Sarcopenia as a Prognostic Factor of Reduced Survival in Elderly Pancreatic Cancer Patients: A Single-Center Experience

Assia BENSALEM[1]*, MD, PhD, Abdelaziz AMMARI[2], PhD, Khadidja DJEBBES[3], MD , Sihem BENSALEM[4], MD

[1,2,3]Medical Oncology Department, Hospital Establishment DIDOUCHE Mourad, Faculty of Medicine, University Constantine 3, Algeria

[4]Endocrinology-Diabetology and Metabolic diseases, Regional University Military Hospital Commander Abdellali BENBAATOUCHE (HMRUC) Constantine, Faculty of Medicine, University Constantine 3, Algeria

DOI: https://doi.org/10.68050/JAMS.2026.568

Received: 21 Sept 2026; Accepted: 22 Sept 2026; Published: 23 September 2026

INTRODUCTION

Sarcopenia, characterized by a loss of muscle mass and function, is highly prevalent in elderly patients with pancreatic cancer, often associated with cachexia. It significantly impacts prognosis by influencing therapeutic tolerance and survival. This study aimed to evaluate the prevalence and clinical impact of sarcopenia in elderly patients with pancreatic cancer.

Methods

We conducted a retrospective, single-center study of 30 patients with pancreatic cancer. Demographic, clinical, genetic, therapeutic, and outcome data were collected and analyzed using a standardized grid. Each case was discussed in a multidisciplinary team (MDT) meeting. Statistical analysis assessed the association between sarcopenia and prognosis.

Results

The mean age at diagnosis was 69.4 years (range: 46–90). Comorbidities included diabetes (43.3%), arterial hypertension (33.3%), and familial cancer history (33.3%). Tumor location was cephalic in 93% of cases. Disease stages were: localized (23%), locally advanced (43.3%), and metastatic (33.3%). Clinically, asthenia and abdominal pain were present in 50% of cases, jaundice in 66.6%. WHO performance status was 1 in 23.3% and 2 in 76.7%. Severe weight loss (>10 kg) occurred in 66.6% of patients. Sarcopenia was present in 60% of cases. Treatments included FOLFIRINOX (33.3%), gemcitabine-platinum salts (33.3%), gemcitabine-nimotuzumab (16.6%), and gemcitabine alone (16.6%). Median overall survival was 8 months, significantly lower in sarcopenic patients (6 vs. 11 months; $p < 0.05$).

Discussion

Our results confirm the high prevalence of sarcopenia in elderly pancreatic cancer patients. Sarcopenia is associated with impaired general condition, significant weight loss, and reduced survival. It serves as a marker of frailty and an independent unfavorable prognostic factor.

Conclusion

Sarcopenia is common in elderly pancreatic cancer patients and linked to poor prognosis. Its systematic screening is essential to optimize therapeutic management. A multidisciplinary approach integrating nutritional support and physical activity is vital for improving outcomes. Due to the limited sample size, further prospective studies with multivariable analysis are needed to confirm its independent prognostic value.

Keywords: Sarcopenia; pancreatic cancer; elderly; prognosis; survival; nutritional support.

INTRODUCTION

Pancreatic cancer remains one of the most lethal malignancies, with a 5-year survival rate below 10% [1]. Its diagnosis is often delayed, and the majority of patients present with locally advanced or metastatic disease [2]. Elderly patients are particularly vulnerable due to the high prevalence of comorbidities, reduced physiological reserves, and the frequent association with sarcopenia [3]. Sarcopenia, defined as a progressive and generalized loss of skeletal muscle mass and strength, is increasingly recognized as a key factor influencing outcomes in oncology [4]. In pancreatic cancer, sarcopenia is frequently compounded by cachexia, a complex metabolic syndrome that further exacerbates muscle wasting and functional decline [5].

The clinical implications of sarcopenia are profound. It not only impairs physical function and quality of life but also reduces tolerance to chemotherapy and is associated with shorter survival [6]. Despite its importance, sarcopenia is often underdiagnosed in routine clinical practice, particularly in elderly populations. Early identification and intervention may improve therapeutic outcomes and survival. This retrospective study aimed to assess the prevalence of sarcopenia and its impact on prognosis in a cohort of elderly patients with pancreatic cancer.

METHODS

Study Design and Population

We conducted a single-center retrospective study in the Medical Oncology Department of Didouche Mourad University Hospital. From the institutional registry, we identified patients aged 65 years or older with histologically confirmed pancreatic adenocarcinoma, diagnosed between January 2018 and December 2022. During this period, 42 patients were screened. Patients with incomplete medical records, specifically those lacking baseline CT scans required for sarcopenia assessment, or those lost to follow-up, were excluded (n=12), leaving a final cohort of 30 patients for analysis.

Data Collection

Data were collected using a standardized grid and included:

- Demographic characteristics (age, sex)
- Comorbidities (diabetes, hypertension, familial cancer)
- Tumor characteristics (location, stage)
- Clinical symptoms (asthenia, abdominal pain, jaundice)
- Performance status (WHO scale)
- Weight loss
- Sarcopenia status
- Treatment modalities
- Survival data

Sarcopenia Assessment

Sarcopenia was assessed on baseline CT scans performed at the time of diagnosis, prior to the initiation of any systemic therapy. Sarcopenia was diagnosed based on the European Working Group on Sarcopenia in Older

People 2 (EWGSOP2) criteria, using computed tomography (CT) scans to measure skeletal muscle mass at the third lumbar vertebra (L3) level [7]. The cross-sectional areas of the psoas, paraspinal, and abdominal wall muscles were delineated using standard Hounsfield unit thresholds (-29 to +150). The total L3 skeletal muscle area (SMA) was normalized to height squared to calculate the L3 skeletal muscle index (SMI = cm^2/m^2). Sarcopenia was defined using previously validated sex-specific cut-offs: SMI < 41 cm^2/m^2 for women and SMI < 43 cm^2/m^2 for men with a BMI < 25 kg/m^2, or SMI < 53 cm^2/m^2 for men with a BMI ≥ 25 kg/m^2 [7].

Statistical Analysis

Survival curves were estimated using the Kaplan-Meier method, and differences between sarcopenic and non-sarcopenic groups were assessed using the log-rank test. Hazard ratios (HR) and 95% confidence intervals (CI) were calculated using univariate Cox proportional hazards models. Due to the limited sample size (n=30), multivariable Cox regression analysis to adjust for potential confounders (such as disease stage and performance status) was not feasible. A p-value < 0.05 was considered statistically significant. Statistical analyses were performed using R software (version 4.1.0).

Ethical Considerations

This study was an analysis of anonymized patient data. As the research involved no direct intervention or modification of standard patient care, formal approval from an ethics committee was not required in accordance with institutional and national guidelines for observational studies. All patient data were anonymized prior to analysis to protect confidentiality.

RESULTS

Baseline Characteristics

The mean age at diagnosis was 69.4 years (range: 46–90). The cohort included 17 men (56.7%) and 13 women (43.3%). Comorbidities included diabetes (43.3%), arterial hypertension (33.3%), and a history of familial cancer (33.3%). Table 1 summarizes the demographic and clinical characteristics.

Table 1: Baseline Characteristics of the Study Population (n=30)

Variable	**n (%)**
Age (years)	
Mean (range)	69.4 (46–90)
Sex	
Male	17 (56.7)
Female	13 (43.3)
Comorbidities	
Diabetes	13 (43.3)
Hypertension	10 (33.3)
Familial cancer	10 (33.3)
Tumor location	
Cephalic	28 (93.3)
Other	2 (6.7)
Disease stage	
Localized	7 (23.3)

Locally advanced	13 (43.3)
Metastatic	10 (33.3)

Clinical Presentation and Sarcopenia

Clinically, asthenia and abdominal pain were present in 50% of cases, and jaundice in 66.6%. The WHO performance status was 1 in 23.3% of patients and 2 in 76.7%. Severe weight loss (>10 kg) was observed in 66.6% of patients. Sarcopenia was diagnosed in 60% of patients.

Treatment Modalities

Treatment decisions were made during multidisciplinary team (MDT) meetings. The therapeutic regimens included:

- FOLFIRINOX: 10 patients (33.3%)
- Gemcitabine-platinum salts: 10 patients (33.3%)
- Gemcitabine-nimotuzumab: 5 patients (16.6%)
- Gemcitabine alone: 5 patients (16.6%)

Survival Analysis

The median overall survival was 8 months (95% CI: 6.2–9.8). Sarcopenic patients had a significantly shorter median survival compared to non-sarcopenic patients (6 vs. 11 months; HR = 2.4, 95% CI 1.1–5.2; p = 0.023). Figure 1 illustrates the Kaplan-Meier survival curves.

Table 2: Survival Analysis by Sarcopenia Status

Sarcopenia Status	**Median Survival (months)**	**95% CI**	**HR (95% CI)**	**p-value**
No (n=12)	11	8.5–13.5	1 (reference)	
Yes (n=18)	6	4.5–7.5	**[2.4 (1.1–5.2)]**	

DISCUSSION

Our findings confirm the high prevalence of sarcopenia in elderly patients with pancreatic cancer, consistent with previous studies [8, 9]. Sarcopenia was present in 60% of our cohort, reflecting its significant burden in this population. The association between sarcopenia and reduced survival is well-documented [10], and our results further support its role as an independent prognostic factor.

Several mechanisms may explain the link between sarcopenia and poor outcomes. Muscle wasting is associated with systemic inflammation and metabolic dysregulation, which can promote tumor progression and reduce treatment efficacy [11]. Additionally, sarcopenia contributes to frailty, increasing susceptibility to chemotherapy toxicity and reducing adherence to therapy [12].

It is crucial to distinguish sarcopenia from cancer cachexia. While cachexia is a complex metabolic syndrome characterized by severe weight loss, anorexia, and systemic inflammation, sarcopenia specifically refers to the loss of muscle mass and function. In our cohort, 66.6% of patients presented with severe weight loss (>10 kg), meeting criteria for cachexia, while 60% were sarcopenic. This discrepancy highlights that severe weight loss alone is not a surrogate for sarcopenia; patients can experience significant weight loss with preserved muscle

mass (cachexia without sarcopenia) or lose muscle mass without profound weight loss, particularly in the context of sarcopenic obesity.

The high frequency of weight loss and asthenia in our cohort underscores the importance of early nutritional assessment and intervention. Nutritional support, combined with physical rehabilitation, has been shown to improve muscle mass and functional capacity in cancer patients [13]. A multidisciplinary approach, including oncologists, geriatricians, dietitians, and physiotherapists, is essential for optimizing care.

LIMITATIONS

This study has several limitations, including its retrospective design, small sample size, and single-center setting. Notably, the small sample size precluded multivariable survival analysis; therefore, while our univariate analysis shows a strong association between sarcopenia and reduced survival, we cannot definitively claim sarcopenia is an independent prognostic factor after adjusting for major confounders such as advanced disease stage, poor performance status, or aggressive tumor biology. Larger prospective studies are needed to validate our findings, confirm the independent prognostic value of sarcopenia, and explore interventions targeting sarcopenia.

CONCLUSION

Sarcopenia is highly prevalent in elderly patients with pancreatic cancer and is associated with a worse prognosis. Its systematic screening using CT-derived muscle metrics should be integrated into routine clinical practice to guide therapeutic decisions and improve outcomes. A multidisciplinary approach, incorporating nutritional support and physical activity, is vital for addressing this challenge and enhancing the quality of life in this vulnerable population.

Conflicts of interest

The authors declare no conflicts of interest related to this article.

Financial declaration

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Informed consent

This study had an anonymized patient data. As the research involved no direct intervention or modification of standard patient care, formal approval from an ethics committee was not required in accordance with institutional and national guidelines for observational studies. All patient's data were anonymized prior to analysis to protect confidentiality and treated according to the Algerian national guidelines

Authors' contributions

Conceptualization: Sihem BENSALEM, Abdelaziz AMMARI ,Assia BENSALEM; **Methodology:** Sihem BENSALEM; **Software:** Abdelaziz AMMARI, Khadidja DJEBBES; **Validation:** Sihem BENSALEM, Abdelaziz AMMARI, Assia BENSALEM; **Formal Analysis:** Sihem BENSALEM; **Investigation:** Sihem BENSALEM, Abdelaziz AMMARI, Khadidja DJEBBES, Assia BENSALEM; **Resources:** Sihem BENSALEM, Abdelaziz AMMARI, Khadidja DJEBBES; **Data Curation:** Sihem BENSALEM, Abdelaziz AMMARI, Assia BENSALEM; **Writing - Original Draft Preparation:** Sihem BENSALEM, Abdelaziz AMMARI, Khadidja DJEBBES; **Writing - Review & Editing:** Sihem BENSALEM, Abdelaziz AMMARI, Khadidja DJEBBES, Assia BENSALEM ; **Visualization:** Sihem BENSALEM; **Supervision:** Sihem BENSALEM, Abdelaziz AMMARI; **Project Administration:** Assia BENSALEM; **Funding Acquisition:** Not applicable.

Acknowledgements

The authors would like to thank the staff of the oncology and endocrinology departments at Didouche Mourad University Hospital, and Regional University Military Hospital Commander Abdellali BENBAATOUCHE (HMRUC) in the Constantine province for their invaluable assistance in data collection and patient management. We are also grateful to the patient whose data is in this study.

REFERENCES

1. Rahib L, Smith BD, Aizenman L, et al. Projecting cancer incidence and deaths to 2030: the unexpected burden of thyroid, liver, and pancreas cancers in the United States. *Cancer Res*. 2014;74(11):2913–2921.
2. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2020. *CA Cancer J Clin*. 2020;70(1):7–30.
3. Muscaritoli M, Anker SD, Argilés J, et al. Consensus definition of sarcopenia, cachexia and pre-cachexia: joint document elaborated by Special Interest Groups (SIG) of the ESPEN. *Clin Nutr*. 2010;29(2):154–159.
4. Fearon K, Strasser F, Anker SD, et al. Definition and classification of cancer cachexia: an international consensus. *Lancet Oncol*. 2011;12(5):489–495.
5. Prado CM, Lieffers JR, McCargar LJ, et al. Prevalence and clinical implications of sarcopenic obesity in patients with solid tumours of the respiratory and gastrointestinal tracts: a population-based study. *Lancet Oncol*. 2008;9(7):629–635.
6. Antoun S, Birdsell L, Sawyer MB, et al. Low muscle mass and sarcopenia associated with toxicities in cancer patients. *Support Care Cancer*. 2013;21(11):3259–3266.
7. Cruz-Jentoft AJ, Bahat G, Bauer J, et al. Sarcopenia: revised European consensus on definition and diagnosis. *Age Ageing*. 2019;48(1):16–31.
8. Voron T, Tselikas L, Pietri S, et al. Sarcopenia impacts on survival of patients with pancreatic adenocarcinoma. *J Surg Oncol*. 2015;111(6):771–775.
9. Martin L, Birdsell L, Macdonald N, et al. Cancer cachexia in the era of targeted therapy: phenotypes, terminology, and definitions. *J Cachexia Sarcopenia Muscle*. 2013;4(1):1–4.
10. Prado CM, Baracos VE, McCargar LJ, et al. Body composition as an independent determinant of 5-year survival after conventional chemotherapy for metastatic breast cancer. *J Clin Oncol*. 2008;26(20):5034–5039.
11. Fearon KC, Glass DJ, Guttridge DC. Cancer cachexia: mediators, signaling, and metabolic pathways. *Cell Metab*. 2012;16(2):153–166.
12. Cesari M, Leeuwenburgh C, Lauretani F, et al. Frailty syndrome and sarcopenia in later years: an update. *Ageing Res Rev*. 2008;7(1):43–48.
13. Bozzetti F, Arends J, Lundholm K, et al. ESPEN guidelines on nutrition in cancer patients. *Clin Nutr*. 2006;25(2):185–200.