Bariatric Surgery Induces Weight Loss but Does Not Improve Glycemic Control in Patients With Type 1 Diabetes

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Diabetes Care 2014;37:e173–e174 | DOI: 10.2337/dc14-0583

Brethauer et al. (1) report an improvement of glycemic control following bariatric surgery in patients with type 1 diabetes. However, the small sample size and limited time of follow-up of this latest and other previous reports preclude drawing firm conclusions (1–3).

We collected data from 22 patients with confirmed type 1 diabetes and BMI $\geq$35 kg/m^2 from three Belgian bariatric surgery centers. Six patients underwent sleeve gastrectomy and 16 had Roux-en-Y gastric bypass surgery. Overall, we compared BMI, glycemic control (as assessed by A1C), and daily insulin dose between pre- and postsurgery using a linear mixed model with a random patient and a fixed period effect. P values < 0.05 are considered significant. At each time point, mean $\pm$ SEM is given in Fig. 1. Data were collected for a mean $\pm$ SD of 14.3 $\pm$ 10.1 months before and 37.8 $\pm$ 29.7 months following surgical intervention.

As expected, a decrease in BMI was observed in all 22 patients: BMI 39.7 (37.1–42.2) pre- versus 31.4 (29.1–33.7) kg/m^2 postsurgery ($P < 0.001$) (Fig. 1*A*). This was accompanied by a decrease in the total daily insulin dose from 92.5 (75.5–109.5) pre- versus 48.0 (36.5–59.5) IU postsurgery ($P < 0.001$) (Fig. 1*B*). The decrease remained significant when assessed as insulin dose per kilogram body weight: 0.8 (0.7–1.0) pre- versus 0.5 (0.5–0.6) IU/kg/day postsurgery ($P < 0.001$) (Fig. 1*C*). However, we did not observe a substantial improvement of glycemic control as assessed by A1C: 8.4 (8.0–8.9)% (69 [64–73] mmol/mol) pre- versus 8.2 (7.8–8.6)% (66 [62–71] mmol/mol) postsurgery ($P = 0.47$) (Fig. 1*D*). Surgery-related adverse events included one gastric fistula, one marginal ulcer, one incisional hernia, and one stenosis. No deaths occurred.

Based on our data set, we conclude that bariatric surgery leads to substantial weight loss and is safe in patients with type 1 diabetes. Nonetheless, we are unable to confirm the improvement of glycemic control as reported by Brethauer et al. (1) in this substantially larger cohort with longer follow-up.

We do confirm the insulin-sparing effect, which is most probably due to an improvement in insulin sensitivity following weight loss. Nonetheless, other weight-independent mechanisms, such as the improvement of the incretin effect following surgery, might also be involved (4). Incretins inhibit the glucagon-induced inappropriate gluconeogenesis in patients with diabetes, a mechanism that is also exploited in ongoing clinical studies where GLP-1 agonists are added to the insulin treatment of patients with type 1 diabetes (5). The potentiating effect of incretin hormones on insulin secretion by the β-cell is obviously of no importance in established type 1 diabetes. Our study did not allow us to assess if sleeve gastrectomy and Roux-en-Y gastric bypass surgery had similar outcomes in patients with type 1 diabetes due to a lack of power. However, we are exploring this further as sleeve gastrectomy is believed to lead to a more predictable absorption of carbohydrates and might thus be a more attractive solution in the type 1 diabetic population. Further studies are warranted to determine which type of surgery is best suited to fit the needs of this specific population.

Acknowledgments. The authors are indebted to Roman Vangoitsenhoven, PhD student at the University of Leuven, for his help with the figure.
Duality of Interest. M.L. has received an unrestricted grant from Johnson & Johnson that is unrelated to this study. No potential conflicts of interest relevant to this article were reported.
Author Contributions. M.L. wrote and edited the manuscript and gathered and researched data. B.D. researched the data and reviewed and edited the manuscript. Y.V.N. gathered data. S.F. performed the statistical analysis. C.M., P.G.,

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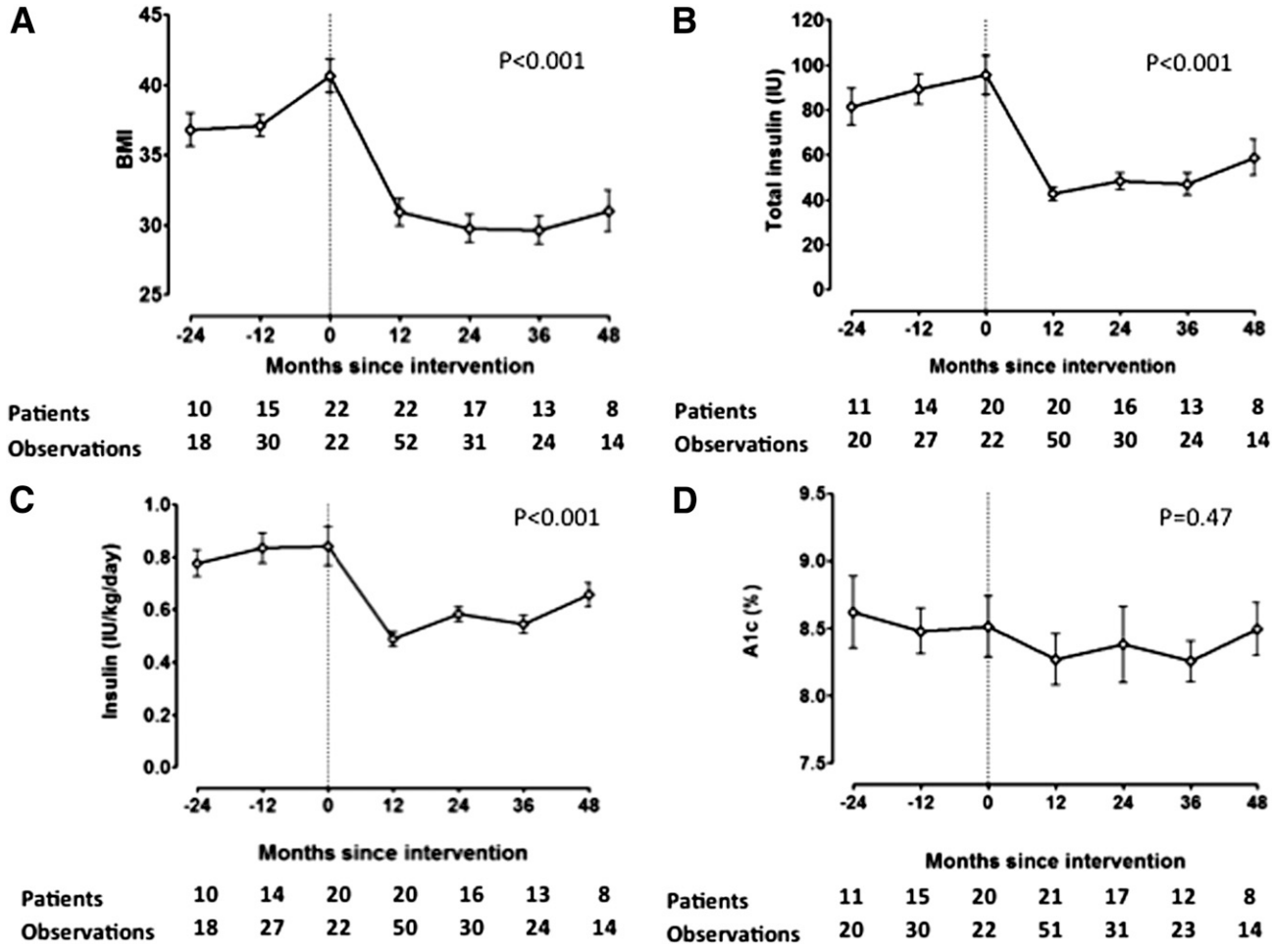

Figure 1—*A*: Evolution of BMI (kg/m^2). *B*: Total insulin dose/day (IU/day). *C*: Total insulin dose per kilogram body weight per day (IU/kg/day). *D*: A1C (%). Data are represented as mean ± SEM.

A.D., and B.V.D.S. contributed to the discussion and reviewed and edited the manuscript.

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