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Serum Biomarkers and CT-Derived Muscle Indices in Sarcopenia Associated with Pancreatic Neoplasm: A Comparative Clinical Study

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Abstract

Background: Sarcopenia is a frequent and clinically relevant condition in patients with pancreatic neoplasm, contributing to poor prognosis, reduced therapeutic tolerance, and increased mortality. The identification of reliable circulating biomarkers, alongside imaging-based muscle assessment, may improve early detection and risk stratification.

Methods: This randomized prospective study included 61 patients, of whom 36 had pancreatic neoplasm associated with sarcopenia and 25 served as controls. Serum levels of osteonectin (SPARC), C-terminal agrin fragment (CAF), procollagen type III N-terminal peptide (P3NP), myostatin (MSTN), and insulin-like growth factor-1 (IGF-1) were measured using ELISA. Skeletal muscle index (SMI) and psoas muscle index (PMI) were assessed using CT at the L3 level.

Results: Patients with pancreatic neoplasm and sarcopenia showed significantly altered biomarker profiles compared to controls. Osteonectin (median 936.4 vs. 539.9, $p < 0.001$), CAF (2135.9 vs. 1165.5, $p < 0.001$), P3NP (8.01 vs. 5.34, $p < 0.001$), myostatin (47.71 vs. 7.85, $p < 0.001$), and IGF-1 (142 vs. 106.7, $p < 0.001$) were all elevated. The highest biomarker levels were consistently observed in the pancreatic neoplasm group compared to other disease groups. Additionally, 100% of patients with pancreatic neoplasm exhibited reduced SMI, confirming the high prevalence of sarcopenia. Biomarker levels were not significantly influenced by tumor location.

Conclusions: The combined use of circulating biomarkers and CT-derived muscle indices provides a clinically relevant approach for identifying sarcopenia in pancreatic cancer.

Keywords: sarcopenia, pancreatic neoplasm, biomarkers, osteonectin, CAF, P3NP, myostatin, IGF-1, computed tomography, skeletal muscle index