

SURVIVAL ANALYSIS AND CHARACTERISTICS OF PANCREATIC ADENOCARCINOMA BASED ON MSCT DATA OF 216 CASES

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Annotation

Background. Pancreatic adenocarcinoma is an aggressive cancer with a poor prognosis and increasing global incidence. Early diagnosis is challenging, as it is often detected at advanced stages. Imaging, particularly contrast-enhanced Multispiral Computed Tomography, plays a crucial role in diagnosing, assessing resectability, and monitoring treatment response. This study aimed to analyze Pancreatic adenocarcinoma characteristics, including tumor location, metastasis, resectability, and postoperative outcomes, using Multispiral Computed Tomography.

Methods A retrospective review of 216 Pancreatic adenocarcinoma cases from 2022-2024 was conducted. All patients underwent bolus contrast-enhanced Multispiral Computed Tomography, and diagnoses were confirmed by histology. Key patient parameters analyzed included age, gender, tumor location, metastases, and surgical outcomes.

Results The group comprised 50.9% women and 49.1% men. The majority of tumors were located in the pancreas head (72.2%), followed by the body (13.9%), tail (3.7%), and multiple sites (10.2%) ($p < 0.05$). Metastases were observed in 50% of patients, with the liver being the most common site ($p < 0.05$). Radical surgery was performed in 41 patients (19%), while 66 patients (30.5%) underwent palliative procedures. The mean life expectancy among deceased patients was without surgery 110 days, after radical resections 247 days, after palliative interventions 118 days.

Conclusion Pancreatic adenocarcinoma remains a highly fatal disease, particularly at advanced stages. Metastasis significantly worsens prognosis, reducing survival rates. Tumor location influences prognosis, with body and tail tumors having better outcomes. Surgery improves survival, and early diagnosis is critical. Contrast-enhanced Computed Tomography is essential for evaluating pancreatic tumors but should be complemented with other diagnostic methods for enhanced accuracy.

Introduction

Pancreatic adenocarcinoma (PAC) is a highly aggressive malignancy with poor prognosis.¹ Currently, the incidence and mortality of pancreatic cancer continue to increase annually throughout the world, including the United States, Europe, Japan and China. By 2050, the global incidence of pancreatic cancer is projected to reach

18.6 cases per 100,000 people, with an average annual increase of 1.1%, which will create a significant burden on healthcare systems. Despite the rapid development of modern medical technologies and significant improvement in survival in many oncological diseases, pancreatic cancer remains one of the most lethal malignant neoplasms of the gastrointestinal tract.² The five-year

survival rate of pancreatic adenocarcinoma is only 10%.³

In the diagnosis of pancreatic cancer, imaging methods play a key role in screening, disease detection, resectability assessment and monitoring of treatment effectiveness. Determination of resectability and tumor diagnosis are decisive factors in choosing treatment tactics, while computed tomography (CT) remains the first-line diagnostic method.⁴

Approximately three quarters of pancreatic cancer cases occur in the head of the pancreas, 17-26% in the body and tail, and the remaining 5-8% in multiple sites of the pancreas.^{5,6} Due to the anatomical location of the pancreas, the disease is usually diagnosed at a late stage, when pronounced clinical symptoms are already present.² Tumors located in the body and tail of the pancreas are usually diagnosed at a later stage compared to tumors of the head, since the latter cause symptoms associated with obstruction of the common bile duct and/or pancreatic duct.⁷

The main problem in treatment remains the late stage of the disease at the time of diagnosis.⁸ Most patients are already at the stage of locally advanced or metastatic process at the time of diagnosis.⁹

Currently, the only potentially radical method of treatment remains surgical intervention, but it is associated with a high risk of complications.¹⁰ However, even with radical surgery, the prognosis remains unfavorable, since surgical treatment is accompanied by a high risk of complications, including postoperative pancreatic fistula, as well as a high risk of recurrence and metastasis.¹¹

Early diagnosis and accurate treatment of pancreatic cancer largely depend on medical imaging, so accurate analysis of medical images is of great importance for patients with this disease.¹²

The aim of this study is to analyze the characteristics of pancreatic adenocarcinoma, including its location, prev-

alence of metastases, resectability and postoperative follow-up according to contrast-enhanced multispiral computed tomography (MSCT).

Materials and methods

A retrospective analysis of 216 cases of Pancreatic adenocarcinoma registered at the Syzganov National Scientific Surgical Center from 2022 to 2024 was performed. All patients underwent bolus contrast-enhanced MSCT. The diagnosis was established by histological examination of patients. The inclusion criteria were patients diagnosed with pancreatic adenocarcinoma that underwent contrast-enhanced MSCT and underwent surgery. The exclusion criteria were patients with other pancreatic diseases and those who did not have MSCT data. The following patient parameters were analyzed: age, gender, tumor location, presence of metastases, and surgical treatment results.

Ethical approval The study was approved by the ethics committee of the Syzganov National Scientific Center of Surgery №1 from 24.02.2025 year.

Statistical Analysis Statistical analyses were conducted using SPSS software (IBM corp., 28 version). Descriptive data analysis was presented as a percentage. For comparative analysis paired t test was used. A $p < 0.05$ was used to determine significance.

Results

The mean age of patients was 65 years (range 33–90 years). The study group included 110 women (50.9%) and 106 men (49.1%). Regarding tumor localization, the highest number of cases was observed in the head of the pancreas – 156 cases (72.2%), in the body – 30 cases (13.9%), in the tail – 8 cases (3.7%), and widespread forms (affecting multiple areas) were observed in 22 cases (10.2%) ($p < 0.05$). The highest, albeit low, survival rate was observed among patients with tumors located in the body and tail of the pancreas compared to those with tumors in the head. The survival rates were 50% and 62.5%, respectively ($p = 0.08$) (Table 1).

Table 1.
Survival and life expectancy
depending on tumor
localization

Tumor Localization	Number of Cases, n (%)	Alive, n (%)	Mean Follow-up Duration, Days	Deceased, n (%)	Mean Life Expectancy, Days
Head	156 (72.2%)	60 (38.5%)	247	96 (61.5%)	142
Body	30 (13.9%)	15 (50%)	353	15 (50%)	135
Tail	8 (3.7%)	5 (62.5%)	294	3 (37.5%)	85
Widespread Forms	22 (10.2%)	4 (18.2%)	502	18 (81.8%)	65

Metastases were detected in 50% of patients (108 cases), with the liver being the most common site ($p < 0.05$) (Table 2).

Table 2.
Distribution of metastasis
localization in patients

Metastasis Localization	Number of Cases, n (%)
Liveronly	37 (34.3%)
Liver + regional lymphnodes	13 (12.0%)
Carcinomatosis	7 (6.5%)
Isolated involvement of other organs	<5%
Multiple metastases	19 (17.6%)

Among patients with pancreatic adenocarcinoma without metastases, 52 (48.1%) were alive, with a mean follow-up duration of 299 days, while 56 (51.9%) had died, with a mean life expectancy of 160 days.

Among patients with metastases, 32 (29.6%) were alive, with a mean fol-

low-up duration of 253 days, while 76 (70.4%) had died, with a mean life expectancy of 107 days. The resectability of patients with PAC largely depends on the involvement of major blood vessels, such as the celiac trunk, mesenteric artery and vein, and splenic artery and vein (Figure 1 a, b, c).

Figure 1a.
Axial CT scan of pancreatic
head adenocarcinoma.



Status: Resectable – does not involve the celiac trunk and superior mesenteric artery (SMA); does not involve the superior mesenteric vein (SMV) and portal vein (PV).



Figure 1b.
Axial CT scan of pancreatic
body adenocarcinoma.

Status: Resectable – does not involve celiac trunk and SMA; involves SMV <180°.



Figure 1c.
Coronal CT scan of pancreatic
head adenocarcinoma.

Status: Unresectable – involves SMA >180°; tumor occlusion of SMV.

Radical surgery (subtotal pancreatectomy, partial resection, pancreaticoduodenectomy) was performed on 41 patients (19%), while 66 patients (30.5%) underwent palliative surgeries.

Among patients who underwent radical resections, 25 (61%) survived, with a mean follow-up duration of 258 days.

Among those who underwent palliative procedures (66 patients), 22 (33.3%) survived, with a mean follow-up duration of 262 days.

The mean life expectancy among deceased patients was without surgery 110 days, after radical resections 247 days, after palliative interventions 118 days (Table 3).

Table 3.
Survival and life expectancy
depending on treatment type

Treatment Type	Number of Patients, n (%)	Alive, n (%)	Mean Follow-up Duration, Days	Deceased, n (%)	Mean Life Expectancy, Days
No Surgery	109 (50.5%)	37 (33.9%)	308	72 (66.1%)	110
Radical Surgery	41 (19.0%)	25 (61%)	258	16 (39.0%)	247
Palliative Surgery	66 (30.5%)	22 (33.3%)	262	44 (66.7%)	118

Discussion

Pancreatic cancer is a highly lethal disease, for which mortality closely parallels incidence. Most patients with pancreatic cancer remain asymptomatic until the disease reaches an advanced stage. According to literature with a dismal 5-year survival rate of less than 5%, ductal adenocarcinoma of the pancreas remains a lethal disease for most patients. While the only potentially curative treatment proven to prolong survival for pancreas cancer patients is surgical resection, only 15% to 20% of cases are categorized as surgically resectable. In addition, even after curative resection, most pancreatic cancers eventually recur, resulting in a 5-year survival rate for patients who have undergone curative resection of only 25%.¹³

Two-thirds of pancreas adenocarcinomas arise in the head of the gland which generally require a pancreaticoduodenectomy. This poses unique considerations for surgical resection compared with tumors of the pancreas body and tail due to the proximity of the pancreas head to multiple important vascular structures including the celiac trunk, hepatic artery, superior mesenteric artery, and portal venous system.¹⁴ Unresectability is mainly due to the presence of metastases to the liver, peritoneum and lymph nodes and to tumor spread especially to the portal mesenteric trunk where it can invade, compress, reduce, or occlude the vessels.

Our study results confirm global literature data, indicating that PAC is most

commonly localized in the pancreatic head, which is explained by its proximity to blood vessels and bile ducts.

Multi-slice computed tomography, a quantitative imaging technique, has been shown to correlate with overall survival in pancreatic cancer patients. It has associations with tumor type and other features, such as lymphovascular invasion, which are indicators of worse outcomes. This technique could help inform treatment strategies.

In our study, half of the patients had metastases at the time of diagnosis. Tumor localization influences prognosis: patients with tumors in the tail or body of the pancreas had higher survival rates (62.5% and 50%, respectively), while widespread tumor forms were associated with the worst outcomes (survival rate – 18.2%), the obtained data showed higher results in comparison with the literature data.

Radical surgery improves survival: the survival rate after resections was 61%, compared to 33.9% without surgery and 33.3% after palliative interventions. Additionally, the mean life expectancy of deceased patients increased to 247 days. Pancreatic head adenocarcinoma remains a challenging tumor to treat. Identifying patients who are more likely to have positive surgical margins or aggressive disease may help optimize treatment planning.

We found that the presence of MSCT with contrast enhancement is a highly informative diagnostic method. However, further studies are needed to optimize early detection and differential diagnosis of pancreatic tumors. The low

resectability rate due to tumor spread, major vessel involvement, and the presence of metastases underscores the urgent need for effective strategies for early diagnosis and prevention.

Pancreatic cancer is a highly lethal disease, with mortality closely paralleling incidence. Most patients with pancreatic cancer remain asymptomatic until the disease reaches an advanced stage. According to the literature, ductal adenocarcinoma of the pancreas remains a fatal disease for most patients, with a dismal 5-year survival rate of less than 5%. While surgical resection is the only potentially curative treatment shown to prolong survival, only 15% to 20% of cases are considered surgically resectable. Furthermore, even after curative resection, most pancreatic cancers eventually recur, resulting in a 5-year survival rate of only 25% among patients who have undergone surgery.¹³

Two-thirds of pancreatic adenocarcinomas arise in the head of the pancreas, which typically requires a pancreaticoduodenectomy. This presents unique surgical challenges compared to tumors located in the body or tail of the pancreas due to the proximity of the pancreas head to several important vascular structures, including the celiac trunk, hepatic artery, superior mesenteric artery, and portal venous system.¹⁴

Our study confirms global literature data, showing that PAC is most commonly localized in the head of the pancreas, likely due to its proximity to blood vessels and bile ducts.

Multi-slice computed tomography, a quantitative imaging technique, has been shown to correlate with overall survival in pancreatic cancer patients. It has associations with tumor type and other features, such as lymphovascular invasion, which are indicators of worse outcomes. This technique could help inform treatment strategies.

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Limitations This study does not include data on patients who underwent chemotherapy for pancreatic adenocarcinoma.

What's Known? Computed tomography with intravenous contrast is the method of choice for diagnosing, staging, and assessing tumor resectability.

What's New? The study confirms that pancreatic adenocarcinoma is most commonly localized in the head of the pancreas, aligning with global literature. This localization is linked to the tumor's proximity to critical vascular structures and bile ducts. Multi-slice computed tomography with contrast enhancement is highlighted as an important diagnostic tool, showing strong correlations with overall survival in PAC patients.

Conclusion

PAC remains a disease with extremely low survival rates, especially in the advanced stages. The presence of metastases significantly worsens the prognosis, reducing both the proportion of survivors and life expectancy. Surgery, especially tumor resection, has a positive effect on survival. Tumor localization affects the prognosis: tumors in the body and tail have a better outcome, while disseminated forms are associated with worse results. Efforts are needed to improve early diagnosis and improve the availability of high-tech imaging methods. Contrast-enhanced CT plays a key role in the evaluation of pancreatic tumors, but requires comple-

mentation with other diagnostic tools to improve efficiency.

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Authors' Contributions BD and SA acquired the data and drafted the manuscript. BD supervised and coordinated study and revised the manuscript. SA, BG, MA and KY were involved in the participants recruitment and screening, data collection. KY performed the statistical analysis. AY, DB conceived and designed the study. All authors read, approved the final manuscript and agreed to publish the article.

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