Outcomes After Bariatric Surgery In Patients With Pulmonary Comorbidities and Risk Factors

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Introduction

- Obesity is associated with altered respiratory mechanics and pulmonary physiology, which leads to pulmonary dysfunction
- Pulmonary risk factors are common in patients undergoing Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy (SG) : obstructive sleep apnea (OSA) present in up to 75%, pulmonary dysfunction in 30%, and smoking history in 40%
- COPD is associated with greater postop morbidity & mortality
- Respiratory complications make up one fifth of total morbidity after bariatric surgery
- Important to understand the effect of pulmonary risk factors on pulmonary and non pulmonary bariatric surgery outcomes

Study Aim: To evaluate the effects of pulmonary comorbidities and risk factors on postoperative outcomes following primary RYGB and SG.

Methods

- Analysis of 2015-2018 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database
- Included adult patients undergoing RYGB or SG
- Patients with severe COPD, OSA, oxygen dependence (O2D), and smoking history (within 12 months prior to surgery) were identified
- Preoperative characteristics, mortality, and postoperative 30 day complications were analyzed
- Multivariable logistic regression analyses were performed controlling for comorbidities, preoperative demographics, age, BMI, and surgery type
- Sub-analysis of the effect of functional status on COPD outcomes was performed with logit regression model

Results

Table 1. Prevalence of pulmonary comorbidities by surgery type.

Pulmonary comorbidity	All (N=96870)	RYGB (n=34353)	SG (n=62517)
COPD*	1728 (1.78)	659 (1.92)	1069 (1.71)
O2D*	889 (0.92)	381 (1.11)	508 (0.81)
OSA*	39443 (40.72)	15943 (46.41)	23500 (37.59)
Smoking*	8133 (8.40)	2700 (7.86)	5433 (8.69)

* Statistically significant ($p < 0.05$)

Table 2. Preoperative characteristics of surgical cases pulmonary comorbidity/ risk factors.

Variable	All (N=96870)	COPD (N=1728)	O2D (N=889)	OSA (N=39443)	Smoking (N=8133)
Age in years					
mean (SD)	44.92 (12.1)	56.12 (9.5)	55.47 (10.6)	48.39 (11.5)	42.26 (10.8)
Female, N (%)	78448 (81.0%)	1320 (76.9%)	655 (73.7%)	27870 (70.7%)	6646 (81.7%)
Preop BMI					
mean (SD)	45.15 (8.0%)	46.80 (8.8)	49.14 (10.0)	46.26 (8.5)	45.98 (8.1)
Diabetes, N (%)					
insulin	8901 (9.2%)	382 (22.1%)	278 (31.3%)	5102 (12.9%)	681 (8.4%)
no-insulin	17292 (17.9%)	435 (25.2%)	201 (22.6%)	8506 (21.6%)	1435 (17.6%)
no	70677 (72.96%)	911 (52.72%)	410 (46.1%)	25835 (65.5%)	6017 (74.0%)
Hypertension, N(%)	46450 (48.0%)	1322 (76.5%)	701 (78.9%)	23779 (60.3%)	3669 (45.1%)
ASA class, N (%)					
no-disturbance	273 (0.28%)	3 (0.17%)	0	43 (0.12%)	15 (0.18%)
mild-disturbance	20400 (21.1%)	113 (6.5%)	29 (3.3%)	5383 (13.7%)	1524 (18.7%)
severe disturbance	71185 (73.5%)	1362 (78.8%)	614 (69.1%)	31383 (79.6%)	6169 (75.9%)
life-threat	4929 (5.1%)	248 (14.4%)	246 (27.7%)	2591 (6.6%)	421 (5.2%)
moribund	8 (0.008%)	0	0	3 (0.008%)	0
NA	75 (0.08%)	2 (0.12%)	0	40 (0.10%)	4 (0.05%)
Function, N (%)					
independent	95730 (98.8%)	1651 (95.5%)	808 (90.9%)	38868 (98.5%)	8022 (98.6%)
partially dependent	639 (0.66%)	66 (3.8%)	74 (8.3%)	399 (1.0%)	56 (0.69%)
totally dependent	501 (0.52%)	11 (0.64%)	7 (0.79%)	176 (0.45%)	55 (0.68%)

Results Continued

Table 3. Multivariable analysis of outcomes, by pulmonary comorbidity/risk factor.

Variable	COPD Odds Ratio (95% CI)	O2D Odds Ratio (95% CI)	OSA Odds Ratio (95% CI)	Smoking Odds Ratio (95% CI)
Pulmonary Complication				
Ventilation > 48 hors	2.46 (1.24, 4.87) *	2.15 (0.95, 4.86)	1.41 (0.91, 2.17)	1.44 (0.76, 2.73)
ICU admission	1.61 (1.20, 2.15) *	2.25 (1.62, 3.12) *	1.27 (1.10, 1.46) *	1.29 (1.03, 1.60) *
Pneumonia	2.51 (1.47, 4.28) *	1.61 (0.76, 3.41)	1.20 (0.91, 1.59)	1.64 (1.11, 2.43) *
Non-Pulmonary Complication				
Discharge home (vs non-home)	0.72 (0.47, 1.10)	0.47 (0.30, 0.74) *	1.02 (0.84, 1.24)	1.01 (0.72, 1.42)
Any complication	1.47 (1.20, 1.79) *	1.97 (1.55, 2.50) *	1.19 (1.10, 1.29) *	1.28 (1.13, 1.45) *
Leak	0.94 (0.52, 1.69)	3.12 (1.77, 5.48) *	1.10 (0.90, 1.35)	1.61 (1.21, 2.14) *
30-day Readmission	1.59 (1.32, 1.91) *	1.61 (1.27, 2.03) *	1.03 (0.96, 1.10)	1.11 (1.00, 1.23)
30-day Reoperation	1.24 (0.89, 1.72)	1.90 (1.29, 2.78) *	0.94 (0.84, 1.06)	1.17 (0.98, 1.40)
30-day Intervention	1.30 (0.94, 1.80)	1.31 (0.87, 1.96)	1.01 (0.90, 1.13)	1.17 (0.98, 1.39)
30-day Mortality	1.45 (0.63, 3.34)	2.77 (1.17, 6.56) *	0.99 (0.65, 1.51)	1.24 (0.64, 2.41)

* Statistically significant ($p < 0.05$)

Table 4. Multivariable analysis of independent vs dependent COPD patients.

Variable	Odds Ratio (95% CI)
ICU admission	0.62 (0.38-0.99) *
Discharge to home (vs non-home)	2.29 (1.32-3.97) *
Any complication	0.53 (0.38-0.75) *
Leak	0.34 (0.15-0.77) *

* Statistically significant ($p < 0.05$)

Conclusion

- All pulmonary comorbidity/risk factors were associated with increased risk of any complication
- COPD was associated with increased risk of any pulmonary complication (prolonged ventilation, ICU admission, and pneumonia) as well as 30-day readmission
- Smoking within 1 year preop was associated with increased risk of leak, ICU admission and pneumonia
- O2D was primarily associated with increased risk of non-pulmonary complications (leak, readmission, reoperation), and was the only pulmonary comorbidity associated with increased risk of mortality
- Functionally independent COPD patients had almost half the risk of ICU admission, any complications and leak than their dependent counterparts

Though less common, COPD and oxygen dependence are associated with worse outcomes. Prehabilitation to improve functional status may have a role in reducing complication risks in this vulnerable population.