COMPARISON OF OBESITY CLASSIFICATIONS AT 1, 3, AND 5 YEARS AFTER GASTRIC BYPASS AND GASTRIC SLEEVE SURGERY USING A FEDERATED ELECTRONIC MEDICAL RECORD (EMR) NETWORK

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BACKGROUND

- Currently 37.7% of the U.S. adult population is obese (BMI ≥30 kg/m^2) and 7.7% is severely obese (BMI ≥40 kg/m^2).[1]
- In 2013 an estimated $168 billion, 16.5% of U.S. health expenditures, was spent annually to treat obesity and obesity-associated comorbid conditions.[2]
- In 2017 approximately 228,000 bariatric surgeries were conducted in the US, 59.4% were gastric sleeve procedures and 17.8% were Roux-en-Y gastric bypass procedures.[3]
- To date most studies of bariatric surgery using real-world data report healthcare use and costs following surgical procedures, but few report the change in BMI or obesity status following surgery.

OBJECTIVES

- Primary: To compare obesity status—BMI <40 (non-severe obesity) and BMI <30 (non-obese)—among adults undergoing laparoscopic gastric bypass (LGB) or laparoscopic gastric sleeve (LGS) procedures at 1, 3, and 5 years post-surgery.
- Secondary: To compare healthcare resource use and mortality in the 1, 3, and 5 years post-surgery.

METHODS

Study Design: Retrospective propensity score matched cohort study

Data Source
- TriNetX EMR Research Data Network, a federated EMR network of 26 academic medical centers, physician specialty practices, and specialty hospitals across the U.S. treating a total of 35.4 million patients.

Patient Selection
- Patients ≥20 years, undergoing LGB or LGS, from Jan 2009 to Mar 2018.
- Excluded were those ever undergoing an additional obesity surgery.

Baseline Characteristics
- Demographic and clinical characteristics one-year pre-surgery.
- BMI at baseline captured by diagnosis code or as recorded in the EMR prior to or including the surgery date.

Outcomes
- BMI <30 and <40 using the most recent measurement or diagnosis code in the 1, 3, and 5 years post-surgery.
- Time to achieve BMI <30 and <40
- Healthcare utilization and mortality at 1, 3, and 5 years post-surgery.

Statistical Analysis
- 1:1 Greedy propensity score matching
  - Age, sex, race, metabolic and cardiovascular comorbidities, other comorbidities, CV and metabolic-related medications, BMI=30-39 and BMI ≥40 by diagnosis code, and BMI measurement as recorded in EMR.
- Kaplan-Meier analysis for time to BMI <30 and BMI <40
- All analyses conducted using the TriNetX Analytics Platform.

Table 1. Baseline characteristics before and after propensity score matching

	Before Matching			After Matching		
Baseline characteristics	**LGB n = 14,482**	**LGS n = 20,890**	**SMD***	**LGB n = 13,450**	**LGS n = 13,450**	**SMD***
Female (%)	79.5	78.5	0.022	79.1	79.2	0.007
White (%)	73.3	66.0	0.160	72.1	73.2	0.025
Black or African American (%)	16.7	21.5	0.123	17.5	17.0	0.015
Age in years at surgery (mean ± SD)	46.3 ± 12.4	45.0 ± 12.3	0.098	46.0 ± 12.3	46.0 ± 12.1	0.005
BMI (mean ± SD)	45.5 ± 9.7	45.3 ± 8.2	0.017	45.4 ± 10.5	45.6 ± 8.4	0.004
BMI ≥ 40 (%)	74.1	69.8	0.046	74.9	73.4	0.018
BMI 30-39 (%)	16.7	18.2	0.060	16.8	16.1	0.008
Morbid obesity due to excess calories (%)	93.4	95.6	0.191	95.0	93.2	0.018
Hypertensive diseases (%)	62.3	58.6	0.132	61.4	64.3	0.010
Episodic and paroxysmal disorders (%)	59.3	57.8	0.078	59.4	62.1	0.017
Disorders of lipoprotein metabolism and other lipidemias (%)	44.9	39.9	0.127	44.0	45.2	0.002
Diabetes mellitus (%)	39.4	30.1	0.220	37.3	38.3	0.002
Osteoarthritis (%)	28.5	23.8	0.137	27.9	28.6	0.000

*Standardized Mean Difference

RESULTS

Patient Characteristics (Table 1)
- 14,482 LGB and 20,890 LGS patients of similar mean age (46±12 years), proportion female (79%) and mean BMI (45±9) met the study criteria.
- Before matching, the starting weight (lbs) for the cohorts was 271.0±73.9 (LGB) and 258.0±71.0 (LGS), *P*<0.001.
- LGB patients had significantly higher rates of comorbidity.
- Post-match there were 13,450 patients in each cohort.

BMI Outcomes
- At least one half of patients in each cohort experienced enough weight loss post-surgery to reach a BMI <40 within 1 year of surgery.
- At each timepoint a significantly greater proportion of LGB compared to LGS patients had a BMI <40.
  - Year 1: 57.2% vs 49.3%
  - Year 3: 66.3% vs 54.6%
  - Year 5: 68.6% vs 55.7%, all *P*<0.001
- The proportion of patients achieving a BMI <30 was 2-fold greater among those undergoing LGB compared to LGS and by year 5 one-third of LGB patients had a BMI <30.
  - Year 1: 21.6% vs 11.6%
  - Year 3: 32.2% vs 16.0%
  - Year 5: 34.0% vs 16.7%, all *P*<0.001
- Over time the likelihood of achieving significant improvements in BMI of those undergoing LGB versus LGS increased (Figure 1).
- The likelihood of having a hospitalization, an ED visit, or dying was greater for the LGB cohort and increased over time versus the LGS cohort.
- Median time to BMI <40 was 193 days (LGB) and 251 days (LGS); a mean difference of approximately 60 days (Figure 2).

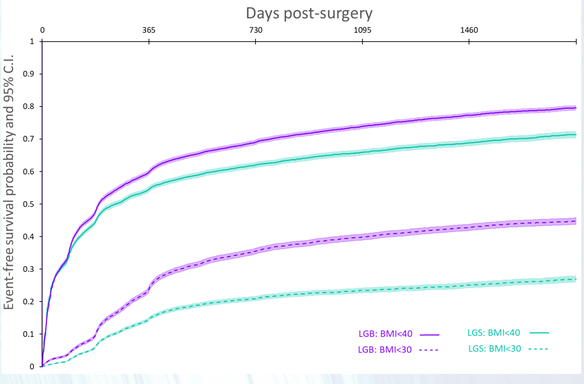

Figure 2. Time to BMI <40 and BMI <30 post-surgery

CONCLUSIONS

- In this real-world setting, LGB patients were more than 2-times as likely to not be obese or severely obese as LGS patients for up to 5 years following surgery.
- At least one half of patients in each cohort experienced enough weight loss to reach a BMI <40 within 1 year of surgery.
- Similar to a previous study comparing gastric bypass to a PS matched control group, the likelihood of hospitalization and ED use increased over time post-surgery in the LGB cohort compared to the matched LGS cohort.[4]
- More studies of bariatric surgery outcomes should report BMI changes as this is a key consideration when patients choose to undergo weight-loss surgery and when choosing among bariatric surgery procedures.

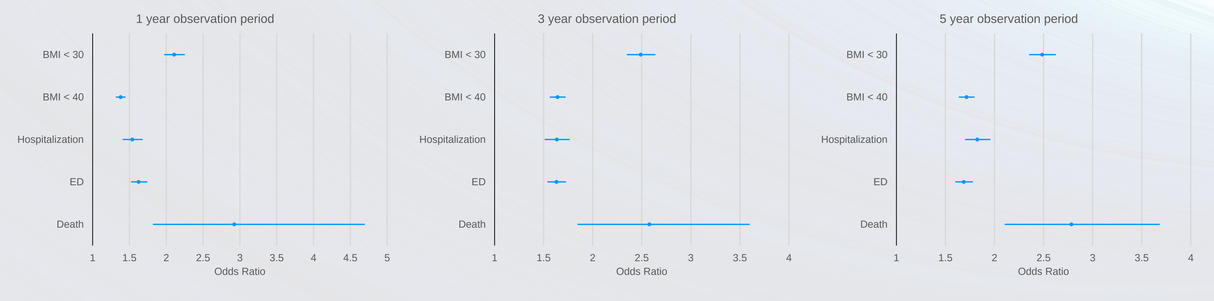

Figure 1. Odds ratios for outcomes: LGB vs. LGS

1. https://www.niddk.nih.gov/health-information/health-statistics/overweight-obesity#prevalencen this real-world setting (accessed 09 Oct 2019)
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3. https://asmbs.org/resources/estimate-of-bariatric-surgery-numbers (Accessed 09 Oct 2019)
4. Weiner JP, Goodwin SM, Chang H, et al. Impact of bariatric surgery on health care costs of obese persons: a 6-year follow-up of surgical and comparison cohorts using health plan data. JAMA Surg. 2013;148(6):555–561

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