

What’s the Threshold? Investigating Body Mass Index & Hemoglobin A1C Cutoff Values for Complication Risk in Breast Reconstruction With NSQIP

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Introduction

Despite the frequency of breast reconstruction procedures, the rate of postoperative complications remains relatively high. Complication rates have a reported range from approximately **25% to 47%** depending on procedure type.

In reconstructive breast surgery, there is **insufficient literature on threshold values** for hemoglobin A1C (A1C) and body mass index (BMI) to identify patients at high risk for complications.

This study aimed to evaluate the effectiveness of A1C, BMI, and other patient factors in predicting complications and to identify cutoff values for plastic surgeons to use in preoperative evaluation.

Methods

Retrospective analysis of breast reconstruction complications was conducted utilizing data from the National Surgical Quality Improvement Program Database (2020-2022). Logistic regressions examined the association of A1C, BMI, age, and diabetes, smoking, and hypertension status with complications. Receiver operating characteristic (ROC) curves were constructed to identify cutoff values. The discriminatory ability of A1C and BMI to predict complications was assessed using area under the curve (AUC).

Procedure groups of interest:

- 1) Alloplastic reconstruction
 - Immediate expander placement
 - Immediate implant placement
 - Delayed implant placement
- 2) Autologous reconstruction
 - Immediate flap (free or pedicled) reconstruction
 - Delayed flap (free or pedicled) reconstruction
- 3) All groups combined

Outcomes of interest:

- Any complication
- Surgical site infection
- Wound dehiscence
- Threshold values, after which the risk of outcomes increases

Risk factors of interest:

- Age
- BMI
- Preoperative A1C
- Diabetes status
- Smoking status
- Hypertension status

Results

Patient Demographics

- The study included 2,713 cases
- Median age: 54 years (IQR 39-69)
- Median A1C: 5.7 (IQR 4.6-6.8)
- Median BMI: 29.3 kg/m² (IQR 21.0-37.7)

Complications

- Alloplastic reconstruction complication rate: 9.2%
- Autologous reconstruction complication rate: 21.5%

Logistic Regression Results:

BMI was the **only** significant predictor of complications. Patients with BMIs 35 kg/m² or greater had the highest odds of complications (OR 2.060, p<0.001).

ROC Results:

AUCs for A1C and BMI curves for all complications were significantly different (0.516 vs. 0.586, *p*<0.0004), indicating **BMI as having superior ability to predict complications**. A BMI cutoff of 27.9 kg/m² provides the greatest specificity and sensitivity for complications.

Conclusions

Based on odds ratios, **A1C was not a significant predictor** of complications after breast reconstruction, however BMI was. Based on AUCs, BMI is a stronger predictor than A1C. Furthermore, our findings suggest that A1C may have limited utility in predicting a patient's risk of developing the examined complications. More research is needed however, for greater contextualization of these findings.

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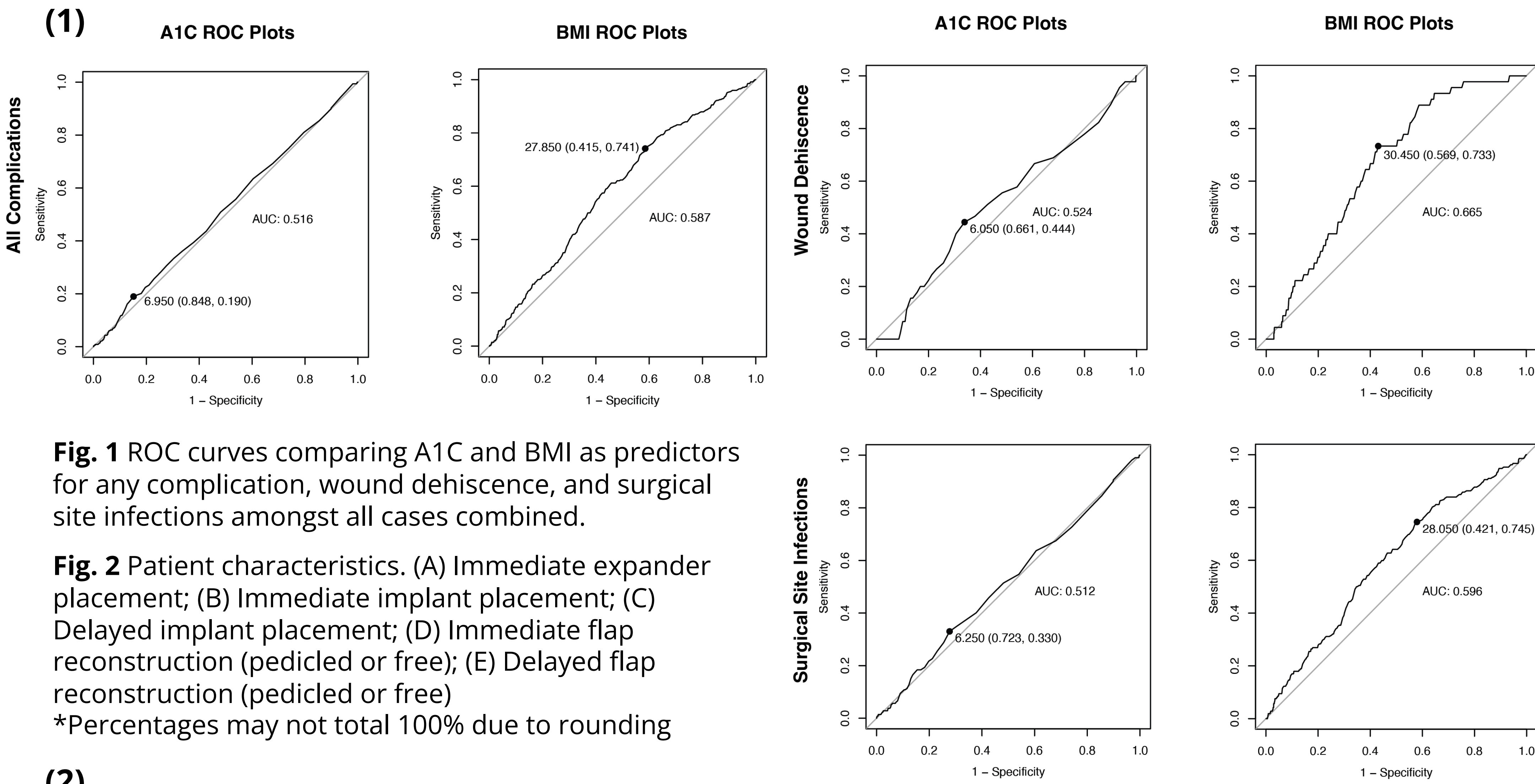


Fig. 1 ROC curves comparing A1C and BMI as predictors for any complication, wound dehiscence, and surgical site infections amongst all cases combined.

Fig. 2 Patient characteristics. (A) Immediate expander placement; (B) Immediate implant placement; (C) Delayed implant placement; (D) Immediate flap reconstruction (pedicled or free); (E) Delayed flap reconstruction (pedicled or free)
*Percentages may not total 100% due to rounding

<i>Patient Characteristic</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>All Cases (Percentage of All Cases)*</i>
Total Cases	1315 (48.5%)	357 (13.2%)	242 (8.9%)	348 (12.8%)	451 (16.6%)	2713 (100.0%)
A1C <7	1126	298	200	298	367	2289 (84.4%)
7 ≤ A1C <9	140	22	33	37	49	281 (10.4%)
A1C >9	49	37	9	13	35	143 (5.3%)
BMI <24.9	315	120	56	52	45	588 (21.7%)
25 ≤ BMI <35	741	189	136	215	291	1572 (57.9%)
BMI ≥35	259	48	50	81	115	553 (20.4%)
Diabetes	307	72	71	103	151	704 (26.0%)
Smoking	78	17	12	19	18	144 (5.3%)
Hypertension	484	116	111	143	170	1024 (37.7%)