The Obesity Paradox: Underweight Patients are at Greatest Risk of Mortality Following Cholecystectomy

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Background

- Elevated BMI is a risk factor for gallstone disease
- There is no difference in mortality or readmission for obese patients following cholecystectomy
- Outcomes for patients with low BMI are ambiguous

Objective:

Examine the effect of low BMI on morbidity, mortality, and resource use following cholecystectomy

Methods

National Surgical Quality Improvement Project
2005-2016
Open or laparoscopic cholecystectomy

→ Age <18 years, Missing BMI data (2.0%)

N=327,473

Underweight	BMI <18.5	1.0%
Normal Weight	BMI 18.5-24.9	19.5%
Overweight	BMI 25-29.9	30.3%
Class I Obesity	BMI 30-34.9	24.0%
Class II Obesity	BMI 35-39.9	13.5%
Class III Obesity	BMI >40	11.7%

Figure 1. Patient selection flowchart.

Primary outcome: 30-day mortality

Secondary outcomes: operative time, postoperative bleeding, reoperation, postoperative wound infection, wound dehiscence, hospital length of stay (LOS), and 30-day readmission

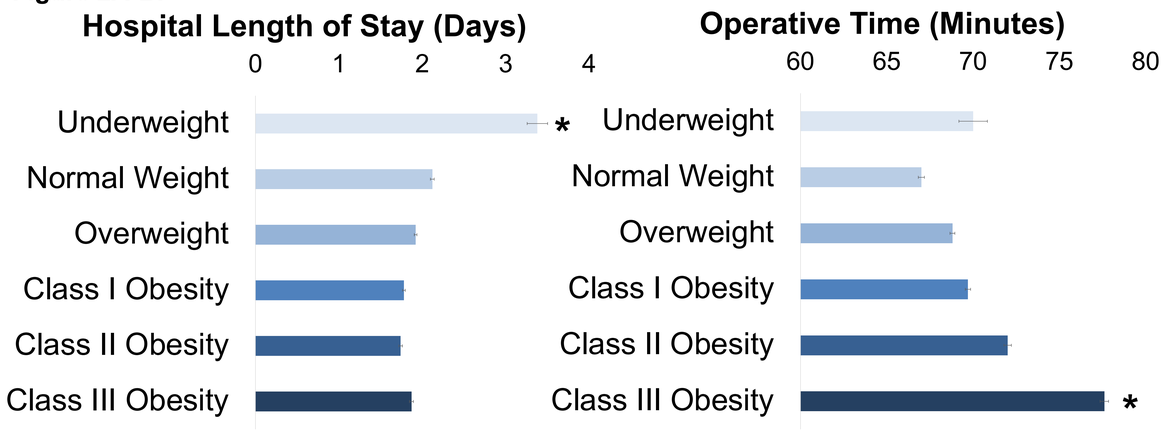
- The **Kruskal-Wallis test** was used for continuous variables and chi squared analyses for categorical variables
- **Multivariable logistic and linear regression models** adjusted for demographics and comorbidities

Results

Table 1. Comorbidities by BMI Class

Variable	Under Weight	Class III Obesity	P
Age (years)	38.8	30.1	<0.001
Steroid Use (%)	4.1	1.8	<0.001
Cancer (%)	1.6	0.3	<0.001
Hypertension (%)	29.5	42.2	<0.001
Diabetes (%)	7.2	19.6	<0.001

Figure 2A-B.



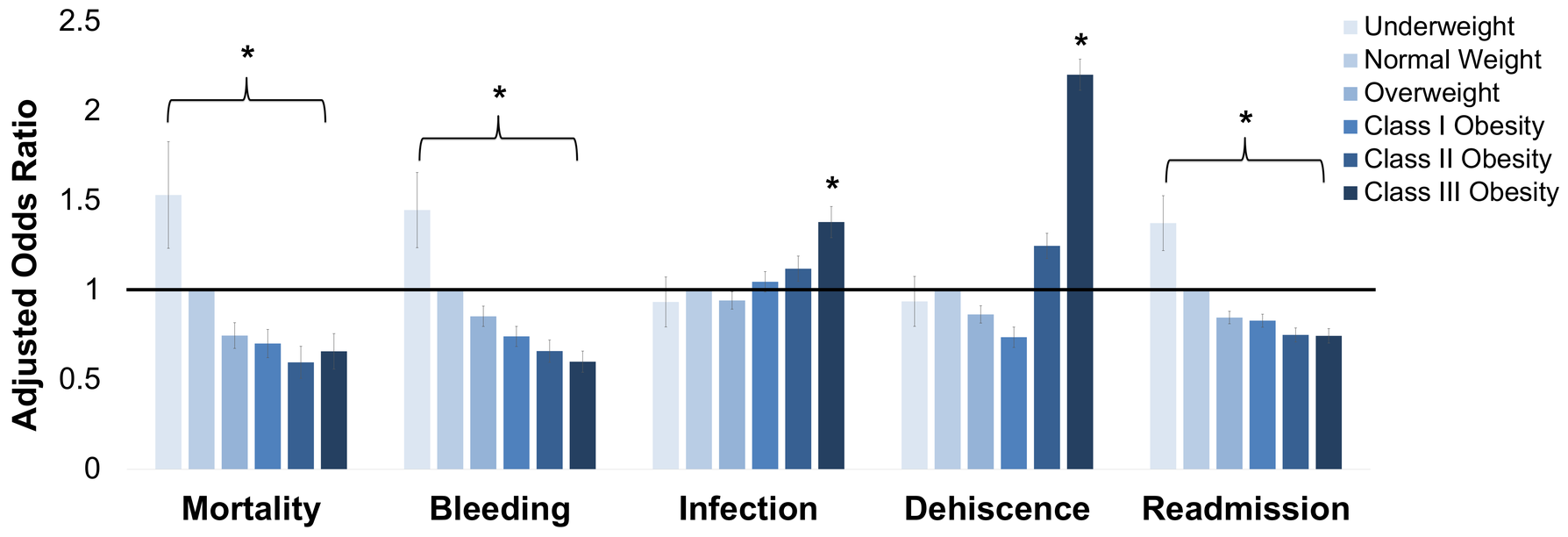


Figure 3. Multivariable Outcomes by BMI Class * signifies p<0.05

Conclusions

- Underweight patients were at highest risk of mortality, postoperative bleeding, and readmission
- Obese patients were at increased risk for wound infection, wound dehiscence, and prolonged operative time but NOT mortality or readmission
- These findings may better guide choice of intervention and preoperative optimization