

Development of an Individualized Surgical Risk Calculator for Abdominoplasty Procedures

Michael M. Vu, BS; Karol A. Gutowski, MD; Jordan T. Blough, BS; Christopher J. Simmons, BS; John Y.S. Kim, MD

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INTRODUCTION: Individual surgical risk calculation is supplanting coarser, population-based risk estimates, helping surgeons better inform patients about risks and expectations of surgery.^{1,2} No risk calculators have been created for aesthetic surgical procedures like abdominoplasties. To this end, we used the Tracking Operations and Outcomes for Plastic Surgeons (TOPS) database to develop a risk calculator for abdominoplasties to predict the chance of complications.

METHODS: Panniculectomies and abdominoplasties with and without liposuction were identified from the 2008-2011 TOPS database. Multiple-procedure cases, duplicate case-IDs, and revisions were excluded. Outlier ages (less than 18 or greater than 100) and BMIs (less than 10 or greater than 100) were also removed. Age, BMI, smoking history, diabetes, American Society of Anesthesiologists' (ASA) Class, facility type, and admission status were examined as relevant clinical parameters. Seroma, dehiscence, surgical site infection (SSI), reoperation, and overall complications were the outcomes of interest. After extrapolating missing values with 5-iteration multiple imputation, we generated logistic regression models to predict the chance of complications based on the perioperative parameters. Model performance was assessed using p-value, c-statistic, Hosmer-Lemeshow (H-L), and Brier score.

RESULTS: 4,597 cases met inclusion criteria. 9.4% suffered at least one surgical complication. Seroma, hematoma, dehiscence, SSI, and reoperation occurred in 3.9%, 1.0%, 3.6%, 1.7%, and 1.2% of cases respectively. Binary logistic regression modeled the risk of each complication, yielding beta values for each clinical parameter (Table 1). Each model performed satisfactorily based on the aforementioned metrics. The average predicted risk was 9.4%, ranging from 0.52% to 74%. The distribution of predicted risk of surgical complication was wide and positively skewed (Figure 1), highlighting the inadequacy of population-based risk estimates and therefore the importance of individualized risk assessment. The models were packaged and published online at AbdominoplastyRisk.org for public, user-friendly use.

CONCLUSION: With the advent of large surgical outcomes databases, we can leverage the abundance of data to develop risk calculators that evaluate absolute risk of complications based on individual patient information. Our risk calculator is based on regression models with good performance and can more accurately determine risk than traditional population-based estimates.

REFERENCES:

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FIGURE LEGEND:

Table 1. Beta values for each predictive model and associated clinical parameters.

Figure 1. Histogram of predicted probability of having any surgical complication, generated from one of five imputed datasets.

Patient characteristic	Model					
	Seroma	Hematoma	Dehiscence	SSI	Reoperation	Any surgical complication
Age	-.009	-.018	.013	-.007	-.005	-.002
BMI	.016	.015	.075	.032	.045	.040
Gender: Male	.530	1.322	-.468	-.043	.634	.288
Race: Black^a	-.293	-1.282	-.634	.244	-1.584	-.443
Race: Asian^a	.191	.426	.124	1.013	1.573	.452
Race: Hispanic^a	-.588	-1.038	.616	.335	-1.227	-.116
Race: Other^a	-1.325	.097	N/A	-1.856	-.349	-1.517
Smoker	.006	.130	.694	.153	-.302	.306
Diabetes	.034	-.123	-.232	-.294	-.185	-.082
ASA = 2^b	.555	.257	.560	.721	.787	.571
ASA > 2^b	.145	.322	.836	.959	.677	.702
Inpatient	.366	.107	1.167	.863	.520	.593
Facility: Ambulatory Surgery Center^c	.353	-.193	.642	.220	-.202	.266
Facility: Office or Office-Based Surgery Center^c	.572	-.002	1.480	-.073	.414	.695

^a Reference category: White

^b Reference category: ASA Class 1

^c Reference category: Acute-Care Hospital

