RESPONSE

Reply letter to the editor: Aerobic fitness and muscle density play a vital role in postoperative complications in colorectal cancer surgery

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Dear Editor,

With interest, we read the letter to the Editor by Chen et al. regarding our article, titled "Aerobic fitness and muscle density play a vital role in postoperative complications in colorectal cancer surgery." Chen et al. highlighted the role of sarcopenia as predictor for postoperative complications, as well as for prognosis in patients with malignant tumours. As sarcopenia can be improved by diet and physical exercise training, they raised the concern that no details were provided regarding preoperative diet and albumin levels.

As a preoperative measure for sarcopenia, muscle mass was determined from preoperative computed tomography (CT) scan analysis at the L3 level in our study. According to the renewed sarcopenia consensus statement, low muscle mass and/or low muscle quality are important measurements in confirming the diagnosis of sarcopenia.[1] In our study, low muscle mass was defined using sex and body mass index (BMI) adjusted cut-off values for skeletal muscle index (for males with a BMI < 25.0 kg/m^2: <43 cm^2/m^2; for males with a BMI ≥ 25.0 kg/m^2: <53 cm^2/m^2; for females: <41 cm^2/m^2, regardless of BMI).

We agree with Chen et al. that nutritional details and albumin levels can be interesting variables to measure in combination with preoperative aerobic fitness and body composition (low muscle mass indicating sarcopenia and low muscle density indicating myosteatosis) to improve preoperative risk assessment. However, reliable nutritional details are often difficult to obtain from patients. Validated nutritional scoring systems are commonly used to quantify malnutrition (e.g., patient-generated subjective global assessment, malnutrition universal screening tool, short nutritional assessment questionnaire). However, there is no consensus regarding the accuracy of tools assessing nutritional status in colorectal cancer patients.[2] According to the European Society of Clinical Nutrition and Metabolism (ESPEN), weight loss, reduced BMI, and reduced fat-free mass index (e.g., measured using CT scan analysis) most accurately reflect malnutrition.[3]

It is known that malnutrition is associated with an increased risk for surgical complications, a prolonged time to postoperative recovery, and reduced overall survival.[2] However, low preoperative albumin levels do not necessarily represent malnutrition. It rather reflects disease severity, which also makes patients prone

to postoperative complications. Therefore, preoperative albumin might be a valuable adjunct to preoperative risk prediction, next to measurements of malnutrition, body composition, and aerobic fitness.[4] As our study was performed using Dutch real-world data in which albumin levels are not routinely collected preoperatively, preoperative albumin levels could not be included in the analysis. In the discussion of our manuscript, we therefore stated that no reliable preoperative nutritional details were available and that no preoperative albumin levels were measured, limiting further assessment regarding the level of malnutrition in the included patients.

When trying to improve preoperative aerobic fitness or decrease the level of preoperative sarcopenia, adequate nutrition is essential to optimally improve muscle mass and muscle density, next to physical exercise training.[5] Previous literature demonstrated that a better baseline nutritional status favorably modifies the effect of prehabilitation before colorectal cancer surgery.[6] This highlights the importance of including a nutritional assessment into preoperative risk assessment and offering multimodal prehabilitation programs including physical exercise training and nutritional interventions,[6] particularly targeted at those patients with low aerobic fitness, a low muscle mass and/or muscle density, and/or malnutrition. On the other hand, low aerobic fitness or poor body composition (low muscle mass as an indicator for sarcopenia and/or low muscle density as an indicator for myosteatosis) can be prevalent in preoperative colorectal cancer patients, regardless of the presence of traditional nutritional risk factors.[7] Additionally, low albumin levels are not necessarily associated with sarcopenia and do not play a role in defining sarcopenia.[1,8] This indicates that aerobic fitness, nutritional status, and body composition seem both related to each other, as well as being different from each other in their relation with postoperative outcomes.[9] Furthermore, we want to state that most of the references used by Chen et al. are studies performed in gastric cancer patients. Colorectal cancer patients are not directly comparable to gastric cancer patients, as sarcopenia, malnutrition, and cancer cachexia seem more prevalent in gastric cancer patients.[10]

Overall, we agree that it is important to preoperatively combine nutritional status with aerobic fitness and body composition variables in risk assessment, as well as that future clinical studies are needed to investigate the combined impact of preoperative nutritional status, aerobic fitness, and body composition (including sarcopenia and myosteatosis) in predicting outcome after colorectal cancer surgery.

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