

PET-CT MONITORING IN THE TREATMENT OF PANCREATIC CANCER

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ABSTRACT

Pancreatic cancer is a disease characterized by low visualization, high metastasis, and lethality. The average life expectancy for this nosology is less than 1 year. Early diagnosis of pancreatic cancer is difficult due to the lack of specific symptoms. As a rule, at the time of tumor visualization, every third patient has regional lymph nodes involved in the process, and every second patient already has distant metastases. We present a clinical case of a 73-year-old patient with a diagnosis of: cancer of the pancreatic head St IV, T4N1M1. The woman's primary positron emission tomography (PET-CT) revealed a metabolically active lesion with a size of 26x21x32 mm. After the combined multi-stage therapy under the control of PET-CT, it was possible to achieve complete leveling of the primary tumor focus and a relapse-free course of the disease for 11 months.

Our clinical observation showed the effectiveness of dynamic control (using PET-CT) treatment of metastatic pancreatic cancer, which influenced the patient's treatment strategy.

Conclusion. Patients with pancreatic adenocarcinoma ECOG ≥ 3 , despite the prevalence of the process, should be offered comprehensive treatment.

Keywords:

pancreatic cancer, adenocarcinoma, positron emission tomography, chemotherapy, radiation therapy, adjuvant therapy.

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Information about funding: no funding of this work has been held.

Conflict of interest: authors report no conflict of interest.

For citation:

Roitberg G.E., Anikeeva O.Yu. PET-CT monitoring in the treatment of pancreatic cancer. South Russian Journal of Cancer. 2020; 1(4): 54-60.

<https://doi.org/10.37748/2687-0533-2020-1-4-7>

Received 18.09.2020, Review (1) 03.10.2020, Review (2) 28.10.2020, Accepted 01.12.2020

РОЛЬ ПЭТ-КТ В ВЫБОРЕ ТАКТИКИ ЛЕЧЕНИЯ ПРИ РАКЕ ПОДЖЕЛУДОЧНОЙ ЖЕЛЕЗЫ: КЛИНИЧЕСКОЕ НАБЛЮДЕНИЕ

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РЕЗЮМЕ

Рак поджелудочной железы — злокачественное новообразование, исходящее из протоков и эпителиальной ткани железы, с высоким метастазированием и летальностью. Средняя продолжительность жизни при этой нозологии составляет менее 1 года. Ранняя диагностика рака поджелудочной железы затруднена из-за отсутствия специфичных симптомов. Как правило, на момент визуализации опухоли у каждого третьего пациента в процесс вовлечены регионарные лимфоузлы, а у каждого второго пациента уже имеются отдаленные метастазы. Мы представляем клинический случай пациентки 73 лет с диагнозом: рак головки поджелудочной железы St IV T4N1M1. У женщины при первичной позитронно-эмиссионной томографии (ПЭТ-КТ) был выявлен метаболически активный очаг размером 26x21x32 мм. После проведения комбинированной многоэтапной терапии под контролем ПЭТ-КТ удалось добиться полного нивелирования первичного очага опухоли и безрецидивного течения заболевания в течение 11 месяцев.

Наше клиническое наблюдение показало эффективность динамического контроля (с помощью ПЭТ-КТ) лечения метастатического рака поджелудочной железы, который оказал влияние на стратегию лечения пациентки. Заключение. Пациентам с аденокарциномой поджелудочной железы ECOG ≥ 3 , несмотря на распространенность процесса, следует предлагать лечение под контролем ПЭТ-КТ.

Ключевые слова:

рак поджелудочной железы, аденокарцинома, позитронно-эмиссионная томография, химиотерапия, лучевая терапия, адъювантная терапия.

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Информация о финансировании: финансирование данной работы не проводилось.

Конфликт интересов: авторы заявляют об отсутствии конфликта интересов.

Для цитирования:

Ройтберг Г.Е., Аникеева О.Ю. Роль ПЭТ-КТ в выборе тактики лечения при раке поджелудочной железы: клиническое наблюдение. Южно-российский онкологический журнал. 2020; 1(4): 54-60. <https://doi.org/10.37748/2687-0533-2020-1-4-7>

Получено 18.09.2020, Рецензия (1) 03.10.2020, Рецензия (2) 28.10.2020, Принята к печати 01.12.2020

INTRODUCTION

The morbidity of pancreatic cancer in Russia in 2018 was 13.05 people per 100,000 population [1]. Besides, there is a steady increase in the incidence of this nosology, and the average annual growth rate reached 2.85% [1]. More than 95% of pancreatic cancer cases develop in the exocrine part of the pancreas. Adenocarcinomas are 95% of these [2]. The diagnosis of pancreatic adenocarcinoma is associated with an unfavorable prognosis of patient survival and high mortality worldwide [2–4]. In this cancer, there is still a tendency to increase mortality [2]. According to leading oncologists, pancreatic cancer will become the second leading cause of death from cancer in the next decade [4].

The clinical course of pancreatic cancer is considered aggressive, with no specific symptoms and high metastasis, which significantly reduces the patient's quality of life. At first, patients may complain of pain in the epigastric region, dyspeptic disorders, loss of appetite, weight loss. Further, as the disease progresses, obstruction of the biliary tract and functional insufficiency of the pancreas often occur, which lead to malnutrition [2].

Due to the absence of specific symptoms, more than 50% of cases of pancreatic cancer are detected at stage III–IV, where overall survival rates vary from 7 to 11 months [4, 5]. The high mortality rate from pancreatic cancer is explained by the lack of reliable screening methods for detecting the early stage of this nosology, as well as the relatively low effectiveness of systemic chemotherapy treatment [6, 7]. However, modern multicomponent chemotherapy regimens, despite their toxicity, allow us to achieve a certain increase in 5-year survival [1].

Since patients with detected pancreatic cancer in most cases already have distant metastases, radical surgical treatment of this category of patients is not always possible [4, 6, 7]. To prolong the survival period, patients with stage IV disease are recommended to undergo chemotherapy and radiation therapy with monitoring of regression of the main focus and metastases [8, 9]. Moreover, the effectiveness of treatment can be effectively evaluated using PET-CT.

Clinical case

Patient V., 73 years old, went to the clinic JCS "Medicine", Moscow with complaints of dysphagia (did not eat for 10 days), severe weakness (moved only in a chair).

From anamnesis: is registered with an oncologist since 2016, when cancer of the head of the pancreas was detected. A puncture biopsy was performed under ultrasound control of the pancreatic head tumor. Histological analysis of the biopsies revealed a low-grade adenocarcinoma. Clinical diagnosis: cancer of the pancreatic head St IV, T4N1M1. In 2016, was performed a palliative surgery – the imposition of hepatico jejuno anastomosis, cholecystectomy. Postoperative histological diagnosis – moderate differentiated adenocarcinoma with low-differentiated areas in the lymph node.

Objectively: the patient's condition is moderate, ECOG 3. Reduced power. The skin is pale, the sclera subicteric. The abdomen is soft, moderately painful in the epigastrium and right hypochondrium.

The patient was further examined at the clinic of JSC Meditsina.

According to PET-CT data from 17.02.2016 with contrast of 18F-fluorodeoxyglucose (18F-FDG), formation of 26x21x32 mm in the head of the pancreas with high metabolic activity in the tumor focus and in a few parapancreatic lymph nodes was revealed (Fig. 1). Aerobilia. Ascites. The liver is not enlarged in size. There are no foci with high FDG metabolism in the liver parenchyma.

The patient underwent EGDS, in which no tumor invasion into the duodenal wall was detected. Endoscopic stenting of the duodenum for stenosis was performed, and an infusion port was installed.

The oncological Council made to conduct chemotherapy (CT) according to the FOLFIRINOX scheme (Leucovorin, fluorouracil, irinotecan and oxaliplatin) – 7 courses, monitoring the effectiveness of treatment using PET-CT with 18F-FDG.

After the 5th course of CT, control PET-CT with 18F-FDG showed that there is still a pathological metabolically active lesion in the head of the pancreas, but there is a positive dynamics in some sorts of a decrease in the size of the

lesion and a slight decrease in its metabolism (table 1). At the end of the course of CT with PET-CT, the metabolic focus in the head of the pancreas decreased by 36.3%, and its metabolic activity by 19.8%. the Liver was not increased in size, without focal changes, and the lymph nodes were not changed (table 1, Fig. 2). The results of the dynamics of cancer markers are presented in table 2.

Taking into account the absence of pronounced positive dynamics after CT using the FOLFIRINOX scheme in July 2016 patient V. underwent palliative radiation therapy for a primary pancreatic tumor up to TTD 40 Gy against the background of xeloda radiomodification.

After the end of radiation therapy, the decision of the second meeting of the oncological Council (31.08.2016) was made to continue systemic CT (stage 2) for 2 months according to the FOLFIRINOX scheme (12 courses). After this stage of CT was completed, PET/CT data with 18F-FDG showed a marked positive dynamics in comparison, in the

form of a significant decrease in the size and level of metabolism of the focus in the head of the pancreas. The liver is not enlarged, without focal changes, and the lymph nodes are not changed. There was a diffuse increase in bone marrow metabolism due to the reaction to chemotherapy.

Taking into account the almost complete regression of the pancreatic tumor, normalization of the marker level, and the presence of a minimal single node (8 mm) in the head of the pancreas, it was decided to suspend systemic treatment. Hypofractive radiation therapy (up to TTD 20g) is recommended for a residual focus in the head of the pancreas, followed by PET-CT and cancer markers.

2 months after the end of radiation therapy, PET-CT shows a pronounced positive dynamics in the form of leveling the focus of pathological metabolism in the head of the pancreas.

Taking into account the complete response of the tumor to the treatment, the consultation of oncologists of the JSC Meditsina clinic on

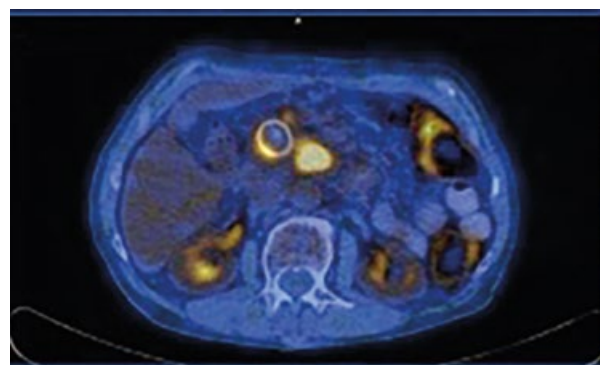
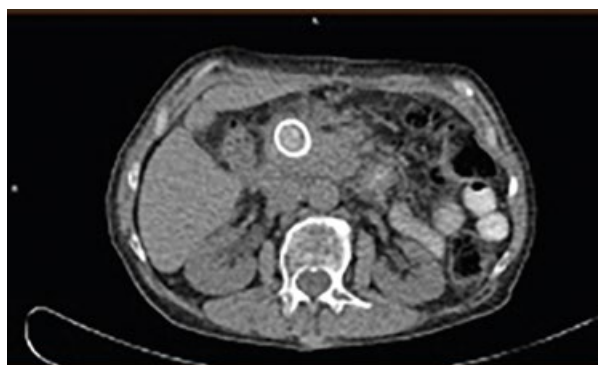


Figure 1. PET-CT with 18F-FDG without contrast enhancement is introduced here, before the treatment. The formation in the head of the pancreas with high metabolic activity SUVmax=10.77 and metabolic volume 6.53 cm³ is visualized.

Table 1. Dynamics of PET-CT results in patient B. against the background of the ongoing treatment

PET-CT criteria	Before the treatment	After ½ of CT (1 st stage)	After CT is finished (1 st stage)	After CT is finished (2 nd stage)	After the end of hypofractive radiation therapy
Presence of a metabolically active focus	26x21x32 mm	24x19x27 mm	17x17x22 mm	16x14x12 mm	Absent
The metabolic level in the lesion (SUVmax)	10.7	9.6	7.7	3.9	Absent

10.01.2017 decided to perform adjuvant therapy: xeloda 2000 mg / m² / day 1–14 days of a 21-day cycle of 6 months (8 courses in the absence of progression).

Thus, in a patient with metastatic pancreatic cancer, a complete response was received against the background of complex treatment.

After 11 months, the results of PET-CT (31.10.2017) showed the progression of the disease in the form of the appearance of hypermetabolic foci in the liver (which were not previously determined by PET CT): the liver is not enlarged in size (CCS 150 mm), in S4, S6, S7, previously not visualized hypodensive foci with uneven and indistinct contours are determined, with maximum dimensions up to 12x11 mm, with hyperfixation of the RPP SUVmax up to 5.7. Also, in the right and left lobes of the liver S4, S5, S6, S7 and S8 segments, multiple hypodensive formations with uneven contours, previously not visualized, up to 19x21 (S6) mm in size without hyperfixation of the RFP are determined.

During the entire treatment period PET-CT monitoring of the treatment dynamics was performed.

DISCUSSION

Pancreatic cancer remains one of the diseases with a high mortality rate [5]. The quality of diagnosis plays a huge role in the visualization of pancreatic cancer [10]. Despite the growth of scientific and technological progress, the 5-year survival rate for this nosology has increased only by 1% (from 5 to 6%) over the past three decades [4].

For the initial examination, it is recommended to perform an ultrasound of the abdominal cavity, which allows you to detect a tumor formation in the form of hypoechoic structures, dilation of the pancreatic ducts and the biliary system [2]. The ultrasound of the abdominal cavity, head tumors are more often visualized. Cancer of the body and tail of the pancreas is difficult to diagnose by ultrasound due to the presence of gas in the stomach and transverse colon [7]. Therefore, ultrasound has a low specificity and effectiveness in the early detection of pancreatic cancer [2].

To improve the quality of diagnosis of pancreatic cancer, especially in metastases, it is recommended to perform spiral computed tomography

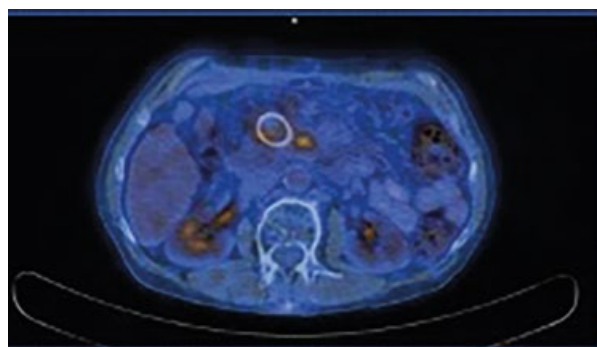
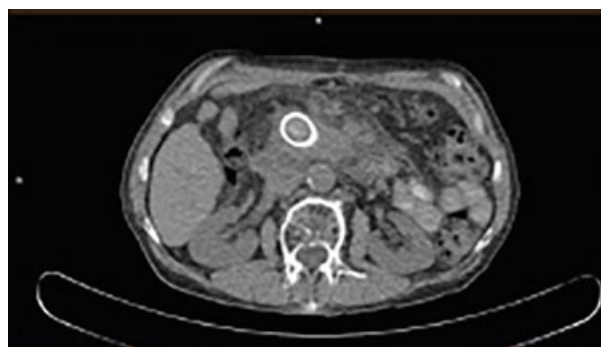


Fig. 2. PET-CT with 18F-FDG without contrast enhancement, control 14 days after the end of CT. The formation in the head of the pancreas persists with a marked decrease in metabolism and metabolic volume, SUVmax=3.98, metabolic volume 2.75 cm³.

Table 2. Dynamics of cancer markers in the patient B

The oncomarkers	Before CT inception	After CT is finished 1st stage	After CT is finished 2nd stage	After the completion of hypofractionative radiation therapy
CEA	1.12	2.8	2.5	2.1
CA125	100	18	16	12
CA19-9	171	48	25	43

(CT) with three-phase contrast [4, 12]. Most researchers believe that magnetic resonance imaging (MRI) is equivalent in sensitivity to CT in the diagnosis of pancreatic cancer [4, 12]. The accuracy of these imaging methods in the diagnosis of cancer lesions of the pancreas largely depends on the size of the tumor [12].

Positron emission tomography (PET) is not recommended for the primary diagnosis of pancreatic cancer [2]. However, according to Kauhanen SP et al. PET-CT is a more sensitive method for detecting metastases and for monitoring treatment after chemotherapy and radiation therapy [13]. The advantage of PET-CT is a wide coverage of anatomical zones, displaying metastases of any localization. Ideally, the use of contrast in PET-CT is preferable, which increases the diagnostic efficiency to 88% versus 76% without contrast [14]. Results of the study Kitajima K et al. the sensitivity, specificity, and accuracy of contrast-enhanced PET-CT in the diagnosis of pancreatic cancer were 91.7%, 95.2%, and 93.3%, respectively, compared with non-contrast PET CT – 83.3%, 90.5%, and 86.7%, and spiral CT – 66.7%, 85.7%, and 75.6%,

respectively [15]. The diagnostic accuracy of contrast PET /CT in pancreatic malignancies was 89% compared to 79% in MRI [13]. Moreover, after receiving information using contrast PET-CT, the treatment strategy was changed in 26% of patients (10 out of 29) [13].

Our clinical observation showed the effectiveness of dynamic control (using PET-CT) treatment of metastatic pancreatic cancer, which influenced the patient's treatment strategy. Thanks to this tactical approach, in this clinical case, it was possible to achieve complete regression of the primary tumor focus in the head of the pancreas.

CONCLUSION

Patients with pancreatic adenocarcinoma ECOG ≥ 3 or poorly controlled comorbid conditions, despite the prevalence of the process, should be offered comprehensive treatment with monitoring of results using PET-CT. The interdisciplinary collaboration of different specialists is necessary to develop a plan for specialized treatment and follow-up of patients with pancreatic cancer.

Authors contribution:

Roitberg G.E. – research concept and design, scientific editing.

Anikeeva O.Yu. – text writing, material processing, and working on illustrations.

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<https://doi.org/10.1007/s11307-009-0271-7>

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