Combined Predictive Value of Metabolic Risk Factors on Postoperative Outcomes in Colectomy for Colon Cancer

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Introduction

- Colorectal cancer (CRC) persists as one of the most prevalent and high-mortality malignancies worldwide. The substantial clinical burden posed by CRC is attributed both to its incidence rate as well as the complexity of its management and patient population.
- Surgical resection – particularly colectomy – remains a mainstay curative intervention for colon cancer.
- Growing evidence suggests that diabetes mellitus not only serves as an independent risk factor for the development of CRC but also impacts outcomes following surgical intervention.
- HbA1c is the primary means of enumerating blood glucose control and offers a more sensitive indicator of patient health and long-term disease management than simply diabetes diagnosis.
- Because colectomy is one of the mainstay curative treatments for colon cancer, diabetes and HBa1C levels are critical to consider in the prognosis, treatment, and continued care of colon cancer.

Study Objective

The objective of our study is to elucidate the impact of preoperative diabetes status as well as preoperative HbA1c levels on postoperative outcomes in patients undergoing colectomy for colon cancer, thereby evaluating prognostic significance and combined predictive value of metabolic risk factors.

Methods

- We conducted a **7-year retrospective cohort analysis** with data extracted from the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database.
- The study comprised of adult patients (age > 18) who underwent **colectomy** from 2017-2023 with the primary indication being **colon cancer or blockage**.
- This resulted in **100,289 enrolled patients**, who were subsequently stratified by preoperative diabetes status and, for 2023 only, by HbA1c levels. HbA1c data was available for **5,455 patients**.
- **Bivariate** regression analysis was conducted with two-tailed chi-square test for categorical variables and two-tailed t-test or ANOVA for continuous variables.
- Further, a **multivariate** regression analysis was conducted to control for the following potential confounding variables: **gender, age, race, and BMI.**
- All analyses were generated using the Statistical Analysis System (SAS) suite, and $p < 0.05$ was considered statistically significant.

Results

Impact of preoperative **diabetes**

	Bivariate analysis		Multivariate analysis	
	OR	P-Value	aOR	P-Value
Superficial incisional SSI*	1.33	<0.001	1.25	<0.001
Deep incisional SSI	1.48	<0.001	1.30	0.016
Organ/space SSI	1.07	0.048	1.12	0.001
Urinary tract infection	1.39	<0.001	1.39	<0.001
Myocardial infarction	1.80	<0.001	1.66	<0.001
Septic shock	1.18	0.002	1.12	0.038
30-day unplanned reoperation	1.01	0.801	0.98	0.560
30-day unplanned readmission	1.38	<0.001	1.34	<.0001
Still in hospital > 30 days	1.26	<0.001	1.16	0.026
Anastomotic leak	1.02	0.654	1.004	<0.001
Ventilator > 48 hrs	1.34	<0.001	1.24	0.001

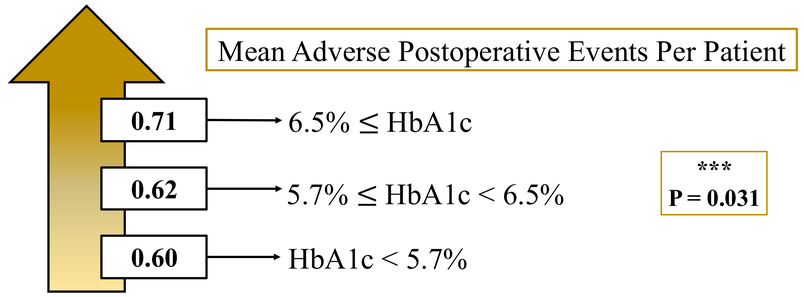
ref = No diabetes

* **SSI** = surgical site infection

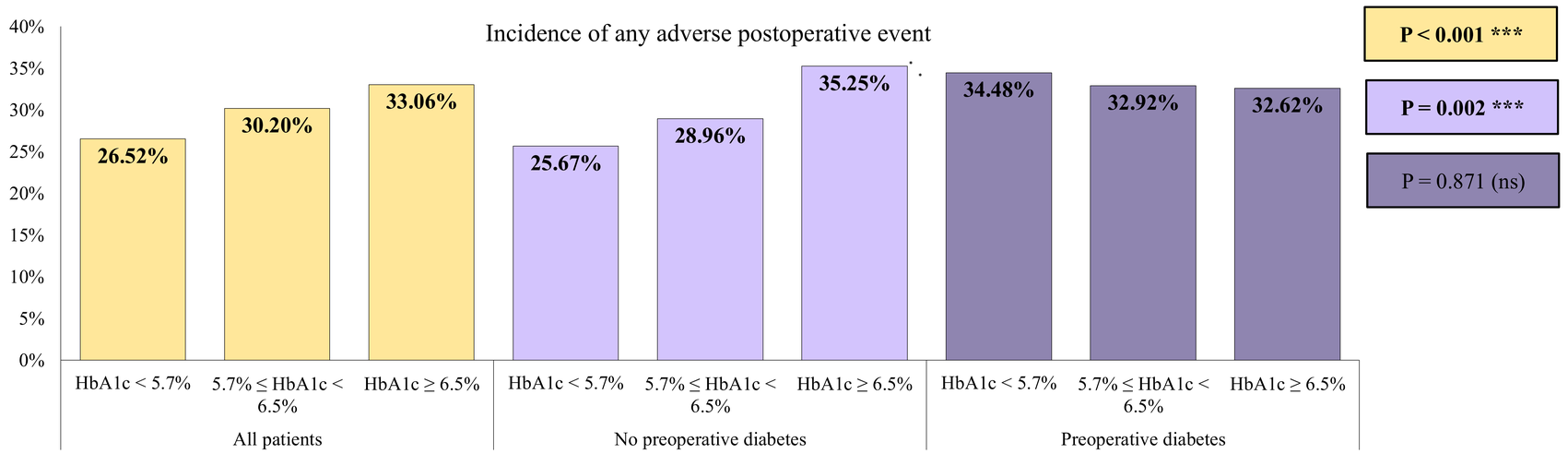
Impact of preoperative **HbA1c level**

	Bivariate analysis		Multivariate analysis	
	OR	P-Value	aOR	P-Value
Superficial incisional SSI*	1.63	<0.001	1.55	0.007
Urinary tract infection	1.64	0.019	1.77	0.008
Ventilator > 48 hrs	1.83	0.012	1.79	0.018

ref = HbA1c < 6.5%



Combined impact of **preoperative diabetes and HbA1c level**



Conclusions

- Patients with diabetes and patients with high HbA1c levels that underwent colectomy for colon cancer exhibited independently greater odds of experiencing numerous postoperative complications.
- Even in patients without diabetes, high preoperative HbA1c levels predicted adverse outcomes.
- Interestingly, the subgroup with the highest occurrence of postoperative complications was of patients with **high HbA1c without a diabetes diagnosis**.
- Among patients with known diabetes, occurrence of adverse events **did not significantly differ** by preoperative HbA1c.
- These findings highlight that **not only diabetes status but also chronic disease management**, proxied by HbA1c levels, have a prognostic role in colectomies.
- In diabetic patients, HbA1c was not found to indicate risk, prompting consideration into metabolic consequences not captured by glycemic control.
- However, in nondiabetic patients, HbA1c was a strong indicator of outcomes, warranting further study of underlying demographic and socioeconomic factors.
- Looking forward, preoperative glycemic status evaluation and proactive diabetes management for patients undergoing colectomy may help **predict and mitigate specific complications, inform care, and ultimately improve outcomes.**