

Congress Abstract

CT-Based Assessment of Sarcopenia Using an Artificial Intelligence Program for Predicting Postoperative Complications in Patients with Gastric and Pancreatic Tumors

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Introduction: Sarcopenia is associated with an unfavorable prognosis in cancer patients, especially in the presence of concurrent nutritional deficiency risk. CT-based sarcopenia assessment remains the gold standard for non-invasive evaluation of muscle mass; however, its routine use is limited by the high labor intensity of manual muscle segmentation on CT images.

Objective: To determine the prognostic value of preoperative CT-based sarcopenia assessment, performed using a developed software assistant, as a predictor of postoperative complications in patients with gastric and pancreatic tumors.

Materials and Methods: The study was conducted in two stages. At the first stage, a muscle tissue segmentation model was trained on 610 CT images (Dice coefficient on the training set — 0.95). A program was developed as an integrated information system incorporating computer vision algorithms, which identifies a single axial slice at the L3 level and performs subsequent semantic segmentation using convolutional neural networks. Thus, the muscle tissue area at the L3 vertebral level was automatically calculated with adjustment for the square of the patient's height, and the skeletal muscle index (SMI) was computed.

At the second stage, using this software module, sarcopenia was assessed preoperatively in 65 patients with gastric cancer and 55 patients with pancreatic cancer who subsequently underwent gastrectomy and pancreaticoduodenal resection, respectively. Sarcopenia was defined as SMI values of < 52.4 cm²/m² for men and < 38.5 cm²/m² for women. The severity of postoperative complications was assessed according to the Clavien–Dindo classification. Differences were considered statistically significant at $p < 0.05$.

Results: The prevalence of sarcopenia was evaluated in both groups: in patients with gastric cancer it was 77% (50 out of 65 patients), and in patients with pancreatic cancer – 73% (40 out of 55), indicating a considerable prevalence of this condition in this patient population.

The crude relative risk of overall postoperative complications (RR = 0.94; 95% CI 0.60–1.47; $p > 0.05$) and pancreatic fistulas in particular (RR = 0.64; 95% CI 0.33–1.26; $p > 0.05$) in pancreatic cancer patients with sarcopenia did not differ from that in patients without sarcopenia, indicating comparable complication rates in both groups.

In gastric cancer patients, the overall rate of postoperative complications also did not correlate with the presence of sarcopenia ($p = 0.392$); however, severe complications ($\geq$ IIIb by Clavien–Dindo) were observed only in patients with sarcopenia ($p < 0.001$).

Conclusions: Thus, the inclusion of automated CT-based sarcopenia assessment in preoperative workup may help identify a high-risk group of cancer patients for severe postoperative complications, enabling optimization of personalized management strategies. However, multivariate analysis accounting for other clinical factors is required; further studies with validation on larger cohorts are necessary to justify the implementation of this method into clinical practice.

Keywords: Sarcopenia; Gastric Cancer; Pancreatic Cancer; Postoperative Complications; Computer Vision