

Comparative Performance of Postoperative Day 3 Biomarkers for Predicting Anastomotic Leakage after Colorectal Cancer Surgery - A Retrospective Cohort Study

Ovidiu-Florin Ghirlea^{1,2,3,4}, Paul Pașca^{1,4}, Dragoș-Eugen Georgescu⁵, Ciprian Duță⁴, Sorin Olariu³ and Marius-Sorin Murariu^{2,3,4}

¹Department of Doctoral Studies, Victor Babeș University of Medicine and Pharmacy Timișoara, Romania

²First Surgical Clinic, Pius Brînzeu Timiș County Emergency Clinical Hospital, Timișoara, Romania

³Abdominal Surgery and Phlebology Research Center (CCCAF), Victor Babeș University of Medicine and Pharmacy Timișoara, Romania

⁴Faculty of Medicine, Victor Babeș University of Medicine and Pharmacy, Timișoara, Romania

⁵Department of Surgery, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania

Abstract

Background: Anastomotic leakage (AL) represents a serious postoperative complication after surgery, especially for digestive tract malignancies, concerning both patients and surgeons. Due to severe clinical repercussions, early identification of patients at risk is essential for improving postoperative outcomes. This study focused on assessing clinical risk factors and the postoperative day 3 (POD 3) biomarkers, in early detection of anastomotic leakage.

Materials and Methods: A retrospective observational study was conducted including 166 patients who underwent resection with primary anastomosis for colorectal cancer. Patient-related factors, tumor characteristics, operative factors and POD 3 laboratory data were collected. Receiver operating characteristics (ROC) curves and logistic regression models were used to assess predictive performance and identify independent risk factors.

Results: Anastomotic leakage occurred in 44 patients (26.50%) and was associated with prolonged hospitalization and higher postoperative mortality (25.00% vs 6.60%, $p=0.002$). Multivariable logistic regression identified emergency surgery, rectal tumor location, intraoperative transfusion and open surgical approach as independent risk factors. Among POD 3 biomarkers, C-reactive protein-to-albumin ratio (CAR) demonstrated the highest predictive accuracy for AL. After adjustment in the multivariable model, CAR remained an independent predictor of AL (OR=1.91, $p<0.001$).

Conclusions: Anastomotic leakage after colorectal cancer surgery remains a multifactorial complication influenced by operative conditions, local tumor-related factors, and the postoperative inflammatory response. In this retrospective cohort, POD 3 CAR showed the highest discriminatory performance among the evaluated biomarkers and may support early postoperative risk stratification when interpreted with clinical findings and operative risk factors.

Keywords: anastomotic leakage risk factors, colorectal cancer surgery, POD 3 biomarkers, C-reactive protein, CAR, LCR, NLR, albumin