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Pancreatic lipoma: An incydentaloma which can resemble cancer – analysis of 13 cases studied with CT and MRI

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Summary

Background: The purpose of this article is to present computed tomography (CT) and magnetic resonance imaging (MRI) findings of rare pancreatic lipomas.

Material/Methods: The analysis covered 13 patients (7 men and 6 women, aged 47-88, average: 65.6 years), with 13 pancreatic lipomas, whose cases constituted the basis for 10 contrast-enhanced CT and 5 MRI studies.

Results: Lipomas measured from 6 mm to 32 mm (average 12.8 mm) and were located in the pancreatic head (n=7), body (n=2), tail (n=3) and uncinate process (n=1). Most lesions (n=11) were homogenous, well-circumscribed.

On contrast-enhanced CT scans, macroscopic fat (<–30 HU) was present in 9 lipomas. In one case (10 mm lesion) the density was -20 HU and the lesion was poorly circumscribed with septations, which altogether made it difficult to precisely characterize its contents.

On MR scans fat was demonstrated in all studied cases (n=5).

Conclusions: Lipomas are rare, small, homogenous and well-circumscribed pancreatic tumours. The most important feature, decisive for the diagnosis and distinguishing them from pancreatic carcinoma, is detection of fatty tissue on CT and MR scans. In these cases differential diagnosis includes other rare fatty tumours of the pancreas (focal fatty infiltration, teratoma, liposarcoma).

Key words: lipoma • liposarcoma • pancreas • computed tomography • magnetic resonance

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Background

Mesenchymal tumours, among others lipomas, constitute 1% of all pancreatic tumours. The most rare are those which include fatty tissue (lipoma, liposarcoma). The majority of lipomas have characterisitc features visible during imaging which allow their differentiation from other lesions. Identification of such features together with the lack of clinical symptoms allow, in most cases, correct diagnosis without the necessity of histopathologic confirmation.

The imaging shows pancreatic lipomas as well-defined, homogenous lesions without infiltration of peripancreattic fatty tissue, widening of the pancreatic duct and the common bile duct. On ultrasound (US), lipomas are usually hyperechoic, although some lesions may demonstrate hypoechogenicity. On computed tomography (CT), the diagnosis of lipoma is based on identification of fatty tissue of low homogenous density (from –120 HU to –30 HU) without visible contrast enhancement [1]. (Figure 1)

On MR imaging these lesions have signal intensity typical for fatty tissue in all sequences: increased on T1-weighted images (obtained with the use of the gradient echo sequence – GRE, but also on spin echo – SE – and the turbo spin echo – TSE sequences) and increased on

Figure 1. Pancreatic head lipoma. Contrast enhanced CT scan. Well circumscribed focal lesion in pancreatic head, measuring 16×11 mm and density of -83 HU consistent with fatty tissue.

T2-weighted images obtained with the use of TSE sequence (on SE sequences, which are rarely used for the imaging of the pancreas, the signal intensity of fat is moderate) (Figure 2A,B). However, in case of chemical shift imaging, the signal of lipoma is not supposed to decrease on out-of-phase images in comparison to in-phase images. However, there is a low signal intensity rim visible on out-of-phase images in-between lipoma and pancreatic parenchyma, corresponding to the chemical shift artefact (Figure 3A,B). Similarly to CT, no contrast enhancement of the lesion is noted [2] (Figure 4A,B).

However, not in all cases imaged by US and CT it is possible to recognize pancreatic lipoma unambigously. Pancreas is not always visible on US, mainly because of intestinal gases which may cover them. Moreover, some lipomas are hypoechogenic, which makes it impossible to distinguish them from pancreatic cancer. In case of small lipomas (constituting the majority of such lesions) imaged by CT, measurement of density is not always possible, which does not allow confident diagnosis. MR provides the basis for the most relevant identification of fatty tissue and it should be performed in order to obtain final diagnosis of lipoma in unequivocal cases. It is also suggested to conduct follow-up studies which confirm the stable lesion size. Determination of tumour enlargement during follow-up is suggestive of malignancy (e.g. liposarcoma).

This article presents the imaging findings of 13 pancreatic lipomas, including characteristic features allowing discrimination of lipoma from other pancreatic tumors, including pancreatic cancer and other lesions containing fatty tissue (focal fatty infiltration of the pancreas, teratoma, liposarcoma).

Material and Methods

In the period from 2006 to 2012 there were 13 cases of pancreatic lipoma diagnosed on the basis of CT and MR imaging. The clinical data together with CTs and MRs of the patients underwent retrospective analysis. Lipomas were identified in 13 patients including 7 men and 6 women aged 47–88 (mean – 65.6). None of these cases was confirmed histopathologically however, in 2 cases the final diagnosis was based on a follow-up MR examination after 7 and 61 months, and the identification of imaging features

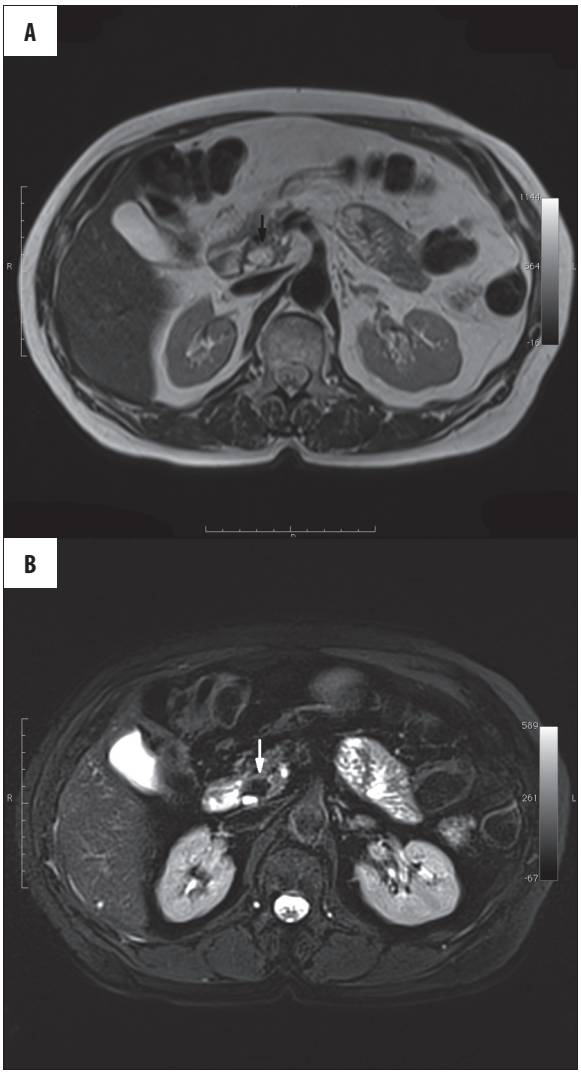

Figure 2. (**A**) Pancreatic head lipoma. MR T2 TSE (turbo spin echo) image shows hyperintense lesion 16×11 mm, located in pancreatic head, consistent with pancreatic lipoma. Signal intensity of lipoma identical with retroperitoneal fat. (**B**) Pancreatic head lipoma. MR T2 TSE fat sat image shows low signal intensity of pancreatic head lipoma. Signal intensity of lipoma identical with retroperitoneal fat.

typical for lipoma with the lack of clinical symptoms of pancreatic or liver disease (such as pancreas infection, diabetes, jaundice). Follow-up studies did not reveal enlargement of the lesions.

The primary reasons for imaging were as follows: stomachaches (n=6), control after surgical treatment of prostate cancer (n=1), suspected gall bladder cancer (n=1), suspected sigmoid cancer recurrence (n=1), follow-up after stent-graft implantation to the abdominal aortic aneurysm (n=1), imaging of focal liver lesions (n=2), evaluation of the biliary tract after liver transplantation (n=1).

CT was performed in 10 cases and MR imaging in 5. Among 5 MR studies, 2 constituted follow-up of lipomas diagnosed earlier on the basis of CT.

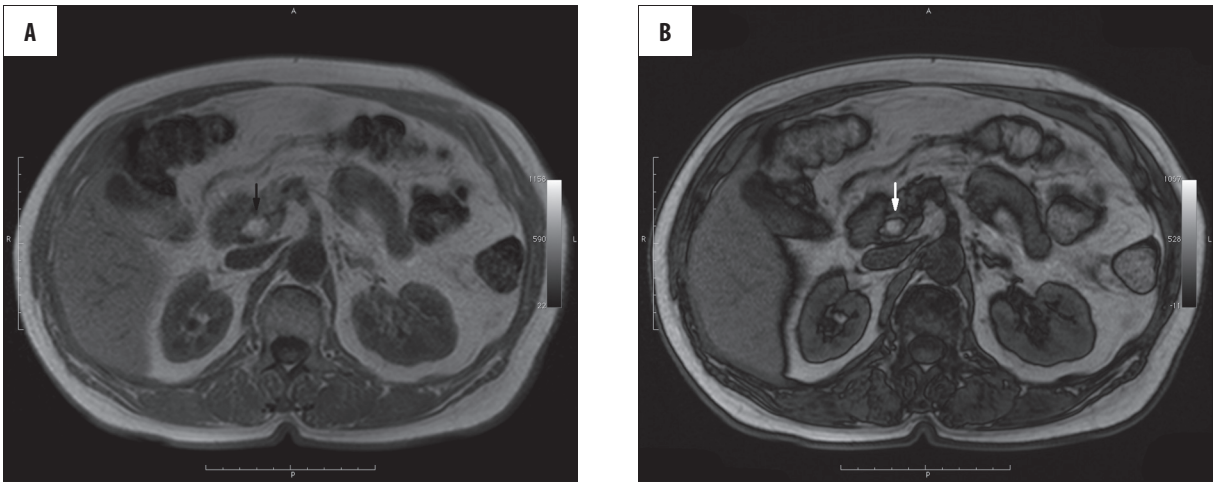

Figure 3. (**A**) Pancreatic head lipoma. High signal intensity of pancreatic head lipoma on MR chemical shift in- phase imaging. (**B**) Pancreatic head lipoma. On MR chemical shift out-of-phase imaging a hypointense demarcation line along circumference of the lipoma is visible, with hyperintense central part of the lesion.

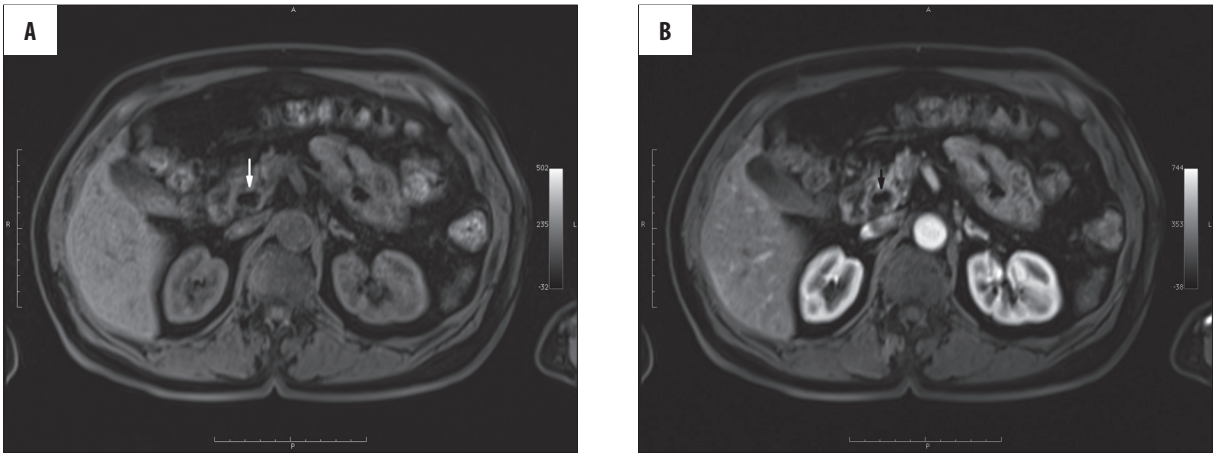

Figure 4. (**A**) Pancreatic head lipoma. MR T1 3D GRE fat sat image without contrast administration shows low signal intensity of pancreatic head lipoma compared to surrounding pancreatic tissue. Signal intensity of lipoma is identical with retroperitoneal fat. (**B**) Pancreatic head lipoma. No enhancement of pancreatic head lipoma on MR T1 3D GRE image after i.v. contrast administration.

Results

Eleven lipomas were well-defined, whereas the remaining 2 lesions were poorly demarcated. Five lesions had rather lobulated margins and in 2 lipomas internal septations were identified.

The greatest number of lesions was located in the head of the pancreas (n=7), the remaining ones were in the tail (n=3), body (n=2) and uncinate process (n=1).

The size of the lipomas (the biggest ones) was from 6 mm to 32 mm (average – 12.8 mm). The largest size of 6 lesions was ≤10 mm, the size of 6 lesions was between 11–20 mm and the remaining one was >20 mm.

All CT images were acquired during single phase after injection of contrast agent. The density of lipomas on contrast-enhanced CT scans ranged from –103 HU to –20 HU (average –64.1 HU). Among 10 lipomas studied with CT (sizes: 7–32 mm), 9 lesions had a density typical for fatty tissue (<–30 HU). However, the density of 1 lesion (diameter of 10 mm) was slightly higher and amounted to –20 HU. In this lesion internal septations were visible.

MR was performed in 5 patients with lipomas. Table 1 presents the characteristics of the lipomas' signals on T2-wieghted images (T2 TSE), T2-weighted images with fat-saturation (T2 TSE fat-sat), T1-weights in-phase and out-of-phase images and T1-weighted images obtained with the use of 3-dimensional gradient echo sequence (T1 3D GRE) before and after contrast material administration.

Discussion

The most frequent pancreatic cancer is adenocarcinoma, constituting 85% of all cases. Tumours other than ductal carcinoma constitute 5–15% of cases and tumours of mesenchymal origin amount to approx. 1%. The last tumour group includes also tumours originating from fatty tissue (lipoma, liposarcoma). Lipomas are formed from mature fatty tissue surrounded by a fibrous capsule. In the human body lipomas occur in locations where fatty tissue is present; in the abdomen, most frequently in the digestive

Table 1. Characteristics of 5 pancreas lipomas on MR imaging.

MR Sequence*	Hypointensivity	Isointensivity	Hyperintensivity
T2 TSE (n=5)	0	0	5
T2 TSE fat-sat (n=5)	5	0	0
IN-OUT – phase (n=5)	0	0	5
IN-OUT – out-of-phase (n=5)	3 – hypointense rim 2 – hypointense whole lesion	0	3 – hyperintensive central part
T1 3D GRE fat-sat (n=5)	5	0	0
T1 3D GRE fat-sat Contrast-enhanced (n=2)	2	0	0

* The brackets include number of patients who underwent particular MR sequences.

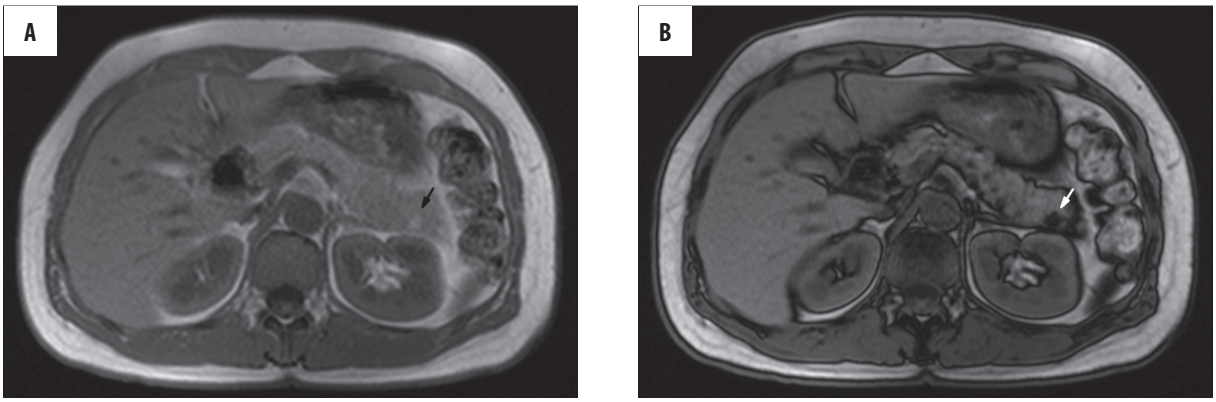

Figure 5. (**A**) Pancreatic tail lipoma 9×9 mm. High signal intensity of pancreatic tail lipoma on MR chemical shift in- phase imaging. (**B**) Pancreatic tail lipoma 9×9mm. Low signal intensity of the whole lipoma on MR chemical shift out-of-phase imaging.

tract. The first histopathologically confirmed case of pancreatic lipoma (located in the head) was published in 1989 by Bilard et al. [3].

Legmann et al. [4] identified the characteristic features of pancreatic lipoma on CT scans, such as homogeneity, low density of the lesion (amounting from –120 HU to –80 HU), its well-defined borders (without infiltration of intra- and extra-pancreatic structures) and lack of contrast enhancement (central and peripheral) [4–8]. In this study was no case of unenhanced CT examination. However, low densities of lipomas demonstrated during contrast-enhanced examinations allow the conclusions that the lesions would not show significant enhancement.

So far, less than 50 cases of pancreatic lipomas and only 4 cases of pancreatic liposarcomas have been published [1,9–11]. It seems that lipomas are more frequent than was previously regarded. Our study, presenting 13 pancreatic lipomas diagnosed within 6 years, also proves this. In all likelihood the frequency of lipoma identification increases with the increasing number of imaging tests and their improved availability. According to our knowledge, this article constitutes the first Polish radiological publication on pancreatic lipomas based on own materials.

The diagnostic problem may be differentiation between pancreatic lipoma and focal fatty infiltration of the pancreas. Although in the majority of cases both lesions have a density (CT) and signal (MR) typical of fatty tissue, focal fatty infiltration of the pancreas is a heterogenous lesion with poorly-defined margins and visible but faint, non-homogenous contrast enhancement [7,12].

In the majority of publications it has been stated that in case of chemical-shift MR imaging lipomas (built from mature fatty tissue) do not cause a relative signal decrease on out-of-phase images, unlike focal fatty infiltration of the pancreas [2]. This has not been confirmed in our study. In 2 out of 5 lipomas analysed with MR (sizes: 6 mm and 9 mm) relative decrease of signal intensity was noted on out-of-phase images within the whole lesion (Figure 5A,B), whereas in 3 remaining cases the presence of hypointense rim with hyperintense central part was demonstrated (Table 1; Figure 3A,B).

From the clinical point of view, differentiation between lipomas and focal fatty infiltration of the pancreas does not have any significance, as none of these lesions requires intervention or treatment (regarding lesions <3 cm). The most important issue in these cases is to confirm the presence of fatty tissue, which excludes diagnosis of adenocarcinoma and pancreatic neuroendocrine tumour.

The only case of fatty pancreatic lesion which requires surgery is liposarcoma. These tumours are usually bigger (>5 cm, and in most cases >10 cm) than lipomas, and heterogenous, containing linear areas with a density/signal of soft tissues [13]. It is presumed that the tumours

containing fatty tissue and bigger than 5 cm; tumours <5 cm but increasing in size on follow-up examinations or non-homogenous tumours, containing solid areas of soft-tissue density/signal should be removed due to increased risk of liposarcoma. Differentiation between lipoma and a rare type of lipogenic liposarcoma which is a well-separated homogenous tumour including fatty tissue may cause problems [14]. However, it is important to emphasize that so far, only 4 such cases have been described.

Conclusions

Pancreatic lipomas are rare tumours of mesenchymal origin, although it seems (also on the basis of the frequency of the occurrence in our materials) that they are more frequent than was previously considered. In the majority of cases CT and MR imaging is typical and the best modality is MR – in cases of small (<3 cm), homogenous fatty lesions with well-defined margins, not causing dilatation of the pancreatic duct and the common bile duct and not showing contrast-enhancement no histopathological confirmation is required. The differentiation between lipoma and pancreatic cancer is usually clear. However, a problem may appear when the lipoma has to be distinguished from other lesions containing fatty tissue (focal fatty infiltration of the pancreas, teratoma, liposarcoma), although in case of focal fatty infiltration, such discrimination constitutes no clinical difference and liposarcoma is usually a large (>5 cm), heterogenous and less frequent lesion (4 cases of this tumour in the pancreas have been described).

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