Supplementary Online Content


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This supplementary material has been provided by the authors to give readers additional information about their work.
eFigure 1. CONSORT Figure of RYGB Patients and Nonsurgical Matches With Follow-up Rates

N=1787 RYGB alive at 1 year
  N=1763 (99%) with at least 1 weight measurement between 1 and 11 years

N=1749 alive at 3 years
  N=1672 (96%) with at least 1 weight measurement between 3 and 11 years

N=1530 eligible for 5 years of follow-up
  N=1424 (93%) with at least 1 weight between 5 and 11 years

N=1268 eligible for 7 years of follow-up
  N=1136 (90%) with at least 1 weight between 7 and 11 years

N=700 eligible for 10 years of follow-up
  N=573 (82%) with at least 1 weight between 10 and 11 years

N=1787 included in mixed model analysis

N=5305 matches eligible to have >= 1 year of follow-up
  N=5131 (97%) with at least 1 weight between 1 and 11 years

N=5084 eligible for 3 years of follow-up
  N=4629 (91%) with at least 1 weight between 3 and 11 years

N=4366 eligible for 5 years of follow-up
  N=3748 (86%) with at least 1 weight between 5 and 11 years

N=3521 eligible for 7 years of follow-up
  N=2806 (80%) with at least 1 weight between 7 and 11 years

N=1889 eligible for 10 years of follow-up
  N=1274 (67%) with at least 1 weight between 10 and 11 years

N=5305 included in mixed model analysis
Patients undergoing bariatric surgery in 2000-2011
N=2500

N=2410 with 1 of these 3 surgery categories and alive at 1 year

N=246 AGB and alive at 1 year
N=244 with at least 1 weight between 1 and 5 years

N=244 alive at 2 years
N=237 (97%) with at least 1 weight between 2 and 5 years

N=244 alive at 3 years
N=230 (94%) with at least 1 weight between 3 and 5 years

N=226 eligible for 4 years of follow-up
N=202 (89%) with at least 1 weight between 4 and 5 years

N=246 included in mixed model analysis

N=1785 RYGB and alive at 1 year
N=1755 with at least 1 weight between 1 and 5 years

N =1760 alive at 2 years
N=1700 (97%) with at least 1 weight between 2 and 5 years

N=1747 alive at 3 years
N=1628 (93%) with at least 1 weight between 3 and 5 years

N=1658 eligible for 4 years of follow-up
N= 1462 (88%) with at least 1 weight between 4 and 5 years

N=1785 included in mixed model analysis

N=379 SG and alive at 1 year
N=374 with at least 1 weight between 1 and 5 years

N=378 alive at 2 years
N=363 (96%) with at least 1 weight between 2 and 5 years

N=376 alive at 3 years
N=325 (86%) with at least 1 weight between 3 and 5 years

N=234 eligible for 4 years of follow-up
N=181 (77%) with at least 1 weight between 4 and 5 years

N=379 included in mixed model analysis

Footnotes: 1) For each year of the 4-year follow-up period, the first sample size number in each surgical cohort represents the number of patients who were eligible because they are alive at 1 year, at 2 years, at 3 years and possibly 4 years and had surgery long enough before 12/31/14 (last date of weight measurement) that they were eligible for follow up to that point. The second sample size number in each surgical cohort represents the number of patients who remain in the sample because they had at least 1 weight measurement beyond each year.

2) All surgical patients had the potential to have a weight measured because the last surgical patients had surgery before 10/1/2011 and the last weight measurement obtained for the surgical cohort was on or before 12/31/2014. Only patients with surgery prior to 12/31/2010 and were alive through 4 years are eligible for 4 years of follow-up.
**eFigure 3.** Individual Percent Weight Change Trajectories of 75 Randomly Selected RYGB Patients With Weight Measurements at Least 10 Years From Baseline
eAppendix. Description of Weight Measurement Cleaning Algorithm

Among the RYGB surgical cases, approximately 3.5% of weights were measured on the same day. If the standard deviation of the same-day weights was less than or equal to 2 lb, then the mean was taken. Otherwise, the standard deviation of each same-day weight with prior/post weight measurements was calculated and the same-day weight leading to the smallest standard deviation was retained.

After sorting weight measures by date for each individual, rolling standard deviations were calculated using consecutive groups of three weight measures for each individual. The first group consisted of weight measures 1-3, the second 2-4, and so forth. The first and last groups were evaluated separately because the first (and last) weight measure could only be included in one group and the second (and next to last) could only be included in two groups. If the first (or last) two groups’ standard deviations were greater than 35 lb, the second (or next to last) weight measure was deleted. If the first (or last) standard deviation was greater than 35 lb, then paired standard deviations were calculated for each pair within the first (or last) group. If two of the paired standard deviations were greater than 45 lb and the remaining was less than 10 lb, the offending weight measure was deleted. After these deletions, the weight measures were reassembled in date order for each individual and rolling standard deviations were recalculated and assigned to the central weight measure of the group. Clusters of high standard deviations, indicating a potential outlier, were identified by flagging consecutive standard deviations greater than 10 lb. For each cluster of high standard deviations of three or more the interior weight measures were deleted keeping only the first and last measures of the cluster. Approximately 1.2% of weight measurements were identified as outliers and were deleted.

Standard deviation cutoffs were determined via iterative trial and error driven by clinical plausibility of the specific measure rather than a standard rule and with guidance from clinical practitioners familiar with context of surgery and expected outcomes. Before the same-day and outlier cleaning, the cohort of n=1787 RYGB patients had 89,757 measurements; after these cleaning steps, 85,556 (95.3%) weight measurements remained.
eTable. Unadjusted and Adjusted Linear Regression of Predicted Percent Change in Weight at 4 Years Post Surgery for 1809 Surgical Cases (n = 200 AGB, n = 178 SG, n = 1431 RYGB)

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted Coefficient (SE)</th>
<th>Adjusted Coefficient (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RYGB</td>
<td>-27.5 (0.3)</td>
<td>-26.9 (0.3)</td>
</tr>
<tr>
<td>Difference between SG and RYGB</td>
<td>9.5 (1.0)</td>
<td>7.5 (0.9)</td>
</tr>
<tr>
<td>Difference between AGB and RYGB</td>
<td>16.3 (0.9)</td>
<td>14.0 (0.9)</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>4.2 (0.7)</td>
</tr>
<tr>
<td>White race (vs non-white/unknown)</td>
<td></td>
<td>-0.4 (0.7)</td>
</tr>
<tr>
<td>Baseline Diabetes Status</td>
<td></td>
<td>2.1 (0.6)</td>
</tr>
<tr>
<td>Baseline DCG</td>
<td></td>
<td>-1.3 (0.4)</td>
</tr>
<tr>
<td>Baseline BMI</td>
<td></td>
<td>-0.4 (0.04)</td>
</tr>
<tr>
<td>Baseline Age</td>
<td></td>
<td>0.1 (0.03)</td>
</tr>
</tbody>
</table>

Note: In both models, standard errors may be underestimated because the outcome variable (% weight change at 4 years) for each individual is predicted from the original mixed model analysis. Additional variables in the adjusted model are centered at their sample mean.