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CT differentiation of solid serous cystadenoma vs endocrine tumor of the pancreas

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ABSTRACT

Aim: To differentiate between solid serous cystadenoma (SSCA) and endocrine tumor (ET) of the pancreas using dynamic CT findings.
Materials and methods: Between 2001 and 2008, there were 3 SSCA and 15 ET surgically resected in our institute, for whom preoperative multidetector-row CT were available. Various CT features were retrospectively evaluated by two radiologists in consensus for the differentiation between the two entities. Delay time for early and delayed phase images were 40 and 180 or 240 s, respectively. For qualitative assessment, density of the tumors relative to the surrounding parenchyma was evaluated, along with other characteristic features. In patients for whom digital data were available, CT values of the tumors were measured, and quantitative assessment was also performed. Relative and absolute washout rate (RWR and AWR, respectively) were also calculated.
Results: Mean sizes of the two groups were similar. Tumors were seen as low density area more frequently in SSCA than in ET on unenhanced CT (3/3 vs 1/14), and also on the delayed phase image (2/3 vs 0/14) ($p < 0.05$). Fibrous capsule was observed more frequently in SSCA (2/3) than in ET (0/14). CT value of the tumor on unenhanced CT was significantly lower, and RWR was higher in SSCA than in ET ($p < 0.05$, Mann–Whitney's *U* test). The difference in delayed phase CT density and AWR did not reach statistically significant level.
Conclusion: Unenhanced and enhanced CT findings may be of value in differentiation between SSCA and ET.

1. Introduction

Solid type serous cystadenoma (SSCA) of the pancreas is a rare variant of serous cystadenoma (SCA), which is composed of acini with glandular spaces [1] that are too small to be recognized as cystic on imaging, therefore giving solid macroscopic appearances. Sporadic case reports [2–7] have described that SSCA is a well-demarcated hypervascular solid tumor on dynamic CT or MR, and on angiography, which have been reportedly indistinguishable from endocrine tumor (ET) of the pancreas, the most common hypervascular solid tumor of the organ [8–10]. Because ET may have hormonal activity or is a potentially malignant lesion, it usually requires surgical resection [1,8–10], whereas SSCA is basically a benign entity which may allow watchful observation unless it is symptomatic [1–7]. It is clinically important, therefore, to differentiate these two entities.

We hypothesized that any CT feature may be of use in differentiation of SSCA from ET, and conducted this retrospective study. Institutional review board approved this study and waived obtaining informed consent because of its retrospective nature.

2. Materials and methods

Between 2001 and 2009, review of the pathological reports revealed 3 SSCA and 18 ETs all of which were surgically resected in our institute. Among these, there were no preoperative CT available in 3 ETs, and therefore 3 SSCA and 15 ET composed the study population in this study. All SSCA were women, with ages of 57, 58, and 74 years old, whereas 5 men and 10 women were included in ET, with age ranging from 41 to 74, with a mean of 61 years old. 15 ET included 6 non-functioning and 9 functioning tumors: histologically, there were 5 carcinomas (2 non-functioning, one

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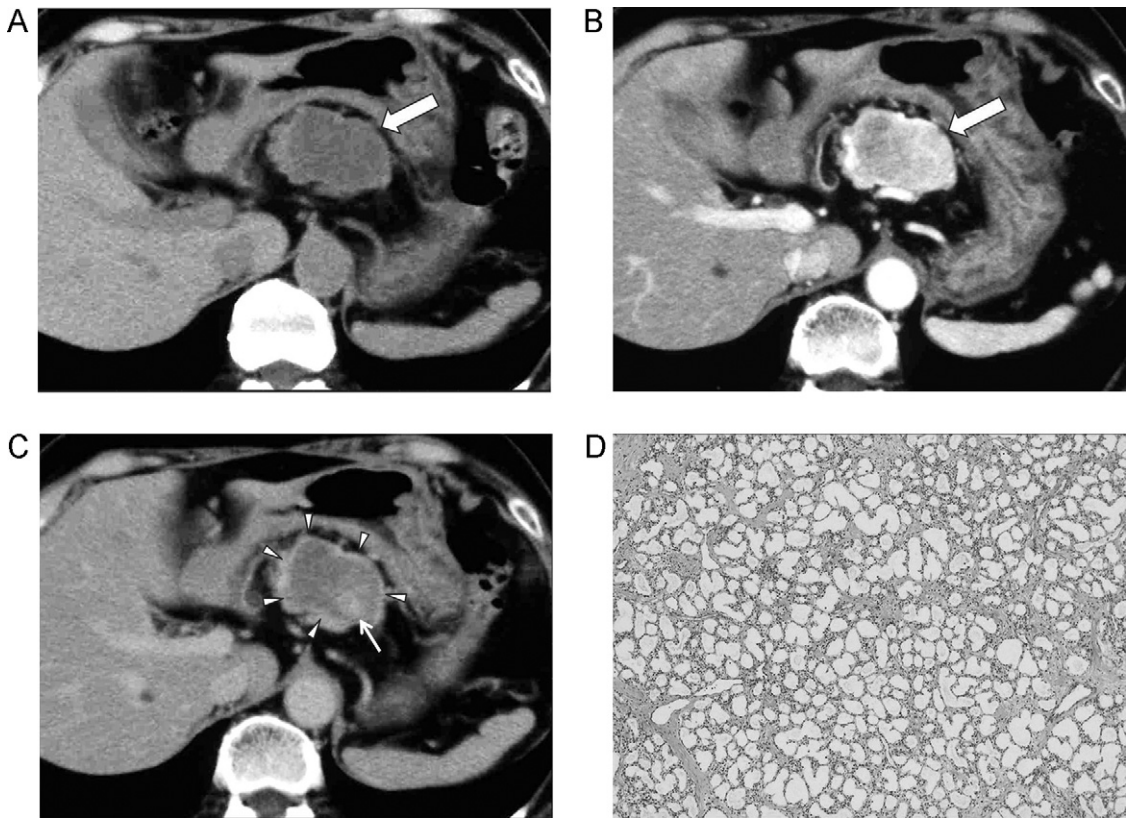

Fig. 1. 74-Year-old woman with solid serous cystadenoma at body of pancreas. (A) Unenhanced CT. Tumor is shown as low density area (arrow) relative to surrounding pancreatic tissue (not shown in this slice). CT value of tumor was 22 HU. (B) Early phase dynamic CT. Entire tumor is strongly enhanced (arrow). (C) Delayed phase CT. Tumor is shown as low density area and washout is evident. At left lower corner of the mass, there is nodular area of prolonged enhancement (arrow), where dense fibrocollagenous stromal bands were recognized at pathological assessment, which was not called central scar. Fibrous capsule is clearly seen (arrowheads). CT value was 63 HU and relative washout rate was 0.56. (D) Photomicroscopy (hematoxylin and eosin stain, original magnification 40×). Tumor consists of small cystic structures measuring approximately 60 μm in diameter along with scanty fibrous stroma.

Table 1
Qualitative assessment of CT density of the tumors.

	Unenhanced	Early	Delayed
All cases			
SSCA	*L*/*I*/*H* = 3/0/0	*L*/*I*/*H* = 0/0/3	*L*/*I*/*H* = 2/0/1
ET	*L*/*I*/*H* = 2/10/2[a]	*L*/*I*/*H* = 1/2/12	*L*/*I*/*H* = 0/2/12[b]
	$p < 0.01$	NS	$p < 0.05$
Excluding one ET with fatty pancreas and three hypovascular ETs			
SSCA	*L*/*I*/*H* = 3/0/0	*L*/*I*/*H* = 0/0/3	*L*/*I*/*H* = 2/0/1
ET	*L*/*I*/*H* = 1/9/1[a]	*L*/*I*/*H* = 0/0/12	*L*/*I*/*H* = 0/1/9
	$p < 0.01$	NS	$p < 0.05$

(χ^2 test, Mann–Whitney's *U* test)

SSCA, solid serous cystadenoma; ET, endocrine tumor; *L*/*I*/*H*, low/iso/high density as compared to the surrounding pancreas parenchyma; NS, not significant.

[a] In one case, unenhanced CT images were degraded and not available for review.

[b] In another case, delayed phase CT images were not obtained due to machine trouble.

malignant insulinoma, one carcinoid tumor, and one malignant gastrinoma), 5 well differentiated tumors of uncertain behavior (3 non-functioning, one pancreas peptide-secreting tumors, and one insulinoma), and 5 well differentiated benign tumors (one non-functioning, 2 serotonin-secreting, one pancreas peptide-secreting, and one multihormone-secreting tumors). One well differentiated benign tumor with pancreas peptide secretion had small cystic component within solid tumor, but the remaining 14 ET showed macroscopically solid appearance.

There were two CT equipment used: 4-detector-row CT (Aquilion 4, Toshiba, Tokyo, Japan) and 64-row-detector CT (Aquilion 64, Toshiba, Tokyo, Japan). 3 mm collimation with 3 mm reconstruction, pitch 5.5, 120 kVp, and 150 mA s were used for the former, and 0.65 mm collimation with 2 mm reconstruction, pitch 5.5, 120 kVp, and variable mA s were used for the latter. There were three different protocols applied: first protocol was for the 4-row CT in which 100 ml of iodine contrast medium of 300 mgI (bodyweight <55 kg, Iopamiron 300, BayerSchering Pharmacoceuticals, Germany) or 370 mgI (bodyweight ≥55 kg, Iopamiron 370, BayerSchering Pharmacoceuticals, Germany) was injected in 30 s, and early and delayed phase images were obtained at 40 s and 180 s after contrast injection, following unenhanced images: second one was for the 64-row CT in which 600 mgI/kg iodine contrast medium was injected in 30 s, and early and delayed phase images were obtained at 40 s and 180 s after unenhanced scan: third one was

Table 2
Pathological details of the three solid serous cystadenomas.

Case #	Age/sex	Size (cm)	Size of gland (μm)	Fibrous stroma	MPD dilatation	CS	FC	NEC
1	74/F	4.2	60	Coarse	No	No	+	None
2	57/F	2.1	50	Coarse	No	No	+	None
3	58/F	3.2	25	Dense	No	No	+	None

MPD, main pancreatic duct; CS, central scar; FC, fibrous capsule; NEC, necrosis.