Postoperative C-Reactive Protein-to-Albumin Ratio Predicts Anastomotic Leakage After Elective Right Hemicolectomy for Colon Cancer

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AIM: Anastomotic leakage (AL) is a life-threatening complication of colorectal surgery carrying significant risks of postoperative morbidity and mortality. Timely identification of patients at elevated risk for AL is critical for optimizing surgical outcomes. This study aimed to evaluate factors associated with AL and to assess the predictive utility of the postoperative day 3 C-reactive protein-to-albumin ratio (CAR) in patients undergoing elective right hemicolectomy for colon cancer.

METHODS: This retrospective observational cohort study included patients who underwent elective right hemicolectomy with primary ileocolic anastomosis for colon cancer at Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital (January 2020 to January 2025). Patients undergoing emergency surgery, multivisceral resection, diverting stoma formation, or with incomplete data were excluded. ROC curve analysis and limited univariable logistic regression were used to evaluate the predictive performance of postoperative day 3 CAR.

RESULTS: A total of 194 patients were included, and AL developed in 14 patients (7.2%). No significant differences were observed between groups regarding age, body mass index, operative duration, surgical technique, or comorbidities, confirming the homogeneity of the study population. Early enteral feeding was initiated significantly later in patients with AL (3.36 ± 0.74 vs. 2.83 ± 0.76 days, $p = 0.021$). Postoperative day 3 C-reactive protein (CRP) levels were significantly higher in the AL group (451.3 [398.7–534.2] mg/L vs. 98.4 [71.2–138.6] mg/L, $p < 0.001$), whereas serum albumin levels were significantly lower (2.30 ± 0.16 g/dL vs. 3.09 ± 0.34 g/dL, $p < 0.001$). The postoperative day 3 CAR was markedly elevated in patients with AL compared with those without leakage (196.4 [168.2–248.7] vs. 32.1 [22.4–45.8], $p < 0.001$). Receiver operating characteristic (ROC) curve analysis demonstrated strong predictive performance for CAR, with an area under the curve (AUC) of 0.91 (95% CI: 0.84–0.98, $p < 0.001$). The optimal cutoff value was 148.7, yielding a sensitivity of 85.7% and specificity of 88.3%. In limited univariable logistic regression analysis, postoperative day 3 CAR remained significantly associated with AL (odds ratio [OR]: 6.84, 95% CI: 3.11–11.52, $p < 0.001$).

CONCLUSIONS: On postoperative day 3, CAR demonstrated strong discriminatory performance for anastomotic leakage after elective right hemicolectomy in this retrospective cohort. The high negative predictive value (98.8%) suggests potential utility as a rule-out tool for early postoperative risk stratification; however, these findings require prospective multicenter validation before any clinical implementation can be considered.

Keywords: anastomotic leakage; right hemicolectomy; colon cancer; CRP/albumin ratio; postoperative biomarker; risk stratification

Introduction

Anastomotic leakage (AL) constitutes one of the most feared postoperative complications in colorectal surgery, contributing to substantial morbidity, mortality, prolonged hospital stay, need for reoperation, and compromised oncological outcomes following curative resection for colorectal cancer [1]. Notwithstanding continuous improvements in operative techniques, perioperative management, and enhanced recovery protocols, AL remains a persistent challenge, with reported incidence rates between 3% and 15% depending on patient characteristics and procedural factors [2].

Prompt recognition of AL is paramount, as delayed diagnosis is associated with progression to severe sepsis and worse clinical outcomes [3]. Unfortunately, the early postoperative signs of AL are often nonspecific and clinically indistinguishable from normal postoperative inflammation, particularly during the first few days after surgery. This diagnostic challenge has driven considerable research interest in identifying biochemical markers capable of detecting AL at an early, pre-clinical stage [4].

C-reactive protein (CRP) is a well-established acute-phase reactant produced by the liver in response to tissue injury

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and systemic inflammatory stimuli. Elevated postoperative CRP has been consistently linked to infectious morbidity and anastomotic complications following colorectal resection [5,6]. More recently, the C-reactive protein-to-albumin ratio (CAR) — which integrates both inflammatory burden and nutritional reserve into a single index — has been proposed as a more comprehensive predictor of postoperative complications than CRP in isolation [7].

Beyond its role as a nutritional marker, albumin is a negative acute-phase protein whose serum concentration declines during systemic inflammation, making it a surrogate indicator of both catabolic stress and impaired tissue repair capacity. Low preoperative and postoperative albumin levels have been implicated in anastomotic healing failure and elevated complication risk in colorectal surgery [8]. Accumulating evidence suggests that CAR may outperform individual inflammatory or nutritional markers in predicting AL [7,8,9]; notably, Paliogiannis et al. [7] reported an independent association between elevated postoperative CAR and AL in elective colorectal resections.

Although several studies have evaluated inflammatory biomarkers in heterogeneous colorectal surgery populations, the majority included both elective and emergency procedures, rectal resections, left-sided colectomies, and patients with diverting stomas, resulting in considerable clinical heterogeneity [10,11]. In contrast, studies focusing exclusively on elective right hemicolectomy patients remain limited, representing a distinct knowledge gap. The incremental value of the present study over prior CAR-related research lies in its focus on a surgically homogeneous cohort with standardized perioperative management, which minimizes confounding by operative heterogeneity and enables a more reliable assessment of biomarker performance.

The present study aimed to evaluate factors associated with postoperative anastomotic leakage in a homogeneous cohort of patients undergoing elective right hemicolectomy for colon cancer and to investigate the predictive value of postoperative day 3 CRP/albumin ratio for early detection of anastomotic leakage. Postoperative day 3 was selected as the primary assessment timepoint based on prior evidence demonstrating that CRP levels typically peak between postoperative days 2 and 4 following major abdominal surgery, and that day 3 CRP has consistently shown the strongest discriminatory performance for infectious complications and anastomotic failure in colorectal surgery [4,5,6].

Methods

This retrospective observational cohort study was conducted at Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital. Patients who underwent elective right hemicolectomy with primary ileocolic anastomosis for colon cancer between January 1, 2020 and January 1, 2025 were included in the study. The primary objective was to identify factors associated with postoperative anastomotic leakage and to evaluate the predictive value of the postoperative CRP/albumin ratio in patients undergoing elective right-sided colon resection.

Patients who underwent emergency surgery, required diverting stoma formation, underwent multivisceral resection, or had incomplete clinical data were excluded from the study. Additionally, patients with active inflammatory bowel disease, systemic autoimmune conditions, preoperative corticosteroid use, severe hepatic insufficiency (Child-Pugh class B or C), or a preoperative serum albumin below 2.0 g/dL were excluded, as these conditions may independently affect CRP, albumin, or CAR values and confound interpretation of the biomarker. To ensure a homogeneous study population, only patients undergoing elective right hemicolectomy were analyzed.

A total of 194 patients met the inclusion criteria and were enrolled in the study. Patients were divided into two groups according to the presence or absence of postoperative anastomotic leakage. Anastomotic leakage was assessed during the first 30 postoperative days and was diagnosed based on clinical findings, radiological imaging, and/or findings at reoperation. Radiological diagnosis was based primarily on contrast-enhanced computed tomography findings suggestive of anastomotic leakage, including extraluminal gas or fluid collection adjacent to the anastomosis and/or extravasation of enteric or contrast material, when present. The definition of anastomotic leakage was based on the criteria proposed by the International Study Group of Rectal Cancer [12]. CRP measurements were reported in mg/L according to institutional laboratory standards. The postoperative day 3 CRP/albumin ratio was calculated by dividing the postoperative day 3 CRP level by the simultaneously measured serum albumin concentration. Procalcitonin (PCT) was measured on postoperative day 3 as part of routine postoperative laboratory assessment using an electrochemiluminescence immunoassay (ECLIA). Only patients with an available postoperative day 3 PCT measurement were included in the PCT analysis.

Receiver operating characteristic (ROC) curve analysis was performed to evaluate the predictive performance of postoperative day 3 CRP/albumin ratio for anastomotic leakage. Area under the curve (AUC), sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated. The optimal cutoff value was determined using the Youden index.

Prior to multivariable analysis, univariate logistic regression was performed to assess the association of each variable with anastomotic leakage. To evaluate independent predictors of anastomotic leakage, limited univariable logistic regression analysis was additionally performed. The postoperative day 3 CRP/albumin ratio was entered as a continuous variable; the reported odds ratio therefore reflects the change in odds per 10-unit increase in CAR. Due to the limited number of leakage events (n = 14) and the reverse causality concern associated with timing of enteral

Table 1. Demographic and perioperative characteristics of patients with and without anastomotic leakage.

Variable	No anastomotic leakage (n = 180)	Anastomotic leakage (n = 14)	*p*-value
Age (years)	62.5 ± 15.6	64.1 ± 17.8	0.749
Male sex, n (%)	104 (57.8)	9 (64.3)	0.634
BMI (kg/m^2)	25.0 ± 2.3	24.8 ± 2.8	0.798
ASA score ≥III, n (%)	38 (21.1)	4 (28.6)	0.514
Smoking history, n (%)	58 (32.2)	5 (35.7)	0.788
Diabetes mellitus, n (%)	39 (21.7)	4 (28.6)	0.549
Hypertension, n (%)	62 (34.4)	6 (42.9)	0.525
Preoperative albumin (g/dL)	3.82 ± 0.41	3.79 ± 0.44	0.808
Preoperative CRP (mg/L)	8.4 (4.2–15.6)	9.1 (4.8–17.2)	0.724
Laparoscopic approach, n (%)	95 (52.8)	6 (42.9)	0.474
Neoadjuvant treatment, n (%)	18 (10.0)	2 (14.3)	0.611
Preoperative transfusion, n (%)	14 (7.8)	2 (14.3)	0.324
Stapled anastomosis, n (%)	131 (72.8)	9 (64.3)	0.495
Operative duration (hours)	2.97 ± 0.78	2.83 ± 0.57	0.402
Time to enteral feeding (days)	2.83 ± 0.76	3.36 ± 0.74	0.021

Data are presented as mean ± standard deviation, median (interquartile range), or number (%), as appropriate. Normally distributed continuous variables were compared using Welch's *t*-test; non-normally distributed variables using the Mann-Whitney U test. Categorical variables were analyzed using the chi-square test. Abbreviations: BMI, body mass index; ASA, American Society of Anesthesiologists; CRP, C-reactive protein. Normally distributed variables (mean ± SD): age, BMI, operative duration, time to enteral feeding, preoperative albumin. Non-normally distributed (median [IQR]): preoperative CRP.

feeding initiation — which may reflect a consequence of early anastomotic failure rather than an independent risk factor — the multivariable model was restricted to a single variable (postoperative day 3 CAR) to avoid model overfitting and causal misinterpretation.

Statistical Analysis

Statistical analyses were performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Normality of continuous variables was assessed using the Shapiro-Wilk test. Continuous variables with normal distribution were expressed as mean ± standard deviation and compared using Welch's *t*-test; non-normally distributed variables were expressed as median (interquartile range) and compared using the Mann-Whitney U test. Categorical variables were presented as frequencies and percentages and analyzed using the chi-square test. A two-sided *p*-value of <0.05 was considered statistically significant.

Results

A total of 194 patients were included in the study, and anastomotic leakage developed in 14 patients (7.2%). The demographic and clinical characteristics of patients with and without anastomotic leakage are summarized in Table 1.

No statistically significant differences were observed between the groups regarding age (62.5 ± 15.6 vs. 64.1 ± 17.8 years, $p = 0.749$), body mass index (25.0 ± 2.3 vs. 24.8 ± 2.8 kg/m^2, $p = 0.798$), operative duration (2.97 ± 0.78 vs. 2.83 ± 0.57 hours, $p = 0.402$), or comorbidities, demonstrating the homogeneity of the study population (Table 1).

However, initiation of early enteral feeding was significantly delayed in patients with anastomotic leakage compared to those without leakage (3.36 ± 0.74 vs. 2.83 ± 0.76 days, $p = 0.021$).

Evaluation of laboratory parameters demonstrated significantly higher postoperative day 3 CRP levels in patients with anastomotic leakage compared to the non-leakage group (451.3 [398.7–534.2] mg/L vs. 98.4 [71.2–138.6] mg/L, $p < 0.001$). In contrast, serum albumin levels were significantly lower in the leakage group (2.30 ± 0.16 g/dL vs. 3.09 ± 0.34 g/dL, $p < 0.001$). Procalcitonin levels were similar between groups and did not differ significantly (3.08 ± 0.52 vs. 3.12 ± 0.55 ng/mL, $p = 0.796$) (Table 2).

Supporting the primary hypothesis of the study, the postoperative day 3 CRP/albumin ratio was significantly higher in patients with anastomotic leakage than in those without leakage (196.4 [168.2–248.7] vs. 32.1 [22.4–45.8], $p < 0.001$) (Table 2). Twelve of 14 patients (85.7%) who developed anastomotic leakage had a CRP/albumin ratio exceeding the optimal cutoff value of 148.7.

ROC curve analysis demonstrated that postoperative day 3 CRP/albumin ratio had strong predictive performance for anastomotic leakage, with an AUC of 0.91 (95% CI: 0.84–0.98, $p < 0.001$). The *p*-value associated with the AUC was derived from a test of the null hypothesis that the true AUC equals 0.5 (i.e., no discriminatory ability beyond chance), assessed using the DeLong method. The optimal cutoff value determined by the Youden index was 148.7, yielding a sensitivity of 85.7%, specificity of 88.3%, positive predictive value of 36.4%, and negative predictive value of 98.8% (Fig. 1, Table 3).

Table 2. Comparison of postoperative laboratory parameters between groups.

Variable	No anastomotic leakage (n = 180)	Anastomotic leakage (n = 14)	*p*-value
Postoperative day 3 CRP (mg/L)	98.4 (71.2–138.6)	451.3 (398.7–534.2)	<0.001
Serum albumin (g/dL)	3.09 ± 0.34	2.30 ± 0.16	<0.001
CRP/albumin ratio	32.1 (22.4–45.8)	196.4 (168.2–248.7)	<0.001
Procalcitonin (ng/mL)	3.08 ± 0.52	3.12 ± 0.55	0.796

CAR was calculated as CRP (mg/L) divided by serum albumin (g/dL), without unit conversion or normalization. Accordingly, CAR is reported as a derived ratio based on these specified measurement units.

Data are presented as mean ± standard deviation or median (interquartile range), as appropriate. Normally distributed variables (serum albumin, procalcitonin) were compared using Welch's *t*-test; non-normally distributed variables (postoperative day 3 CRP, CRP/albumin ratio) using the Mann-Whitney U test. The CRP/albumin ratio was calculated using postoperative day 3 CRP and simultaneously measured serum albumin levels. Abbreviations: CRP, C-reactive protein.

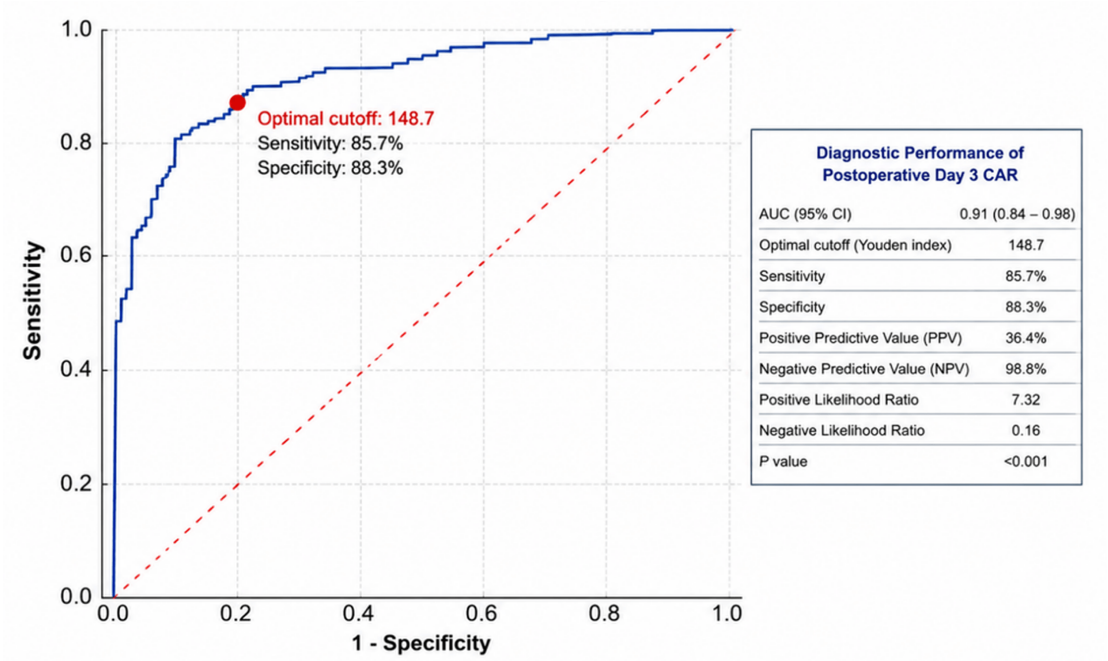

Fig. 1. ROC curve for postoperative day 3 CRP/albumin ratio predicting anastomotic leakage after elective right hemicolectomy. AUC = 0.91 (95% CI: 0.84–0.98); optimal cutoff: 148.7 by Youden index (sensitivity 85.7%, specificity 88.3%, PPV 36.4%, NPV 98.8%). Abbreviations: AUC, area under the curve; CRP, C-reactive protein; NPV, negative predictive value; PPV, positive predictive value; ROC, receiver operating characteristic.

Table 3. Univariate logistic regression analysis of factors associated with anastomotic leakage.

Variable	Odds ratio	95% CI	*p*-value
Age (per year)	1.01	0.97–1.05	0.749
BMI (per kg/m^2)	0.96	0.81–1.14	0.798
Operative duration (per hour)	0.88	0.46–1.69	0.402
Procalcitonin (per ng/mL)	1.12	0.61–2.03	0.796
Delayed enteral feeding (per day)	1.84	1.09–3.72	0.021
Postoperative day 3 CRP (per 10 mg/L)	4.92	2.34–8.71	<0.001
Serum albumin (per g/dL)	0.22	0.09–0.51	<0.001
CRP/albumin ratio (per 10 units)	6.84	3.11–11.52	<0.001

Odds ratios reflect the change in odds per the unit increase specified in parentheses. Odds ratios reflect the change in odds per the unit increase specified in parentheses. Postoperative day 3 CRP/albumin ratio was evaluated using univariable logistic regression analysis (Table 4).

Univariable logistic regression analysis demonstrated that postoperative day 3 CRP/albumin ratio was significantly associated with anastomotic leakage (odds ratio [OR]: 6.84, 95% CI: 3.11–11.52, $p < 0.001$) (Table 4).

Table 4. Univariable logistic regression analysis of the association between postoperative day 3 CAR and anastomotic leakage.

Variable	Odds ratio	95% CI	*p*-value
CRP/albumin ratio (per 10 units)	6.84	3.11–11.52	<0.001

The odds ratio reflects the change in odds per 10-unit increase in postoperative day 3 CAR. This analysis is unadjusted and does not account for potential confounding factors. CAR, C-reactive protein-to-albumin ratio.

Among patients with anastomotic leakage, 8 underwent reoperation, 4 were managed with percutaneous drainage and antibiotic therapy, and 2 were treated conservatively.

These findings suggest that an elevated postoperative CRP/albumin ratio may serve as a strong predictive marker for anastomotic leakage in patients undergoing elective right hemicolectomy.

Discussion

In the present study, postoperative day 3 CAR was significantly higher in patients who developed AL following elective right hemicolectomy, with most AL patients demonstrating a CAR above the optimal cutoff of 148.7. These findings support the hypothesis that postoperative inflammatory-nutritional indices may serve as reliable early predictors of anastomotic failure.

CRP is widely recognized as an important postoperative inflammatory marker in colorectal surgery. Several previous studies have demonstrated that elevated postoperative CRP levels are associated with infectious complications and AL development [4,5,6]. Consistent with these reports, postoperative day 3 CRP levels in the present study were markedly elevated in patients who developed AL, while serum albumin levels were significantly reduced, as detailed in the Results section. However, CRP alone may be influenced by several perioperative inflammatory conditions and may not fully reflect the patient's nutritional and immunological status.

For this reason, recent studies have increasingly focused on composite inflammatory markers such as CAR [7,9]. Albumin is a negative acute-phase reactant and an important indicator of both nutritional reserve and systemic inflammatory burden. Hypoalbuminemia has been associated with impaired collagen synthesis, delayed wound healing, and increased susceptibility to postoperative septic complications [8]. In the current study, serum albumin levels were significantly lower in the AL group, while CAR values were markedly elevated, suggesting that simultaneous assessment of inflammation and nutritional status may provide superior predictive performance compared to isolated biomarkers.

A notable negative finding of the present study was the absence of a significant difference in procalcitonin (PCT) levels between the AL and non-AL groups ($p = 0.796$). This result is noteworthy given that PCT has been proposed as an early predictor of AL in several previous studies. The meta-analysis by Bona et al. [6] reported that PCT may offer higher specificity than CRP for AL detection; however, considerable heterogeneity exists across studies, and PCT performance appears more variable than CRP in the literature. The failure of PCT to discriminate between groups in the present cohort may reflect the relatively early measurement timepoint (postoperative day 3), as PCT kinetics following anastomotic failure may peak later than CRP. Alternatively, it may suggest that in a homogeneous right-sided colon resection cohort, PCT adds limited diagnostic value beyond CAR. PCT levels did not differ significantly between the AL and non-AL groups in the present cohort. Therefore, the PCT findings should be interpreted cautiously, and further studies incorporating direct comparative diagnostic analyses are needed to clarify its potential role in the detection of anastomotic leakage.

Our findings are consistent with previous studies investigating CAR in colorectal surgery. Paliogiannis et al. [7] demonstrated that elevated postoperative CAR was significantly associated with AL following colorectal resections. Similarly, Yu et al. [9] reported that higher preoperative CAR values were associated with increased postoperative complications and AL risk in elderly colorectal cancer patients. Previous studies have suggested that postoperative CAR may provide greater discriminatory performance than CRP alone for detecting anastomotic leakage or postoperative complications after colorectal surgery [7,13].

One of the most important strengths of the present study is the relatively homogeneous patient population. Unlike many previously published studies that included heterogeneous colorectal procedures such as rectal resections, emergency surgeries, left-sided colectomies, and diverting stomas [10,11], the current study exclusively evaluated elective right hemicolectomy patients. This methodological approach minimized surgical heterogeneity and allowed a more reliable assessment of the relationship between CAR and AL. In addition, demographic and perioperative characteristics including age, BMI, operative duration, comorbidities, and surgical technique were statistically similar between groups, further supporting the homogeneity of the study population.

Another notable finding of the present study was the association between delayed enteral feeding and AL. Patients who developed AL initiated enteral feeding significantly later than those without leakage. Although causality cannot be established due to the retrospective design, this finding may reflect delayed postoperative recovery and impaired gastrointestinal function in patients with develop-

ing septic complications. Enhanced recovery after surgery (ERAS) protocols strongly emphasize early enteral nutrition because of its beneficial effects on intestinal mucosal integrity and immune function [14].

ROC curve analysis in the present study demonstrated that postoperative day 3 CAR had strong discriminatory ability for predicting anastomotic leakage, with an AUC of 0.91. The optimal cutoff determined by the Youden index was 148.7, yielding high sensitivity and specificity. These findings suggest that CAR may serve as a potentially useful early postoperative biomarker in this retrospective cohort; however, prospective validation is required before drawing conclusions about direct clinical applicability. Similar cutoff-based predictive performances have been reported in recent colorectal surgery studies evaluating inflammatory biomarkers [15,16].

The relatively low positive predictive value (PPV) of 36.4% is likely influenced by the low prevalence of anastomotic leakage (7.2%) in the study cohort. In contrast, the negative predictive value (NPV) was 98.8%. Although this finding suggests potential value of postoperative day 3 CAR for identifying patients at lower risk of anastomotic leakage, its clinical utility requires prospective validation in independent cohorts before it can be used to guide postoperative management decisions.

To further evaluate the independent predictive value of CAR, a single-variable univariable logistic regression analysis was performed. Given the limited number of AL events in the present cohort and the concern that timing of enteral feeding initiation may represent a consequence of developing anastomotic failure rather than an independent antecedent predictor (reverse causality), enteral feeding was excluded from the multivariable model. Postoperative day 3 CAR was significantly associated with anastomotic leakage in the univariable logistic regression analysis (OR: 6.84, 95% CI: 3.11–11.52, $p < 0.001$). However, this analysis was unadjusted and does not establish an independent or incremental predictive effect of CAR. A previous study has similarly demonstrated the independent predictive role of inflammatory-nutritional indices in colorectal anastomotic complications [13].

Although CRP levels in the leakage group were markedly elevated, similar postoperative CRP elevations have previously been reported in severe septic complications following colorectal surgery [17]. Since all CRP measurements were standardized according to institutional laboratory protocols and reported in mg/L, the observed values likely reflect the severity of systemic inflammatory response associated with clinically significant leakage.

Despite these important findings, several limitations of the present study should be acknowledged. First, the retrospective single-center design may introduce selection bias and limits the generalizability of the findings. Second, the relatively limited number of AL events (n = 14) constrains statistical power; the final multivariable model was restricted to a single variable (postoperative day 3 CAR), yielding an events-per-variable ratio of 14, which meets the conventional threshold of 10. Nevertheless, the regression findings should be interpreted with caution and are considered hypothesis-generating rather than confirmatory. Third, the identified cutoff value of 148.7 was derived from the same dataset used for model development, without internal or external validation; bootstrap or split-sample validation was not performed due to the limited sample size, and the cutoff therefore requires confirmation in independent cohorts before routine clinical application. Given the small number of AL events and the absence of internal validation, it is possible that the reported AUC of 0.91 is subject to optimistic bias, and this should be considered when interpreting the diagnostic performance metrics. Fourth, the five-year inclusion window (2020–2025) may have introduced chronological bias, as surgical techniques, ERAS protocol implementation, and institutional learning curves may have evolved over time. Although no formal time-period adjustment was performed, baseline demographic and perioperative characteristics were comparable across groups, providing some reassurance against gross confounding. Fifth, normality-based statistical tests were applied; although the distributional assumptions were assessed using the Shapiro-Wilk test, the relatively small AL group size limits the robustness of parametric inference for some variables. Nevertheless, the study possesses important strengths, including the homogeneous surgical cohort consisting exclusively of elective right hemicolectomy patients, standardized perioperative management, and inclusion of consecutive patients over a five-year period.

Overall, postoperative day 3 CAR appears to be a practical and readily available biomarker for early prediction of AL after elective right hemicolectomy, with its high NPV supporting its role as a rule-out tool. Prospective multicenter validation is needed before it can be incorporated into standardized postoperative surveillance protocols.

Conclusions

Postoperative day 3 CAR showed potential as a readily available biomarker associated with anastomotic leakage after elective right hemicolectomy. However, given the retrospective single-center design and the absence of direct comparative diagnostic analyses with other biomarkers, these findings should be considered exploratory. Prospective multicenter studies are required to validate the diagnostic performance and potential clinical utility of CAR.

Availability of Data and Materials

The data and materials in the current study are available from the corresponding author on reasonable request.

Author Contributions

İES, AT, and FS contributed to the conception and design of the study. İES and FS contributed to data acquisition and data curation. AT and FS contributed to the analysis and interpretation of the data. İES drafted the initial manuscript. AT and FS critically revised the manuscript for important intellectual content. All authors read and approved the final version of the manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

The study protocol was approved by the Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital Scientific Research Ethics Committee (Approval No: 2025/211). The study was conducted in accordance with the principles of the Declaration of Helsinki. Due to the retrospective nature of the study, the requirement for individual informed consent was waived by the Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital Scientific Research Ethics Committee.

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Conflict of Interest

The authors declare no conflict of interest.

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