

CT CHARACTERISTICS OF MUCIN-PRODUCING PANCREATIC TUMORS

By

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ABSTRACT:

To establish the CT characteristics of mucin producing pancreatic tumors, 6 patients with mucin-producing pancreatic tumors and 20 with other pancreatic diseases underwent computed topography (CT).

After injection of 200 ml of contrast material, scan of 5 mm thickness and 5 mm spacing were obtained.

Mucin-producing pancreatic tumors were divided into 3 groups and the CT characteristics were as follow:

1. Main duct tumors: consisted of cystic mass in or communicating with the dilated main pancreatic duct, septa or nodules, were found in the cyst.
2. Branch duct tumors: consisted of small cysts, containing no nodules, or septa, the diameter of the cysts 1-2 cm.
3. Peripheral tumors: consisted of a well defined cystic mass with nodules, and or septa. If this tumor is detected early a good prognosis may be obtained.

INTRODUCTION:

Mucin-producing pancreatic tumors were proposed as a specific type of pancreatic carcinoma (110), it was defined as a tumor associated with excretion of mucin through the patulous orifice of the enlarged ampulla of vater at endoscopy and marked dilatation of the entire main pancreatic duct associated with filling defects at pancreatography (12).

In 1988, Kuroda (8) proposed the terminology mucin-producing pancreatic tumor and includes mucin hypersecreting carcinoma and mucinous cystadenoma because histopathologically these two neoplasms represented the same entity.

The symptoms and signs of mucin-producing pancreatic tumors are attacks of abdominal pain, mimicking pancreatitis, abdominal mass, diabetes and jaundice (11).

The aim of this study was to establish the diagnostic CT criteria of the disease to differentiate it from other pancreatic disease, because if detected early a good

prognosis may be obtained.

MATERIALS and METHODS:

Six patients with mucin-producing pancreatic tumors and twenty with other pancreatic diseases, their age ranging from 45 to 65 years underwent CT at Al-Hussin and Bab-Alsharia University Hospitals and in other private Radiology centers. The cases without mucin-producing pancreatic tumors were selected at random. Among these twenty patients, five had chronic pancreatitis, 5 had pseudocyst secondary to acute pancreatitis and 10 had pancreatic carcinomas.

In accordance with classification of Nakazawa et al., (9), the 6 mucin-producing pancreatic tumors were classified into :

- 1- Main duct type
- 2- Branch duct type
- 3- Peripheral type.

Plain CT was performed first, followed by CT with high dose contrast material, 100 ml as a bolus injected just before scanning then 100 ml administered as a drip infusion during scanning. In some cases no oral contrast was used to avoid extra artifacts. Ten or five mm thickness and 10 or 5 mm spacing were used for scanning.

The machines used were GE 9800 and Sytic-plus GE equipments.

The location of tumors in the pancreas, the components of the tumors, solid or cystic are recorded in table I.

RESULTS:

CT findings are recorded in table I, cystic components were found in all 6 cases of mucin-producing pancreatic tumor. four cases of main pancreatic duct

tumor were located in the head, composed mainly of cystic components, 2 cysts contain septa, the main pancreatic duct (MPD) was entirely dilated > 75 %. No solid components or calcification could be seen in any of the MPD tumor (Fig. 1).

One case of branch duct tumor was located in the body, it was mainly cystic and the type of cyst was clustered, the MPD was not dilated, no calcification or solid components could be seen (Fig. 2).

One case of peripheral type tumor located in the tail of the pancreas, the tumor component was mainly cystic and the type of the cyst was isolated one, the cyst contains septa and excrescent nodules, the MPD was not dilated, no calcification could be seen (Fig. 3).

The characteristic CT findings of the mucin-producing pancreatic tumors were demonstrated by plain CT and were shown more clearly with high dose contrast enhanced CT. The six cases diagnosed as mucin-producing pancreatic tumors were proved surgically and histologically. To differentiate mucin-producing pancreatic tumors from other pancreatic disease:

1. Main pancreatic duct type tumors: the tumors mainly composed of cystic mass compressing the pancreatic parenchyma, the mass contains septa and sometimes nodules. The main pancreatic duct is dilated.
2. Branch duct type tumor: composed of small 1-2 cm clustered cysts, rarely septa are seen and the main pancreatic duct near the lesion is slightly dilated.
3. Peripheral type tumor: consist of cystic mass with loculation or septation. The MPD is not dilated.

Differentiation of cysts of mucin-producing pancreatic tumors from tumor necrosis was possible depending upon the irregularity of the boundary of the necrosis and the nonhomogeneous attenuation (Fig. 4). Cystic components were seen in 5 cases with other pancreatic diseases, 2 of them were mimicking a cyst of mucin producing pancreatic tumor depending upon the CT criteria but the MPD was not

dilated. One cyst was pancreatic carcinoma and the other was chronic pancreatitis "Tumor forming pancreatitis" (Fig. 5).

In four cases of pancreatic carcinoma small cysts were scattered inside the tumor, it was possible to differentiate these cysts from clustered cyst of mucin-producing pancreatic tumor because the cysts were scattered and less than 1 cm in diameter (Fig. 6).

Table (1): CT criteria for diagnosis of mucin-producing pancreatic tumors.

CT findings	Subtype of mucin producing pancreatic tumors.			Other Pancreatic diseases		
	MPD (4)	Branch (1)	Peripheral (1)	pancreatic carcinoma (10)	Chronic pancreatitis (5)	Pseudocyst (5)
Location of the tumor						
Head	3	0	0	8	4	0
Body	0	1	0	1	0	0
Tail	0	0	1	1	0	0
Diffuse	10	0	0	0	1	5
Components of the tumor						
Solid	0	0	0	7	3	0
cystic	3	1	1	0	0	5
Mixed	1	0	0	3	2	0
Content of cyst						
Septum	2	0	2	0	0	2
Nodule	2	0	2	0	0	2
Calcification	0	0	0	0	0	0
Necrosis in solid mass	0	0	-	3	0	0
Amount of dilata. of MPD						
Non	0	0	1	8	4	4
< 75 %	0	1	0	1	1	1
> 75 %	4	0	0	1	0	0
Location of dilat. of MPD						
Entire	3	1	0	0	0	0
Distal	0	0	0	1	1	1
Proximal	0	0	0	0	0	0
No dilatation	0	0	0	8	4	4

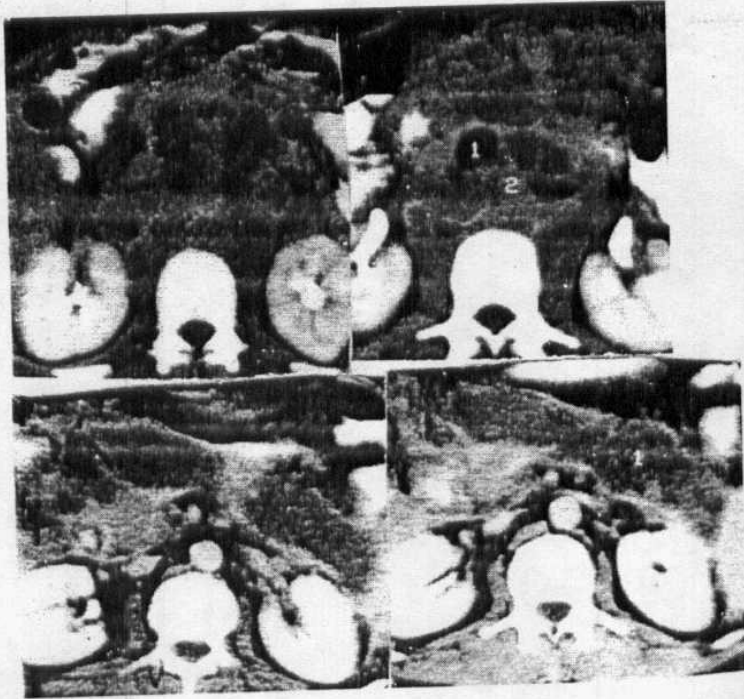


Fig. (1): MPD tumor composed of mainly cystic component. Notice dilatation of the main pancreatic duct. Excrescent nodules and septa are seen.

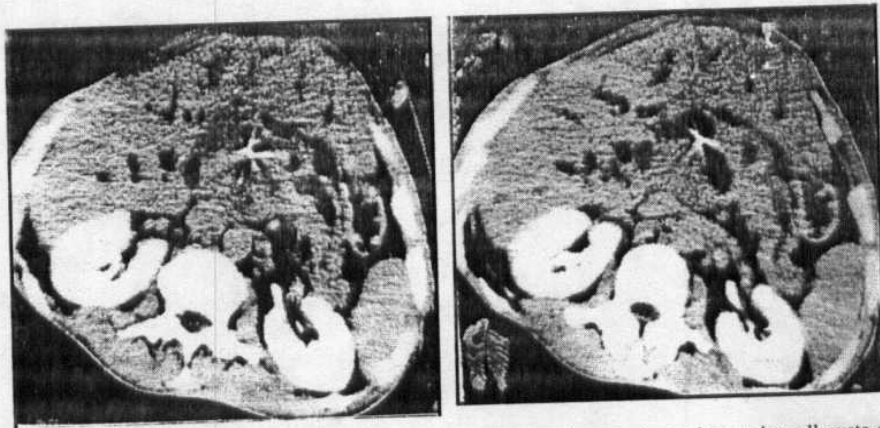


Fig. (2): Branch duct tumor seen in the body, serial CT scans demonstrate clustered small cysts of almost the same size.

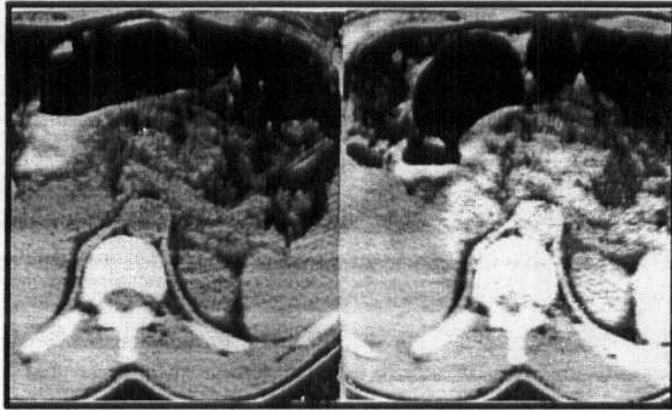


Fig. (3): Peripheral duct tumor seen in the body and tail, composed mainly of cystic nature.

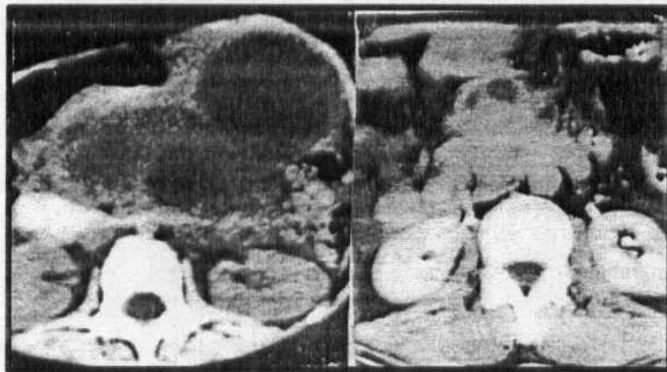


Fig. (4): (a) Cyst of mucin producing pancreatic tumor has regular boundary and homogeneous attenuation (b) Tumor necrosis has irregular boundary and nonhomogeneous attenuation.

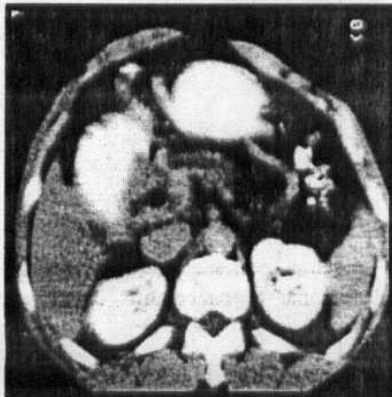


Fig. (5): Tumor forming pancreatitis.

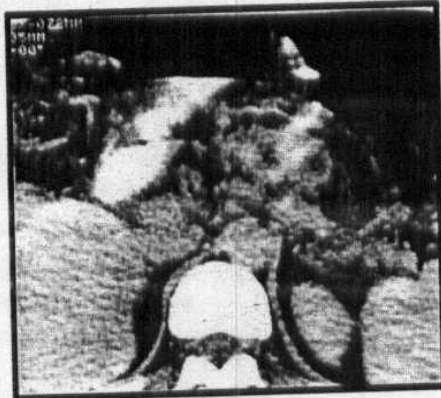


Fig. (6): Pancreatic carcinoma. Small cysts less than 1 cm in diameter and scattered in the tumor. Notice that cysts of mucin producing pancreatic tumors are clustered and more than 1 cm.

DISCUSSION:

A mucin producing pancreatic tumor can be benign and malignant, even if malignant, it is more curable than ordinary pancreatic carcinoma and has a better prognosis, and if advanced it is easier to resect (12).

Ohhash et al., (11) have reported that five of seventeen patients with mucin-producing pancreatic tumors had more than four years survival rate after resection. The characteristic growth pattern of each type of mucin-producing pancreatic tumor are taken into consideration in our CT criteria.

In the main duct type, a large volume of mucin is produced resulting in marked dilatation of the main pancreatic duct, while in branch duct type the cystic dilatation occurs in neighboring branches, and in peripheral ductal type isolated cystic lesions results.

The characteristic CT findings of the cystic components and MPD in each type of mucin-producing pancreatic tumors are the most important diagnostic clues. To visualize these characteristics high dose contrast enhanced CT with thin sections were used in our technique. With CT evaluation of this tumor, it is important to provide contrast between a tumor, mucin material and surrounding tissue by administering a large volume of contrast material (6), also to reduce partial volume effect and increase spatial resolution with thin sections (2).

Inadequate CT techniques may be the reason for the low diagnostic ability of CT in previous studies (5).

Dilatation of the MPD over its entire length and the presence of excretion nodules within it are specific findings in main duct type tumors (12). Fistula formation in the duodenum or bile duct may occur due to mechanical compression associated with the expansion of MPD (8).

Chronic pancreatitis sometimes causes dilatation of the MPD over its entire length, however the ratio of the anteroposterior diameter of MPD to that of the pancreatic parenchyma is less than 50% according to the report of Korosawa et al., (7) and there are usually no excrescent nodules within the pancreatic duct, just calcification. Clustered small cysts are visualized on CT in cases of branch duct type. These small cysts reflect the characteristic focal cystic dilatation of branch ducts seen on ERCP (12).

Retention cysts secondary to pancreatic carcinoma or pancreatitis can cause confusion with branch duct type, however differentiation is possible with use of the

CT criteria because retention cysts are usually solitary and if multiple they are scattered and usually smaller less than 1 cm in diameter. Serous cystadenoma is also a tumor consisting of multiple small cysts, it may be possible to differentiate it from branch duct type because the former has honey comb appearance consisting of central satellite fibrotic scar and numerous tiny cyst (3).

Agostini et al., (1) have found that peripheral mucin-producing pancreatic tumors have relatively large well defined cystic tumor with septa and/or excrescent nodules.

In our study we can differentiate this peripheral type from pseudocysts and large retention cysts by the presence of septa and/or excrescent nodules. However we agree with the opinion of Friedman et al., (4) and Shigeki et al., (12) that pseudocysts and retention cysts may have septa and/or mural nodules and cannot be reliably differentiated from peripheral type tumors on the bases of the CT findings alone. So careful follow up and aspiration of the cyst is necessary.

In conclusion CT with a large volume of contrast material and thin sections as well as searching for the specific CT criteria of the tumor will play an important role in differentiating mucin-producing pancreatic tumors from other pancreatic diseases. Classification into subtypes is not necessarily important because no remarkable difference of the prognosis among the three subtypes has been noted (11).

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الخصائص التشخيصية لأورام البنكرياس المفترزة لمادة الميوسين باستخدام الأشعة المقطعية بالكمبيوتر

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أجرى هذا البحث على ستة وعشرون مريضاً من الذين يعانون من أمراض مختلفة بالبنكرياس ولبيان الفروق التشخيصية باستعمال الأشعة المقطعية التي يمكن أن تستخدم للفرقة بين أورام البنكرياس التي تفرز مادة الميوسين وبين غيرها حيث أن تشخيص هذا النوع الأخير مبكراً يختلف عن الأنواع الأخرى من الأورام من حيث إمكانية علاج وتحسن حالة المريض نسبياً إذا ما قورن بالأنواع الأخرى من الأورام التي غالباً ما تكون نتائجها غير مرضية .
وخلال البحث تبين لنا وجود ثلاثة أنواع من الأورام التي تفرز مادة الميوسين النوع الأول وهو ما يصيب القناة البنكرياسية الرئيسية والنوع الثاني هو الذى يصيب القناة البنكرياسية الفرعية أما النوع الثالث فهو الذى يصيب القنوات السطحية .