Percutaneous Biopsy under Simultaneous Ultrasound and Computer Tomography Guidance in Diagnosis of Isolated Pancreatic Metastasis of Clear Cell Renal Cell Carcinoma

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Abstract

Cancers of the kidney are a various group of tumors, most of which are of epithelial origin and malignant. Renal cell carcinoma (RCC) classically referred to as clear cell carcinoma is the most common kidney cancer (70-80% of all kidney cancers). The most common primary cancer site resulting in pancreatic metastases is liver, followed by colorectal cancer, melanoma, breast cancer, lung carcinoma and sarcoma. 65 year old man six years after nephrectomy due to clear cell renal cell carcinoma (ccRCC), attended regular abdominal CT examination, which revealed 28.9 mm focal lesion located in pancreatic tail. No other pathological lesions were detected. Patient underwent US guided biopsy preceded by CT pre-biopsy planning. Histopathological analysis of the obtained material confirmed clear cell carcinoma. The authors being aware of other than renal possible sites of clear cell carcinoma origin, additional tests such as membranous immunoreactivity with renal cell carcinoma (RCC), and immunohistochemical staining applied to identify the cellular origin and confirm the renal origin of the metastasis. This innovative, combined method of US guided biopsy supported by CT pre-biopsy planning can be helpful in the diagnosis of atypically located metastases of RCC. Our described case shows that in contrast to other well-known biopsy methods, our assay enables to obtain material for complete histopathological diagnosis and consequently start treatment. Moreover, presented method is based on diagnostic tools that are routinely available in every hospital such as US and CT. The only required modification is the installation of programme that enables to upload CT images containing marked planned needle path to the biopsy room, and simultaneous display of both - static CT image and US image performed in real time.

Keywords: Renal cell carcinoma, Clear cell renal cell carcinoma metastases, Pancreas, Pancreatic metastasis, Percutaneous biopsy, US and CT guidance

Abbreviations: RCC: Renal cell carcinoma; CT: Computer Tomography; US: Ultrasound Examination; MRI: Magnetic Resonance Imaging; PET: Positron Emission Tomography; ccRCC: Clear cell renal cell carcinoma; DFI: disease-free interval
Introduction

In the clinical estimation of pathological tumor lesions, including pancreatic tumors, we tried to determine their size, location and the type of histopathological pattern. To evaluate them, Roentgenographic Examination, Computer Tomography (CT), Ultrasound Examination (US), Magnetic Resonance Imaging (MRI), [1,2,3] and Positron Emission Tomography (PET) [4], are most frequently applied.

Histopathological analysis of pancreatic focal lesions is based on the material obtained during operation [5,6,7] or during aspiration biopsy [8,9].

Clear cell renal cell carcinoma (ccRCC) is the most common type of kidney cancer representing approximately 70-80% of such cases. More than 30% of patients have metastatic spread before they are diagnosed with ccRCC and in 20% of cases the cancer is locally advanced after diagnosis [10]. The most common sites for metastases are the lymph nodes, liver, lungs, bones, adrenal glands and brain. Metastases to the heart, gallbladder, unaffected kidney and intestine are less common. In medical literature there are also described metastases to other unusual sites such as the pituitary gland, trachea, thyroid gland, vagina, skin, cavernous body of the penis, seminal vesicles, pancreas and breast [11,12]. Clear cell renal cell carcinoma metastasizes to the pancreas in 2.8% of cases [13].

Case Presentation

A 65 year old patient six years after right nephrectomy and adrenalectomy due to clear cell renal cell carcinoma underwent regular abdominal computer tomography. CT images revealed suspicious focal lesion (28.9 mm in diameter) in the pancreatic tail.

Figure 1 US examination confirmed a hypoechoic, irregular lesion in the pancreatic tail (Figure 2) and the patient was referred for US guided biopsy preceded CT pre-biopsy planning. This innovative and combined method is being used by the authors for the diagnosis of peripheral lung tumors [14].

During the CT pre-biopsy planning measurements such as depth and distance of the tumor were made, planned needle path was established (Figure 3) and the needle insertion site was marked on the patient's skin.

All the gathered data was transferred to the biopsy room allowing the biopsy operator to visualize and compare simultaneously both images: a static CT image made during pre-biopsy planning consisting of all the gathered data and the measurements plotted in the CT image (Figure 4) with the real-time US image and the performed US guided biopsy.

(The specimens were taken with 90 x 0.9 mm diameter BALTON biopsy needles [15], and the needle insertion was performed only once trying to collect 2-4 samples.)
each time from the diagnosed lesion. The collected specimens were then examined histopathologically).

The microscopic analysis of the tissue obtained from the pancreatic focal lesion confirmed the presence of clear cell renal cell carcinoma (Figure 5), and immunohistochemical staining confirmed the renal origin of the metastasis (Figure 6). The patient has been currently referred for a surgical.

**Figure 3:** CT - pancreas tumor - planned needle path.

**Figure 4:** Procedure room. CT and US images visualizing simultaneously the same lesion in the pancreas.

**Figure 5:** Metastatic clear cell renal cell carcinoma, H&E staining, magnification 200x.

**Figure 6:** Metastatic clear cell renal cell carcinoma, membranous immunoreactivity with RCC, magnification 400x.

**Discussion and Conclusions**

ccRCC is a rare malignant cancer which presents with a broad spectrum of symptoms. Metastases occur in 1/3 of patients before they are diagnosed and metastatic dissemination or recurrence occurs in 50% of patients who undergo surgical treatment. The prognosis for renal cell carcinoma is largely influenced by a variety of factors, including tumor size, stage of disease, and degree of invasion, dissemination and disease-free interval-DFI [16]. Metastasis spreads through hematogenous and lymphatic routes [17]. Metastatic spread to the pancreas is usually hematogenous [18]. In the presented case, no metastases in other organs except for the pancreas were found by CT or US [16,18,19].

Single metastases and long disease-free interval (above 12 months) are associated with a better overall prognosis. Surgical removal of the single ccRCC metastases offers a 5-year survival of 35-60%. However, there are very few studies proving the impact of surgery in patients with disseminated ccRCC in whom metastases occurs at a different time after removal of the primary lesion [6,7,18].

The presented case showed how helpful the combined method of US guided biopsy supported by CT pre-biopsy planning could be in the diagnosis of atypically located metastases. The focal pancreatic lesion found in CT did not require any further action rather than observation and did not look suspicious enough to send the patient for surgical treatment. Without the patients' medical history of cancer, such a small pancreatic lesion detected by CT would require only observation and repeated tests. Using the combined method of US guided biopsy preceded by
CT pre-biopsy planning could help to establish diagnosis in unambiguous cases.

None of the mentioned examinations would separately give a proper diagnosis. In medical literature, there are some descriptions of diagnosing ccRCC based on intraoperatively obtained material [5,6,7]. However, there are no cases of ccRCC metastasis in the pancreas confirmed by US-guided biopsy.

In addition, the diagnosed pancreatic lesion had a size of only 28.9 mm in diameter. The combined method gave us the ability to obtain a diagnostic tissue sample from such a tiny lesion and consequently establish proper diagnosis and start treatment. It should also be noted that the innovative combined biopsy method presented by the authors has never been described in previous literature.

Declarations

Ethics approval and consent to participate

Our study has acceptance of the Commission of Ethics: Decyzja No 1/2006 Uczelniana Komisja Bioetyki ds. Badań Naukowych AWF Katowice 27 04 2006r.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

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Authors’ contributions

AW contributed to drafting and revising the manuscript critically and to the analysis and interpretation of the data. AK contributed towards data collection and drafting of the manuscript. MC was involved in conception, reviewing and finally approving the version to be published. All authors read and approved the final manuscript.

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