Gadolinium contrast MR images showing slight rim enhancement.
tenderness or rigidity. She is a long-term vegetarian and works as a housekeeper with no history of foreign travel or exposure to infectious disease. A splenectomy was performed 5 years ago due to trauma history. Physical examination revealed a temperature of 37.5°C, with no evidence of cervical or maxillary lymphadenopathy. Her lungs were congested. There was no evidence of hepatomegaly. Her extremities and neurological examination were normal. No history of diabetes mellitus or hypertension could be found. Laboratory evaluation revealed hemoglobin of 8.4 g/dl, with white cell blood count of 5370 (differential: 46 segs, 43 lymph, 1 band, 7 mono, 1 eosin, and 2 basos). Liver function test, amylase, and lipase were all normal. Only hyponatremia was noticed and was possibly due to vomiting and reduced food intake. Tumor markers of CEA, CA19-9, and AFP were all within normal limits. Serum HIV was also negative. Chest and abdominal X-ray showed no evidence of abnormalities. Bone marrow biopsy also showed a negative result. Abdominal CT taken at another medical facility revealed a loculated low-attenuation mass over the pancreatic head area with no other associated abdominal condition (Fig. 2a). Sequential MR examination showed a clustered loculated mass with low signal intensity on both T1WI (15/3.9/5 flip angle 25) and T2WI (2000/1004) with

Figure 2. A 53-year-old female with pancreatic tuberculoma. a. Axial postcontrast enhanced abdominal CT scan revealing an inhomogeneous low-attenuation mass involving the pancreatic head. b. T1-weighted (15/3.9/5 flip angle 25) MR image demonstrating hypointensity nodules over the pancreatic head with relatively lower intensity as compared with that of the liver and the pancreatic body portion. c. T2-weighted (2500/100/4) MR image also showing hypointensity nodular structures in the pancreatic head region. d. Gadolinium-enhanced T1-weighted MR image revealing a hypointensity nodule with mild rim enhancement. e. Photomicrograph of histopathologic specimen (H&E stain; original magnification, 50X) showing caseating necrosis in the center and granulomatous tissue in the periphery. A Langhan’s giant cell can be seen in the granulomatous tissue.
identical size over the pancreatic head region. This lesion was poorly enhanced. Associated biliary tract and gallbladder dilatation was absent (Fig. 2b-d). On account of a normal CRP counting result, laparotomy was recommended. The head of the pancreas was mobilized despite severe adhesion with the duodenum. Surrounding lymphadenopathy was noticed along the hepatoduodenal ligament and in the portal hepatic area. A firm relatively nonhomogenous mass was palpable within the head of the pancreas. There was no other intra-abdominal pathology identified. Excision biopsy was performed over the pancreatic head and surrounding lymph nodes, which revealed granulomatous inflammation with no evidence of malignancy. Microscopically, it showed caseating granuloma with caseous necrosis surrounded by epithelial cells and Langhan’s giant cells (Fig. 2e). Tuberculosis granuloma was then our impression. She began antituberculous therapy with INH, rifampin, and ethambutol, and her symptoms gradually resolved.

DISCUSSION

Cases manifesting abdominal tuberculosis are commonly encountered in both developing and developed countries of Asia; however, an accurate preoperative diagnosis is not always readily obtained [3, 4]. Pancreatic tuberculomas should be considered in the differential diagnosis of cystic pancreatic lesions. CT alone cannot differentiate between a caseous necrotizing tuberculoma and a necrotic neoplasm. It can only delineate the lesion location [4]. In conjunction with other evidence of disseminated tuberculosis, CT findings of low-attenuated peripancreatic/periportal adenopathies may support the diagnosis of pancreatic tuberculosis (Fig. 1b). Cases of isolated pancreatic lesions, however, are often mistaken for pancreatic tumors [5]. Few case reports have been published about tuberculous pancreatitis with neither prior nor concomitant evidence of tuberculosis at other sites. Clinical presentations were pancreatic carcinoma in most cases. Manifestations of pancreatic abscess refractory to antibiotic therapy, unexplained obstructive jaundice, and portal hypertension have also been reported [6]. An accurate diagnosis has rarely been achieved prior to explorative laparotomy. Tubercular involvement of the peripancreatic lymph nodes appears to be more frequent; however, a correct diagnosis is seldom made if there is no history of tuberculosis in another organ. Either CT or MR findings of macronodular tubercular involvement had been discussed in several reports [2, 7]. However, isolated pancreatic focal lesions under both imaging modalities have not previously been mentioned in the literature. We discovered that low signal intensity on both T1- and T2-weighted images was helpful and characteristic for differentiating tuberculomas from other neoplastic or inflammatory lesions, which show hyperintensity on T2-weighted images [7]. An identical configuration could also be recognized in 84% of cases of CNS tuberculomas reported in the previous literature [2]. Several reasons for the hypointensity on T2-weighted images were considered, including calcification, fibrosis, and free radicals produced by macrophages during active phagocytosis [2]. Although a definite diagnosis requires a positive culture, recognition of typical MR findings of tuberculoma can help suggest a tentative diagnosis, so that appropriate therapy can be instituted earlier during the 4 to 6-week waiting period for mycobacterium culture results. Low T1 and T2 signal intensity MR appearance should raise serious doubt about accepting a diagnosis of more common diseases, which tuberculosis frequently mimics. Knowledge of the MR appearance of tuberculosis lymphadenopathies may alert the clinician to the correct diagnosis of isolated lesions [7]. As for the differential diagnosis in cases showing hypointensity on both T1- and T2-weighted images, a fibromatous tumor, scar tissue, and other lesions having calcification or old hemorrhage, as well as a tuberculoma, should be kept in mind [2]. It should also be emphasized that diagnosis of a mass needs to be verified by examination of the tissue, even in inoperable lumps of the pancreas, to confirm the nature of the lump and to exclude curable pancreatic tuberculomas. Finally, active tuberculosis could lead to differential diagnoses in patients with an enlarged pancreas in which the usual diagnostic reasons do not yield conclusive results.

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REFERENCES
結核性胰臟炎在電腦斷層及磁振造影的獨特表徵—病例報告

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結核性胰臟炎雖為少見且易被誤診為惡性腫瘤，我們收集三例個案，其中兩例接受磁振造影
檢查後發現獨特結核結節表徵。回溯文獻報導，未曾有個案同時接受磁振造影及電腦斷層兩項
檢查之紀錄。本文應屬首次利用之報告。

目前，原發性結核性胰臟炎有漸增的趨勢。遇到不明原因患者又合併疑似胰臟腫瘤病變患者，
結核性胰臟炎應列入考慮範疇。若利用其磁振造影T1及T2高低訊號的獨特表徵，我們更可於術
前提供正確的診斷及治療方向。

關鍵詞：電腦斷層掃描，磁振造影，結核性結節，胰臟炎