



Prospectively Validated Prediction of Weight Loss and Resolution of Obesity Co-Morbidities after Open and Laparoscopic Gastric Bypass, Adjustable Gastric Band, Sleeve Gastrectomy, and Duodenal Switch: Modeling in 166,601 Surgical Review Corporation BOLD Database Patients

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Background

Bariatric surgeons and patients lack objective means to determine which operation is best for which patient. Frequently, procedure choice is based on the surgeon's operative repertoire, the patient's mass and co-morbidities, and patient preference. A method to predict before surgery what post-operative outcomes will be for individual patients following each of the major bariatric operations does not exist.

Objective

To develop from baseline, pre-operative data prognostic models that predicted weight loss and resolution of obesity co-morbidities in individual patients after open (ORYGB) and laparoscopic (LRYGB) Roux-en-Y gastric bypass, adjustable gastric band (AGB), sleeve gastrectomy (SLEEVE), and duodenal switch (DS) and to validate the models prospectively.

Methods

From the Surgical Review Corporation's BOLD database, 166,601 patients who underwent ORYGB (n=5,389), LRYGB (n=83,059), AGB (n=67,514), SLEEVE (n=8,966), and DS (n=1,673) were randomized into a modeling group (n=124,053) and a validation group (n=42,548). From pre-operative data linear regression models that predicted weight and weight loss and logistic regression models that predicted presence/resolution of obesity co-morbidities at 2, 6, 12, 18, and 24 months after surgery were developed. Coefficient of determination (r-squared) and ROC/AUC examined model fit. Pearson correlation coefficient and Sensitivity/Specificity evaluated predicted versus observed results from validation patient data entered into the models

Results

For categorical models predicting diabetes, cholelithiasis, hypertension, obstructive sleep apnea, GERD and liver disease, ROC/AUC at 24 months ranged from 0.617 to 0.949

Modeling Results: Continuous Dependent Variable Models

r - squared	2 months n = 120,909	6 months n = 75, 130	12 months n = 42,410	18 months n = 15,387	24 months n = 11,014
Weight and Weight Loss Models	0.910	0.813	0.725	0.638	0.613

Predicted Versus Observed Results: Weight and Co-Morbidities

Post-op Interval	2 Months n = 41,443	6 Months n = 25,661	12 months n = 14,479	18 months n = 5,149	24 Months n = 3,699
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Weight and Weight Loss Models (Pearson Correlation Coefficient)

	0.959	0.932	0.875	0.937	0.811
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Co-Morbidities (Sensitivity/ Specificity) %

Diabetes	98/89	75/92	72/92	69/91	60/94
Cholelithiasis	97/99	95/98	92/98	91/97	87/97
Hypertension	92/85	93/75	78/81	79/80	79/79
Sleep Apnea	74/94	88/88	64/88	59/90	51/91
GERD	95/81	75/80	50/87	47/87	45/87
Liver Disease	89/99	85/99	85/98	79/98	78/98

Conclusions

This study describes a prospectively validated method that predicts, from pre-operative data, weight and weight loss and the resolution of morbid obesity co-morbidities in individual patients up to two years in advance for ORYGB, LRYGB, AGB, SLEEVE or DS.

Validation Predicted versus Observed results include:

1. Weight and weight loss in individual patients (all p<0.0001)
2. Presence and resolution of Diabetes, Cholelithiasis, Obstructive Sleep Apnea, Hypertension, GERD, and Liver Disease
3. Median Sensitivity for co-morbidities up to 2 years post-operatively is 79
4. Median Specificity for co-morbidities up to 2 years post-operatively is 91

This advance knowledge can identify the best weight loss operation for individual morbidly obese patients.

Matching morbidly obese patients with the procedure optimally suited to each can maximize the benefits of bariatric surgery