Bariatric surgery results in patients with type 1 diabetes mellitus on continuous subcutaneous insulin infusion therapy

Resultados de la cirugía bariátrica en pacientes con diabetes mellitus tipo 1 tratados con infusión subcutánea continua de insulina

Obesity is correlated with the development of chronic metabolic conditions such as type 2 diabetes mellitus (T2DM), hypertension and hyperlipidaemia. Bariatric surgery in an effective treatment for obese T2DM patients. Nowadays, obesity also affects type 1 diabetes mellitus (T1DM) patients. In fact, 13% of T1DM patients suffer from obesity and/or to half of the patients are either overweight or obese. Hypoglycaemia events and severe hypoglycaemia were defined in order to standardized concepts. Hypoglycaemia frequency was estimated from self-monitoring blood glucose values during the previous month to each visit. Changes in weight, BMI, total cholesterol, triglycerides, high-density lipoprotein (HDL), low-density lipoprotein (LDL), systolic blood pressure (SBP), diastolic blood pressure (DBP), improvements in hypertension and hyperlipidaemia were gathered.

Six T1DM obese patients treated with CSII during 9.5 ± 3.1 years (duration of CSII at surgery time 5.0 ± 2.4 years) undergone bariatric surgery in the 30 reviewed hospitals during the analysed period of time. Patients had a male-to-female ratio of 1:5, a mean age of 43.2 ± 11.5 years, a median duration of T1DM of 24.2 ± 4.9 years. Surgical procedures were Roux-en-y gastric bypass (RYGB) in 3 patients and sleeve gastrectomy in other 3. Total follow-up from surgery time was 4.5 ± 1.4 years.

Although we could not detect significant HbA1c improvement after surgery (7.9 ± 0.8% vs. 7.3 ± 0.8%, p = 0.08), we found a daily insulin requirement reduction (mean difference in change, −0.10 ± 0.04 UI/kg/day; 95% CI, −0.06 to −0.15; p < 0.05). Insulin decrease proceeded from both basal rate (mean difference in change −16.1 ± 5.5 UI/day; 95% CI, −10.4 to −21.8; p < 0.05) and insulin boluses (mean difference in change −8.3 ± 4.8 UI/day; 95% CI, −3.3 to −13.3; p < 0.05). No differences in the proportion of basal/bolus during the follow-up were detected. Hypoglycaemic frequency and severe hypoglycaemia frequency did not significantly change after surgical procedure. In fact, only one patient experienced one severe hypoglycaemia in the first two years after bariatric surgery. Daily carbohydrate intake showed a reduction at the end of follow up (mean difference in change −53.8 ± 25.2 g/day; 95% CI, −27.4 to −80.3; p < 0.05).

A significant body weight reduction was observed at the end of the follow-up (mean difference in change, −38.1 ± 13.4 kg; 95% CI, −24.1 to −52.2; p < 0.05). This weight difference was also representative for a BMI reduction (mean difference in change, −14.2 ± 3.9 kg/m²; 95% CI, −10.1 to −18.3; p < 0.05). There were also favourable changes in triglycerides following the surgery (mean difference in change, −26.9 ± 15.1 mg/dl; 95% CI, −11.0 to −42.7; p < 0.05). Cardiometabolic risk factor assessment did not show other benefits. Lipid-lowering medication was discontinued in three of four (75%) patients. Hyper tension resolved in one of three patients (33%). Other metabolic and diabetes-related results are shown in Table 1.

Limited information is available about bariatric surgery results in T1DM CSII treated patients (five studies reported a total of 22 cases). All studies described data from mixed intensive insulin regimen (multiple daily injections and CSII). These small cohorts showed significant improvement in weight and insulin requirements, although other glycaemic benefits, such as HbA1c reduction, were not consistent. This was also demonstrated in our study. Improved insulin resistance following weight loss and decreased caloric
intake due to the restrictive component of bariatric surgery have been postulated to explain the reduction in insulin requirements. Our patients showed carbohydrate intake and insulin bolus reductions that could explain this hypothesis.

Our study was limited by small sample size and could not be representative for all T1DM patients treated with CSII. Nevertheless, our findings suggest that bariatric surgery induces weight loss but does not improve glycemic control in T1DM patients on CSII. Otherwise, a negative impact on glucose control has been observed. Thus, the role of bariatric surgery in such patients will require larger and longer studies.

References


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1 http://www.sediebres.org/gruposDeTrabajo/grupo.asp?idApartado=UW0A3jWoeKkb9d8E26fGQw%3d%3d.

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