

The Comparison of Outcomes Between Metabolic Bariatric Surgery and Glucagon-Like Peptide 1 Receptor Agonists (GLP-1 RAs) After Three Years

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BACKGROUND

Obesity significantly increases the risk of illness and mortality, and it has been associated with a greater risk of developing metabolic syndromes.^{1,2} Previous studies have demonstrated that bariatric surgery provides a high degree of weight loss as well as diabetes remission and cardiovascular benefits³. Recently, glucagon-like peptide 1 receptor agonists (GLP-1 RAs) have been approved by the FDA for weight loss, and a growing body of evidence has demonstrated that GLP-1 RAs alleviate obesity-related comorbidities, including diabetes and fatty liver diseases, and prevent weight regain among patients with obesity.^{4,5}

There is no current evidence directly comparing GLP-1 RAs with bariatric surgery on obesity-related labs, medication burdens, and healthcare utilization.

OBJECTIVE

To compare the changes of weight, obesity-related comorbidity lab values, vitals, and healthcare utilization between metabolic bariatric surgery (MBS) and glucagon-like peptide-1 receptor agonists (GLP-1 RA) three years after initiation.

METHODS

Retrospective, longitudinal, observational, single-site study design

Data sources: electronic health record accessed via the Epic Caboodle data warehouse from Baylor Scott & White Health Study period: Jan 1, 2016 to Dec 31, 2023

Primary outcome: compare the change in average body mass index (BMI) before and after either bariatric surgery or GLP-1 RAs

Secondary outcome: compare the change in lab measurements and healthcare utilization before and after either bariatric surgery or GLP-1 RAs

Descriptive statistics were expressed in aggregates and percentages to demonstrate the trends in BMI changes, lab measurements and healthcare utilization.

Multiple linear regression was used for lab values and healthcare utilization to identify the significant factors that impact these outcomes. An alpha value 0.05 was used.

STUDY CRITERIA

Patients were included in this study:

- Age \geq 18 years; BMI \geq 30 kg/m² (if received GLP-1 RAs)
- Initiated GLP-1 RAs or received bariatric surgery between Jan 1, 2017, and Dec 31, 2020
- Received regular care (\geq 1 office visits per year) at the organization during the study period
- Did not receive both treatments during the study period

RESULTS

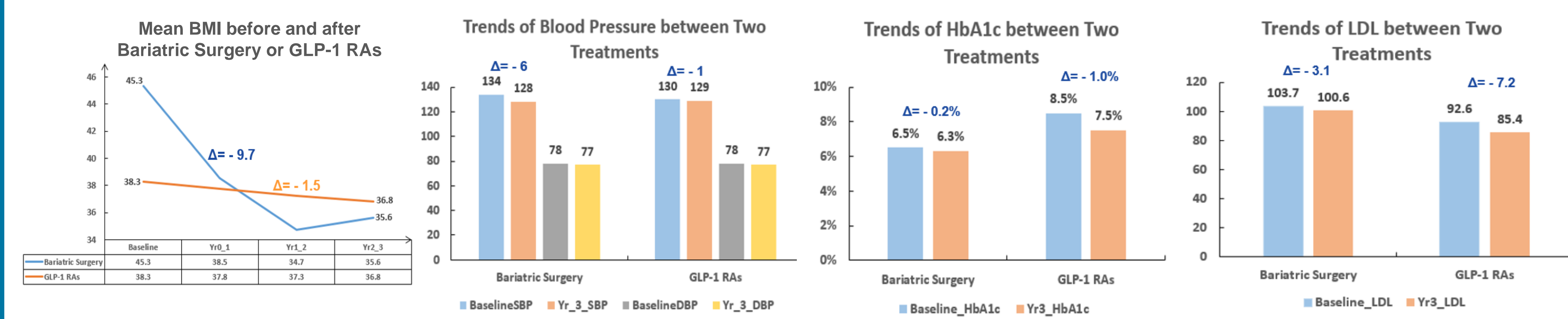
Table 1. Patients' Demographic

| | MBS (n=2481) | GLP-1 (n=2198) | P Value |
|------------------|---------------|----------------|---------|
| Age, mean (SD) | 48 (13) | 55 (12) | P<0.001 |
| Female, n (%) | 2,070 (83.4%) | 1,227 (55.8%) | P<0.001 |
| Race, n (%) | | | P=0.946 |
| White | 1,790 (72.2%) | 1,597 (72.7%) | |
| Black | 546 (21.8%) | 428 (19.5%) | |
| Asian | 16 (0.6%) | 44 (2.0%) | |
| Other | 134 (5.4%) | 129 (5.8%) | |
| Ethnicity, n (%) | | | P=0.006 |
| Hispanic/Latino | 401 (16.2%) | 508 (23.1%) | |

Table 2. Patients' Baseline Characteristics

| | MBS (n=2481) | GLP-1 (n=2198) | P Value |
|---|---------------|----------------|---------|
| Primary insurance type, n (%) | | | P=0.241 |
| Commercial | 1,538 (62.0%) | 1,501 (68.3%) | |
| Medicare | 692 (27.9%) | 517 (23.5%) | |
| Medicaid | 157 (6.3%) | 65 (3.0%) | |
| Other | 66 (2.7%) | 145 (6.6%) | |
| Annual median household income by zip code, n (%) | | | P<0.001 |
| \leq \$49,999 | 353 (14.2%) | 226 (10.3%) | |
| \$50,000-\$74,999 | 957 (38.6%) | 807 (36.7%) | |
| \$75,000-\$99,999 | 656 (26.4%) | 526 (23.9%) | |
| \geq \$100,000 | 251 (10.1%) | 497 (22.6%) | |
| Missing | 30 (1.2%) | 28 (1.3%) | |
| Obesity category, n (%) | | | P=0.025 |
| BMI<30 | 61 (2.5%) | 79 (3.6%) | |
| Charlson Comorbidity Index, (CCI), n (%) | | | P<0.001 |
| CCI=0 | 882 (35.6%) | 108 (4.9%) | |
| Mild (CCI=1 or 2) | 859 (34.6%) | 1016 (46.2%) | |
| Moderate (CCI=3 or 4) | 356 (14.3%) | 897 (40.8%) | |
| Severe (CCI>5) | 289 (11.6%) | 407 (18.5%) | |
| HbA1c, n (%) | | | P<0.001 |
| Normal (HbA1c<5.7%) | 459 (18.5%) | 61 (2.8%) | |
| Prediabetic (5.7% - 6.4%) | 389 (15.7%) | 162 (7.4%) | |
| Diabetic (\geq 6.5%) | 498 (20.1%) | 1840 (83.7%) | |
| Missing | 1171 (47.2%) | 135 (6.1%) | |

Figure 1. Changes in Obesity-Related Labs from Baseline to Year 3 between Bariatric Surgery and GLP-1 RAs



| | Change in BMI | | Change in Systolic Blood Pressure | | Change in HbA1c | | Change in LDL | |
|---------------------|------------------------------------|-------------------|-----------------------------------|--------------------|---|----------------------|-------------------------|----------------------|
| | MBS | GLP-RAs | MBS | GLP-RAs | MBS | GLP-RAs | MBS | GLP-RAs |
| Coefficient | 0 [Reference] | 5.66 [5.28, 6.04] | 0 [Reference] | 0.20 [-0.01, 0.40] | 0 [Reference] | -0.16 [-0.30, -0.11] | 0 [Reference] | -3.76 [-6.59, -0.93] |
| Intercept | | -4.11 | | -0.26 | | -0.46 | | -2.90 |
| P Value | | P<0.001 | | P=0.0711 | | P=0.0186 | | P=0.0093 |
| Significant factors | Age, ethnicity, race, baseline BMI | | Age, baseline SBP and DBP | | Ethnicity, baseline HbA1c, other anti-diabetic meds | | Antihyperlipidemic meds | |

Table 3. Changes of Healthcare Utilization from Baseline to Year 3 between Bariatric Surgery and GLP-1 RAs

| | Number of ED Visits per 1000 Patient-Years | | | Number of Inpatient visit per 1000 Patient-Years | | | Inpatient Length of Stay per 1000 Patient-Years | | | Number of Outpatient Visits per 1000 Patient-Years | | |
|---------|--|--------|----------|--|--------|----------|---|---------|----------|--|--------|----------|
| | Baseline | Year 3 | Δ | Baseline | Year 3 | Δ | Baseline | Year 3 | Δ | Baseline | Year 3 | Δ |
| BMS | 33.05 | 30.63 | -2.42 | 126.16 | 214.83 | 88.67 | 404.68 | 1005.24 | 600.56 | 19,018 | 7,406 | -11,612 |
| GLP-RAs | 15.01 | 16.83 | 1.82 | 69.61 | 90.54 | 20.93 | 258.87 | 346.22 | 87.35 | 9,660 | 4,703 | -4,957 |

| | Change of Total Number of ED Visits | | Change of Total Number of Inpatient Admission | | Change of Total Number of Inpatient Length of Stay | | Change of Total Number of Outpatient Visits | |
|---------------------|-------------------------------------|--------------------|---|----------------------|--|----------------------|---|-------------------|
| | MBS | GLP-RAs | MBS | GLP-RAs | MBS | GLP-RAs | MBS | GLP-RAs |
| Coefficient | 0 [Reference] | 0.02 [-0.01, 0.03] | 0 [Reference] | -0.18 [-0.27, -0.04] | 0 [Reference] | -0.87 [-1.02, -0.31] | 0 [Reference] | 6.58 [5.87, 8.31] |
| Intercept | | 0.01 | | 0.04 | | 0.20 | | -11.02 |
| P Value | | P=0.0562 | | P<0.001 | | P<0.001 | | P<0.001 |
| Significant factors | Age, insurance type | | Age, race, insurance type, CCI | | Age, race, insurance type | | Age, gender, CCI, insurance type | |

LIMITATIONS

- Notable proportion of missing laboratory values including HbA1c (47.2% in MBS patients) and LDL (36.1% in MBS patients)
- Not able to capture care if the patients' visits were outside of Baylor Scott and White Health, so healthcare utilization may be underestimated.

DISCUSSION

- Patients who got bariatric surgery have significantly higher BMI.
- Bariatric surgery reduces BMI within the first year but increases in the next two years after surgery.
- GLP-1 RAs gradually reduce BMI over three years.
- Compared to bariatric surgery, GLP-1 RAs might be a better choice for non-severe obese patients with diabetes or hyperlipidemic issues.
- Patients undergoing bariatric surgery are less likely to have outpatient visits, while patients receiving GLP-1 RAs are less likely to have inpatient admissions.
- Further studies are needed to analyze patients on both bariatric surgery and GLP-1 RAs.

CONCLUSION

- In a real-world setting, there is no clear winner between bariatric surgery and GLP-1 RAs.

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DISCLOSURES

All authors are research investigators of studies sponsored by Pfizer and Sanofi but not in connection with this study.

Questions? Contact Xiaoxia.Wang1@BSWHealth.org