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Cardiopulmonary Fitness, Postoperative Complications, and Length of Stay Following Robotic-Assisted Colorectal Cancer Surgery

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Background

Robotic-assisted colorectal cancer (CRC) surgery is increasingly adopted due to improved surgical precision and recovery profiles, yet postoperative complications remain common. Cardiopulmonary exercise testing (CPET) provides objective measures of physiological reserve, but it is unclear which CPET-derived parameters are most clinically informative for risk stratification in robotic CRC surgery.

Methods

This pilot analysis examined associations between CPET-derived fitness measures and postoperative outcomes following robotic-assisted CRC surgery. Anaerobic threshold (AT) and peak oxygen uptake (peak VO_2) were expressed relative to body mass. Complications were classified as present or absent and as minor or major (Clavien Dindo classification). Length of stay (LOS) was recorded in days. Associations were examined using age and sex adjusted logistic regression, with non-parametric analyses for LOS.

Results

Fifty-seven patients (mean age 70 ± 8 years) underwent robotic-assisted CRC surgery; 23 (40%) developed postoperative complications. Median AT and peak VO_2 were 12.0 (IQR 3.4) and 17.1 (IQR 3.9) $\text{ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$, respectively.

In adjusted models, AT was associated with postoperative complication status (likelihood ratio test $p = 0.045$), whereas peak VO_2 was not. Female sex independently predicted reduced complication risk ($p = 0.003$). Neither AT nor sex was associated with complication severity.

Median LOS was longer in patients with complications (6.0 [IQR 8.5] vs 3.0 [IQR 3.0] days; $p = 0.050$). AT showed a weak inverse association with LOS ($\rho = -0.22$, $p = 0.095$).

Conclusions

In robotic-assisted CRC surgery, lower submaximal cardiopulmonary fitness assessed by AT is associated with postoperative complication risk, whereas lower peak VO_2 is not. These findings support the relevance of AT for perioperative risk stratification and exercise-based prehabilitation in robotic surgical pathways.

Keywords

Robotic-assisted surgery; colorectal cancer; cardiopulmonary exercise testing; postoperative complications

Conflict of Interest & Ethical Approval

yes

Abstract submitters declaration

yes

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