



MDCT appearances of pancreatic insulinoma as well as the other well differentiated endocrine tumors

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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; insulinomas, gastrinomas and glucagonomas are the most common function-ing PETs

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 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 and Conclusion: 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.

Keywords: Pancreatic endocrine tumors; Pancreatic insulinoma; Islet cell tumors; Gastrinomas; Glucagonomas

1 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; insulin normal, gastrinomas, and glucagonomas are the most common function-ing 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.

2 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.

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

All images are reviewed with multi planar 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 1.4 cm enhancing mass in the pancreatic tail (Figure 3).

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.

3 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 surgeons 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, up to 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].

4 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.

Compliance with ethical standards

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Disclosure of conflict of interest

No one of the authors haven't conflict of interests

Statement of ethical approval

The authors have appropriate ethical approval from the Medical university-Plovdiv

Statement of Informed consent

Informed consent was obtained from all individual participants included in the study.

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