Predicting Unplanned Reoperation After Breast Reduction Using National Data

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BACKGROUND

Reduction mammaplasty continues to be a commonly sought procedure in the United States. Reported complication rates vary widely, with some studies describing as few as 4.3% to as high as 8.2%, with the most common complication being delayed wound healing.

OBJECTIVE

We sought to identify the preoperative risk factors for unplanned reoperation within the first post-operative month on a national, multi-institutional scale.

METHODS

Patients who underwent reduction mammoplasty from the ACS-NSQIP 2012 – 2019 database were analyzed to determine rates of reoperation within 30 days of the initial breast surgery. The cohort was divided into 60 and 40% random testing and validation samples. A multivariable logistic regression analysis was then performed to isolate independent factors of unplanned reoperation using the testing sample (n = 22,743). The predictors were weighted according to beta coefficients to develop an integer-based clinical risk score predictive of complications. This system was then validated using receiver operating characteristics (ROC) analysis of the validation sample (n = 15,162).

RESULTS

Table 1: Multivariate regression analysis for unplanned rates of reoperation.

| Variable	Multivariate regression: extensive adjustment			Scoring System	
	Odds Ratio	P value	95 % CI	β coefficient (SE[a])	Integer score
Age		0.0027			
≤ 44 years	Ref	—	—	—	—
>44 years	1.338	0.0027	(1.11 – 1.62)	0.29 (+//– 0.08)	3
Inpatient status	3.320	<0.0001	(2.67 – 4.31)	1.20 (+//– 0.20)	12
Bleeding Disorder	2.717	0.0330	(1.08 – 6.81)	1.00 (+//– 0.03)	10
Integer Range					[0, 25]

This multivariable logistic regression model adjusted for the following perioperative variables: 1. Age (dichotomous), 2. Gender (dichotomous), 3. Smoking (Dichotomous), 4. Race (categorical), 5. Inpatient status (dichotomous), 6. Operation year (categorical), 7. Body mass index class (categorical), 8. Diabetes mellitus with oral agents or insulin (dichotomous), 9. Chronic steroid use (dichotomous), 10. Dyspnea (dichotomous), 11. Functional health status pre-operative (categorical), 12. Chronic obstructive pulmonary disease (dichotomous), 13. Hypertension requiring medication (dichotomous), 14. History of disseminated cancer (dichotomous), 15. History of bleed disorders (dichotomous), 16. Preoperative weight loss of [10 % in last 6 months (dichotomous), 17. Wound classification (categorical), 18. Preoperative platelet count (continuous), 19. Preoperative International Normalized Ratio (continuous), 20. Preoperative hematocrit (continuous), 21. Pre-operative serum albumin (continuous), 22. Operation time (categorical), 23. Length of hospital stay (continuous), 24. American Society of Anesthesiologist classification

[a]SE standard error, represented throughout the text and tables by the symbol "+//–"

Figure 1: ROC curve for unplanned rates of reoperation. The AUC is 0.61.
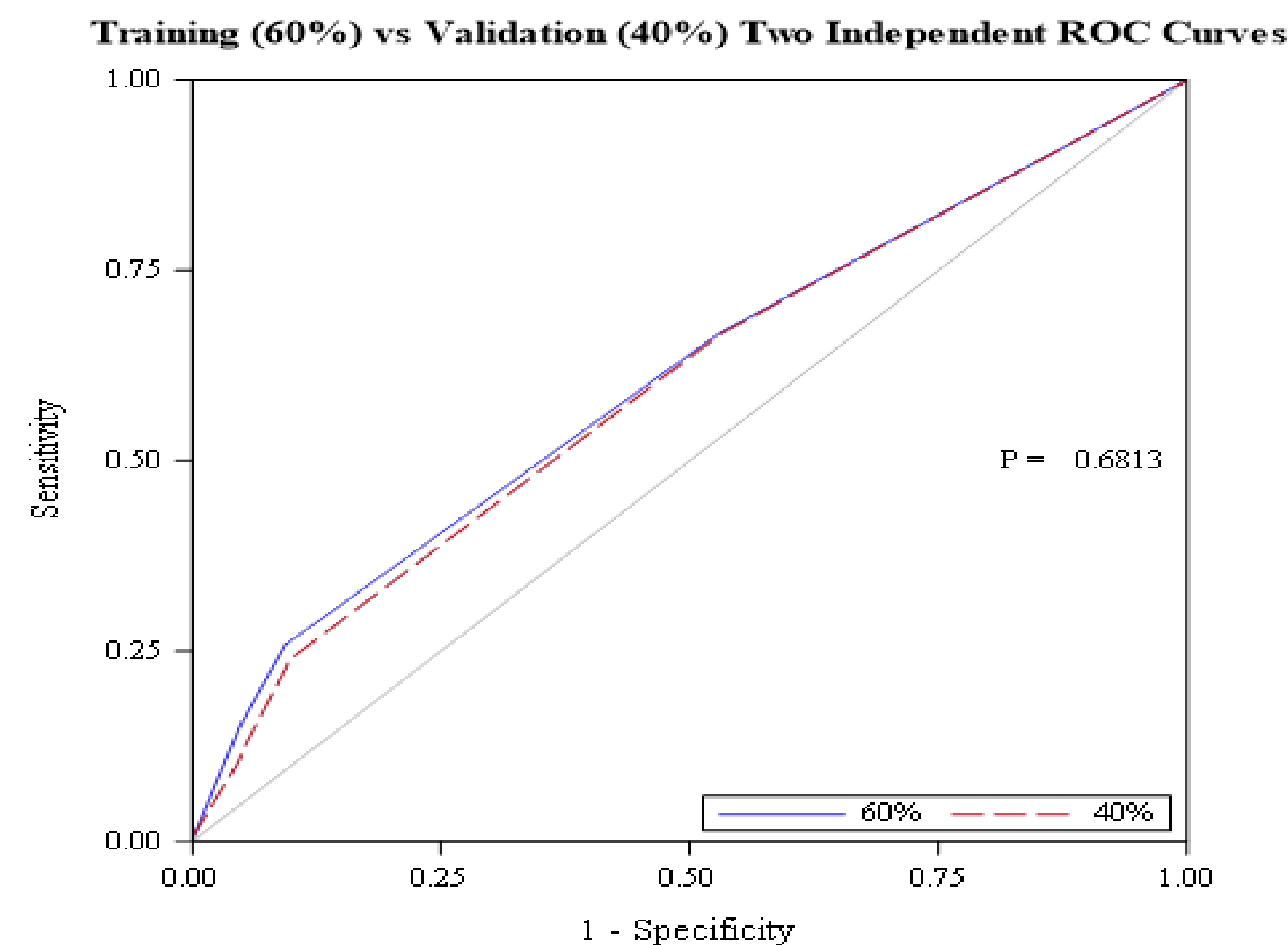
Figure 2: Score risk groups for unplanned reoperation.
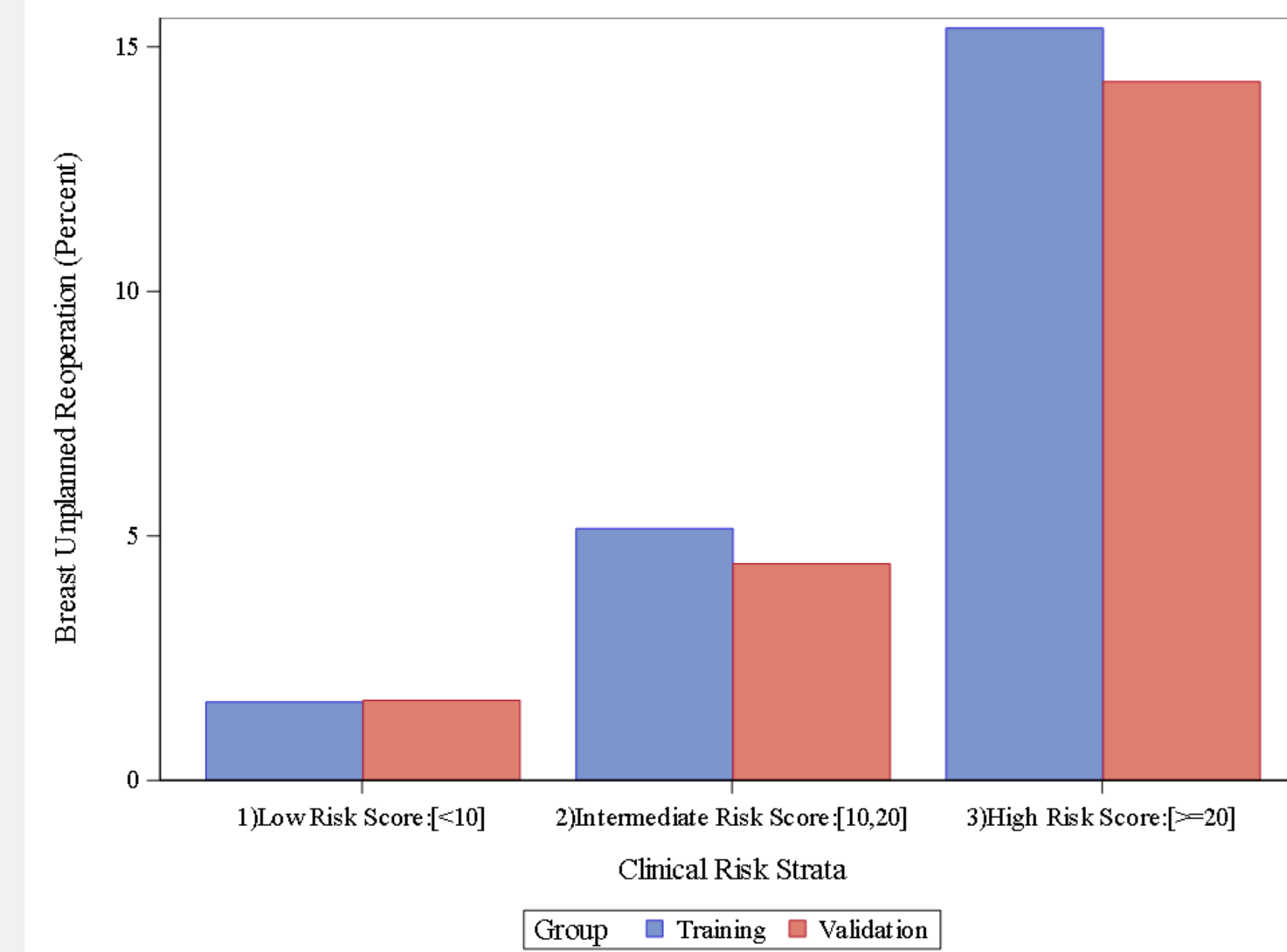
CONCLUSION

Independent risk factors for unplanned reoperation in this population included age older than the median of 44 years (p < 0.01), inpatient status (p < 0.01), and a history of bleeding disorders (p < 0.05). Given the frequency of this procedure this data should serve as a risk stratification tool to guide post-operative monitoring and follow up in an attempt to decrease the associated healthcare burden associated with unplanned reoperation.

ARTICLES SELECTED

1.ASPS (2019) Plastic surgery statistics report 2019. https://www.plasticsurgery.org/documents/News/Statistics/2019/plastic-surgery-statistics-full-report-2019.pdf.
2.Aravind, P., Siotos, C., Bernatowicz, E., Cooney, C. M., & Rosson, G. D. (2020). Breast Reduction in Adults: Identifying Risk Factors for Overall 30-Day Postoperative Complications. *Aesthetic surgery journal, 40*(12), NP676-NP685.
3.Waltho, D., Gallo, L., Gallo, M., Murphy, J., Copeland, A., Mowakket, S., ... & Thoma, A. (2020). Outcomes and Outcome Measures in Breast Reduction Mammaplasty: A Systematic Review. *Aesthetic surgery journal, 40*(4), 383-391.
4.Cunningham, B. L., Gear, A. J., Kerrigan, C. L., & Collins, E. D. (2005). Analysis of breast reduction complications derived from the BRAVO study. *Plastic and reconstructive surgery, 115*(6), 1597-1604.
5.Shestak, K. C., & Davidson, E. H. (2016). Assessing risk and avoiding complications in breast reduction. *Clinics in plastic surgery, 43*(2), 323-331.