



MD Spiral CT appearances of pancreatic tail insulinoma

Peer review status:

No

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Article ID: WMC004688

Article Type: Case Report

Submitted on: 31-Aug-2014, 10:50:05 PM GMT **Published on:** 01-Sep-2014, 06:15:45 AM GMT

Article URL: http://www.webmedcentral.com/article_view/4688

Subject Categories: RADIOLOGY

Keywords: Insulinoma; MD Computed tomography; Localization, diagnosis; Dynamic enhanced scan

How to cite the article: Hilendarov AD, Nedeva A, Petrova A, Simova E. MD Spiral CT appearances of pancreatic tail insulinoma. WebmedCentral RADIOLOGY 2014;5(9):WMC004688

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Source(s) of Funding:

University hospital staff in the Dept. of Diagnostic imaging and surgery

Competing Interests:

NO any competing interests

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Abstract

Introduction. Pancreatic endocrine tumors (PETs) are primarily well-differentiated tumors composed of cells that resemble normal islet cells but that arise from pancreatic ductal cells. They are classified as functioning or nonfunctioning according to their associated clinical symptoms; insulinoma, gastrinoma, and glucagonoma are the most common functioning PETs. Insulinomas are the most common category of pancreatic endocrine tumors, with an annual incidence of 1-4 cases per million people. Most are intrapancreatic, benign and solitary. Therefore, they have an excellent prognosis after surgical resection. However, the localization diagnosis of insulinomas still poses a challenge to surgeons and radiologists.

Case Report

A 36-years old man presented with a one-month history of fainting attacks and dizziness, symptoms of hypoglycemia such as hunger, sweating, palpitations, loss of consciousness and syncope.

We were asked to locate the tumor. The ultrasound examination showed no expansive formations in the pancreatic area (Fig. 1). We tried abdominal enhanced spiral CT to localize the tumor, but that wasn't successful. Therefore, we tried a new method of MD spiral CT scanning and localized the tumor.

Discussion

Insulinomas are the commonest islet cell tumors of the pancreas, followed by gastrinomas. Preoperative localization is very helpful in planning the operation: it allows the surgeon to determine whether simple tumor resection or partial pancreatectomy is likely to be required.

The imaging algorithm usually starts with US, followed by helical CT. Angiography and portal venous sampling may be useful in cases where CT is negative. Endoscopic US is also a newer and sensitive modality for pre-operative localization

The advent of spiral MDCT has improved the detection of insulinomas compared with conventional CT.

Case Report(s)

Endocrine tumors of the pancreas originate from multipotential stem cells that have retained the capacity to proliferate and differentiate themselves in the various cellular lines that make up this group of neoplasms. Insulinomas represent the most frequently found functioning endocrine tumors of the pancreas and are benign in most cases (85%–99%), are single (93%–98%), and have diameters of less than 2.5 cm. Eighty to ninety percent of insulinomas are < 2 cm in size and the lesions are distributed equally throughout the head, body and tail of the pancreas[1]. Thus, localization diagnosis before operation is important.

In the present case, the tumor was occult and could not be found by either abdominal computed tomography (CT) or ultrasonography. Therefore, we tried a new method of CT scanning and localized the tumor. This paper introduces the method.

We present a case showing classical appearances on helical CT. We would like to emphasize the need for performing helical CT whenever the diagnosis is suspected, due to the ability to image the pancreas in the early arterial as well as in the equilibrium phase. It should also be noted that water should be given instead of radio-opaque oral contrast as islet cell tumors may also be found in the bowel wall.

Case Report

A 36-years old man presented with a one-month history of fainting attacks and dizziness, symptoms of hypoglycemia such as hunger, sweating, palpitations, loss of consciousness and syncope. On routine blood examination, all parameters were within limits, except for a reduced blood glucose level. A blood sample during one of the episodic attacks showed the blood glucose level to be 38 mg/dl. These symptoms had lasted 3 years. During that time, he had been to many hospitals for treatment, but none of them could localize the tumor, and no one was willing to perform an exploratory operation.

We were asked to locate the tumor. The ultrasound examination showed no expansive formations in the pancreatic area (Fig. 1). We tried abdominal enhanced spiral CT to localize the tumor, but that wasn't successful.

Figure 1. US image of pancreas without visible focal

lesions

A subsequent computed tomography (CT) investigation in the arterial phase using “smart prep options”, and slice thickness was 5 mm.. Water was used as an oral contrast medium, to detect any tumor in the walls of the upper gastro-intestinal tract, which can be missed if radio-opaque contrast is used orally. All of the data are then transferred to our 3D workstation for VR.

The insulinoma was finally localized in the tail of the pancreas, resembling hypervascularized expansive formations (Fig. 2)

Figure 2.a Axial images of the pancreas – hyperdense formation in the tail of the pancreas.

Figure 2.b/ Coronal images of the pancreas – hyperdense formation in the tail of the pancreas.

All images are reviewed with multiplanar reformation as well as interactive 3D VR. The brightness, opacity, and window width and level can be adjusted in real time to accentuate the wall of the gastrointestinal tract and optimize the visualization of abnormalities. In the evaluation of the mesenteric vessels, VR is the main algorithm used. Arterial phase contrast-enhanced CT scan demonstrates a solitary 1.3 x 1.4cm enhancing mass in the pancreatic tail (Figure 3).

Figure 3. Post processed MIP CT images revealing arterial supply of the tumor formation in the tail of the pancreas.

The tumor was homogenous, without calcification or necrosis and the peripancreatic fat was well preserved. The rest of the pancreas, adjacent stomach, duodenum and abdominal viscera were also normal. There was no adjacent lymphadenopathy (Figure 4).

Figure 4. VR reconstruction of CT investigation. Best visualization of the tumor formation.

A 1.5-cm insulinoma was resected at surgery. The lesion had low malignant potential owing to its low mitotic rate, and there was no evidence of invasion of the surrounding tissues . After resection of the insulinoma, the patient was followed up for 6 mo. His blood glucose level was in the normal range, and no symptoms of hypoglycemia recurred.

Discussion

Insulinomas are the commonest islet cell tumors of the pancreas, followed by gastrinomas. Glucagonomas are the least common islet cell tumors.

Some researchers insist that preoperative localization diagnosis is necessary and valuable for surgery[2].

Preoperative localization is very helpful in planning the operation: it allows the surgeon to determine whether simple tumor resection or partial pancreatectomy is likely to be required.

Most insulinomas are under two cm in size. In 90% of cases, these are solitary and benign. Eight percent are multiple and these may present as diffuse hyperplasia or micro adenomatosis in 2% of cases(3). Insulinomas are predominantly found in the pancreatic substance, whereas gastrinomas in 28-44% of cases may be extra-pancreatic in the stomach, duodenum and lymph nodes .

Extra pancreatic tumors are usually small and located in the duodenal wall and are least likely to be detected pre-operatively (4). The role of imaging is in the localization of the tumors pre-operatively. Multiple modalities are useful in the detection of islet cell tumors. However, upto 27% of islet cell tumors are not detected pre-operatively (4).

The imaging algorithm usually starts with US, followed by helical CT. Angiography and portal venous sampling may be useful in cases where CT is negative. Endoscopic US is also a newer and sensitive modality for pre-operative localization

The advent of spiral MDCT has improved the detection of insulinomas compared with conventional CT [5]. However, occult insulinomas are not rare. There is still argument about which phase is more sensitive in detecting insulinoma. Some subscribe to the arterial phase, whereas others espouse that the pancreatic phase may be more useful[6]. Furthermore, different injection rates of contrast material may have great effects on enhancement of tumor and pancreas contrast. Also, the time point of the peak may be different[7,8].

Therefore, when we are confronted with an occult insulinoma, how should we localize the tumor by CT scanning? And why is abdominal dual-phase spiral CT not able to find the tumor in these patients?

First of all, the interval of occult insulinoma-to-pancreas contrast is not obvious. We know that tumor delineation is based mainly on the interval of tumor-to-pancreas contrast during contrast-enhanced CT. Generally speaking, when the interval of tumor-to-pancreas contrast exceeds 30 HU, it is relatively easier to distinguish the tumor from the surrounding pancreas[7].

Conclusion

However, in this case, the interval of

tumor-to-pancreas contrast was less than 20 HU most of the time. Secondly, as with the individual differences, the time point of the enhancement value peak of the tumor is uncertain. Thus, it is possible that abdominal dual-phase spiral CT cannot catch the time point of the peak. For these reasons, we used "smart prep" options to make arterial phase of pancreatic enhanced CT scanning. Also, it supplies a large number of images for radiologists to search the tumor. Therefore, when we are confronted with an occult insulinoma, pancreatic dynamic consecutive enhanced CT scanning may help us to localize the tumor.

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Illustrations

Illustration 1

Figure 1. US image of pancreas without visible focal lesions



Illustration 2

Figure 2.a Axial images of the pancreas – hyperdense formation in the tail of the pancreas

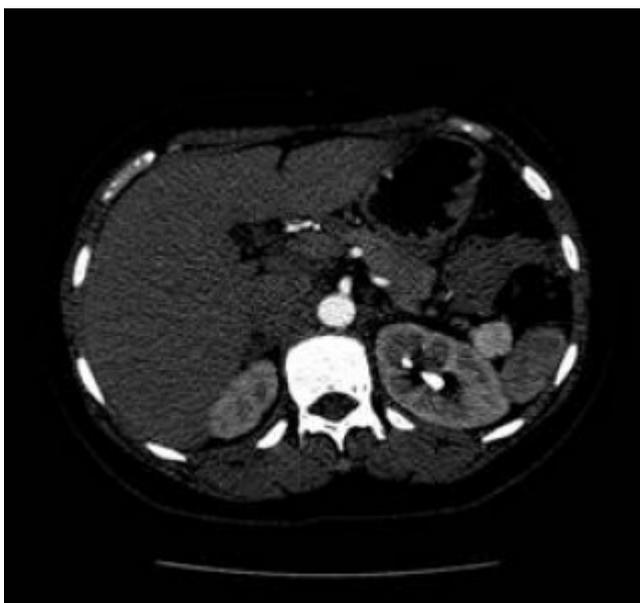


Illustration 3

Figure 2.b/ Coronal images of the pancreas – hyperdense formation in the tail of the pancreas.



Illustration 4

Figure 3. Post processed MIP CT images revealing arterial supply of the tumor formation in the tail of the pancreas.

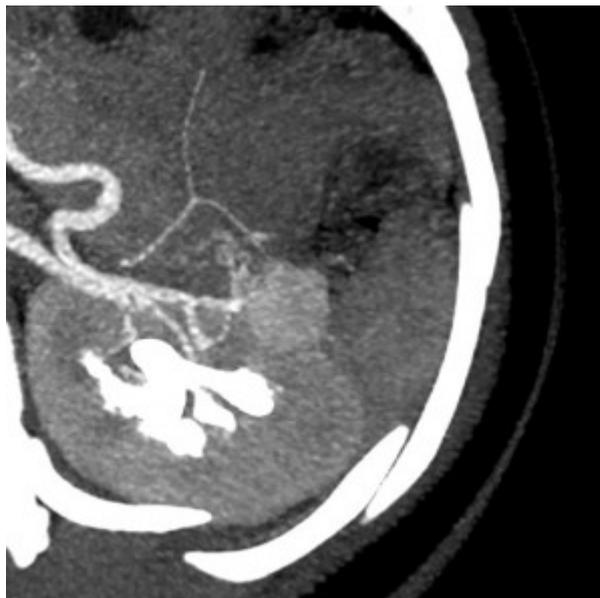


Illustration 5

Figure 4. VR reconstruction of CT investigation. Best visualization of the tumor formation

