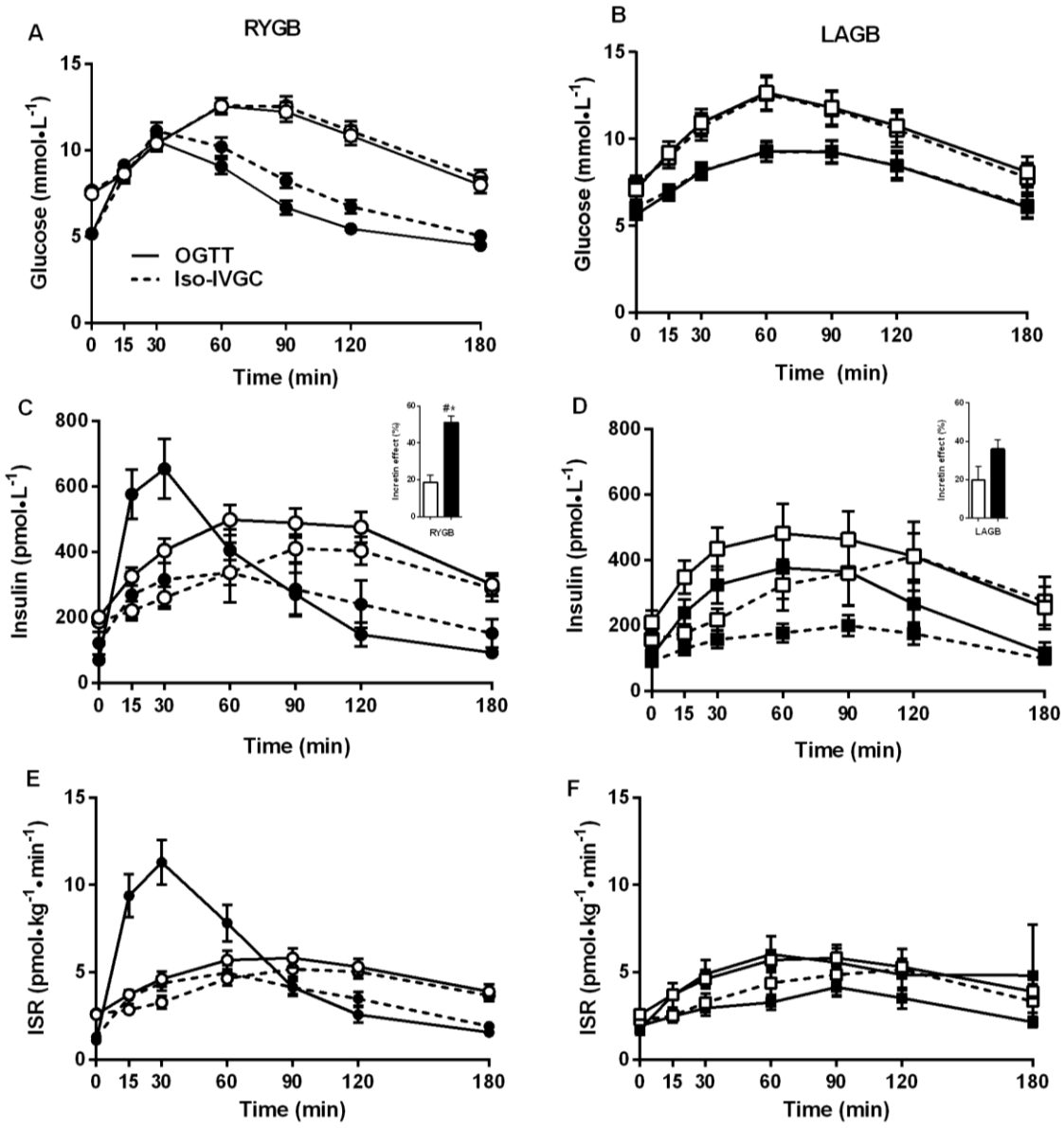
SUPPLEMENTARY DATA

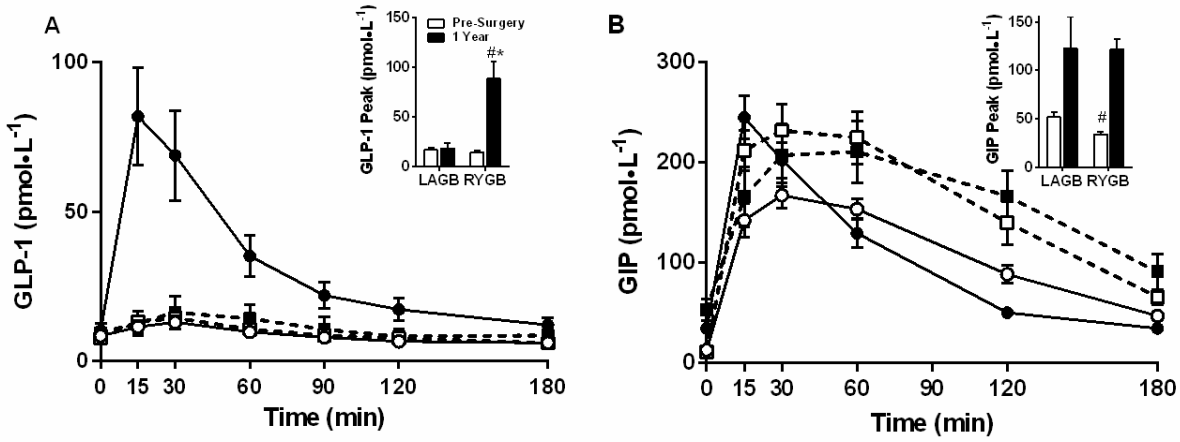
Supplementary Figure 1. Effect of RYGB and LAGB on glucose and insulin concentrations, insulin secretion rate (ISR) during OGTT and iso-IVGC and incretin effect of insulin. A-B: Glucose concentrations during OGTT and Iso-IVGC in RYGB and LAGB. Due to the rapid drop in glucose levels in the second part of the OGTT after RYGB, glucose levels could not be matched during the iso-IVGC. **C and D:** Insulin concentrations during OGTT and IV-isoGC and incretin effect (%) (insert) before and 1 year after surgery. **E:** ISR during OGTT and IV-isoGC before and 1 year after RYGB. Circles: RYGB, Squares: LAGB; open symbols: pre-surgery; dark symbols: 1 year post SURGERY; n=12 FOR LAGB and n=27 for RYGB. Mean±SEM for each group. *p<0.05 vs. Pre-Intervention , # p<0.05 vs. LAGB.



SUPPLEMENTARY DATA

Supplementary Figure 2. Effect of RYGB and LAGB on GLP-1 and GIP concentrations during the OGTT before and 1 year after surgery. Inserts: Effect of RYGB and LAGB on peak GLP-1 and GIP concentrations during the OGTT.

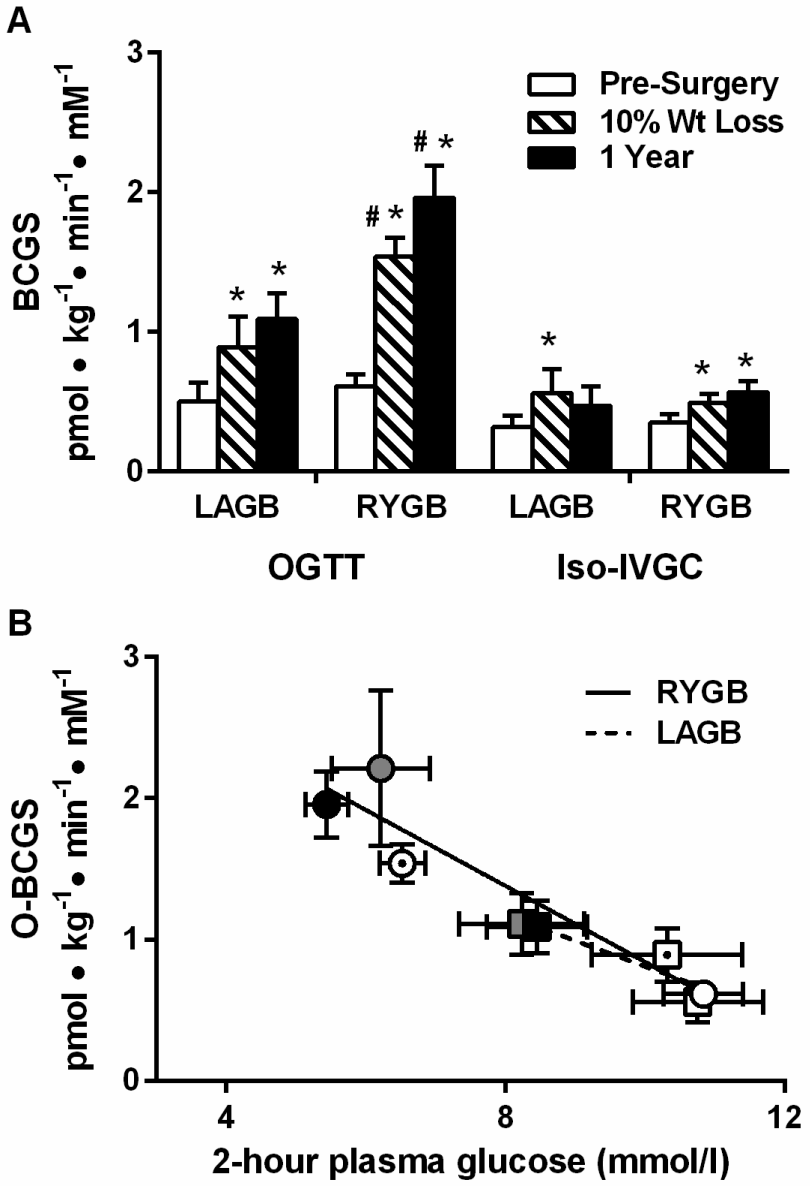
Circles: RYGB, Squares: LAGB; open symbols: pre-surgery; dark symbols: 1 year post SURGERY; n=12 FOR LAGB and n=27 for RYGB. Mean±SEM for each group. *p<0.05 vs. Pre-Intervention , # p<0.05 vs. LAGB.



SUPPLEMENTARY DATA

Supplementary Figure 3. A- Effect of RYGB or LAGB on β-cell glucose sensitivity (BCGS) in response to oral and IV isoglycemic stimuli. Open bars: pre-surgery; hatched bars: 10% matched weight loss after either LAGB or RYGB; black bars 1 year post surgery. Mean±SEM for each group. *p<0.05 vs. pre-intervention; #p<0.05 vs. LAGB.

B- Relationship between O-BCGS and 2 hour post-prandial glucose. Each symbol represents the mean±SEM for each group. Circles: RYGB, Squares: LAGB; open symbols: pre-surgery (LAGB, n=15; RYGB, n=27); 'target' symbols: 10% matched weight loss (LAGB, n=15; RYGB, n=26); grey symbols: 20% matched weight loss (n=8 for LAGB and RYGB); dark symbols: 1 year post LAGB (n=12) or RYGB (n=27).



SUPPLEMENTARY DATA

Supplementary Table 1. List of abbreviations and definitions used throughout manuscript.

Abbreviations List	
RYGB	Roux-en Y gastric bypass
LAGB	laparoscopic adjustable gastric banding
OGTT	oral glucose tolerance test
Iso-IVGC	IV-isoglycemic glucose clamp
IVGTT	IV glucose tolerance test
GLP-1	glucagon-like peptide 1
GIP	gastric inhibitory polypeptide
DPP-IV	dipeptidyl peptidase IV
IV-[variable]	Variables derived from Iso-IVCG
O-[variable]	Variables derived from OGTT
AUC_{0-180}	area under the curve from 0 – 180 minutes
AUC_{0-60}	area under the curve from 0 – 60 minutes
HOMA-IR	Homeostasis model assessment of insulin resistance
ISI	insulin sensitivity index or Matsuda index
AIRg	acute insulin secretion
Sg	glucose-dependent glucose disappearance
Si	insulin sensitivity
$DI_{O\ (HOMA-IR)}$	oral disposition index calculated with HOMA-IR
$DI_{O\ (ISI)}$	oral disposition index calculated with ISI
$DI_{IV\ (IVGTT)}$	IV disposition index in response to IVGTT
$DI_{IV\ (iso-IVGC)}$	IV disposition index in response to iso-IVGC
BCGS	beta cell glucose sensitivity
ISR	insulin secretion rate

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Supplementary Table 2. Metabolic and hormonal changes 1 year after LAGB and RYGB. Mean ±SD. **Δ:** change after each intervention. Reported p value is for difference between change with LAGB and with RYGB: *p<0.05 vs. pre-intervention; †p<0.05 vs. IV; #p<0.05 diff between LAGB and RYGB; n=27 and LAGB n=12 except for body composition and IVGTT (RYGB=13, LAGB=7).

	LAGB (n=12)			RYGB (n=27)			p
	Pre-Surgery	**1 Year Post**	**Δ**	**Pre-Surgery**	**1 Year Post**	**Δ**	
Age (years)	48.5±10.2			43.7±8.2			
DM duration (months)	35.7±36.7			29.6±27.2			
Oral DM medication (# subjects)	8/12	1/12		20/26	1/26		
Insulin (# subjects)	0/12	0/12		2/26	0/26		
HbA1c (%)	6.5±0.9	5.8±0.7	0.8±1.0	6.8±0.7	5.5±0.5*	1.2±1.0*	0.379
Weight (kg)	116.7±11.1	97.3±15.6	19.3±12.5*	120.2±15.3	84.1±13.9#	36.1±9.2*	0.001
Fasting insulin ($pmol \cdot L^{-1}$)	207.1±129.2	107.3±73.9	99.4±99.8*	204.3±76.6	60.8±33.3	140.2±76.4*	0.227
Fasting GLP-1 ($pmol \cdot L^{-1}$)	7.5±3.7	9.4±11.4	2.1±9.3	8.3±7.6	10.2±8.1	0.03±11.4	0.557
Fasting GIP ($pmol \cdot L^{-1}$)	11.0±5.1	23.4±10.8	12.4±5.4*	9.4±4.2	16.8±10.8	7.4±6.3	0.717
GLP-1 peak ($pmol \cdot L^{-1}$)	17.1±8.3	18.6±19.3	2.4±17.0	14.5±11.0	88.2±72.7#	50.0±74.7*	0.005
GLP-1 AUC ($pmol \cdot L^{-1} \cdot min^{-1}$)	9.3±4.7	11.0±13.2	1.9±3.2	8.5±6.4	31.3±22.9#	14.9±4.9*	0.033
GIP peak ($pmol \cdot L^{-1}$)	51.6±17.5	122.7±88.3	71.1±91.3	33.8±12.2#	121.7±87.2	87.9±43.9*	0.132
GIP AUC ($pmol \cdot L^{-1} \cdot min^{-1}$)	32.6±13.1	32.5±22.2	0.1±5.6	20.8±9.1#	25.2±28.7	4.4±2.6	0.131
% C-peptide Incretin Effect	14.8±38.2	33.1±23.7	18.5±38.8	11.0±18.0	30.1±16.1	16.5±17.8*	0.866
$DI_{O\ (ISI)}$	228.0±334.3	379.7±246.7	151.7±248.1	160.5±102.9	617.8±388.1#	452.8±410.4*	0.009
Fat Mass (%)	49.9±8.5	42.9±7.5	7.0±4.9*	46.3±6.0	39.3±7.1	7.8±8.5*	0.796
Fat Mass (kg)	57.1±11.7	42.1±11.6	14.5±8.0*	56.1±8.2	32.8±7.5	22.7±10.0*	0.057
Waist Circumference (mm)	957.0±137.4	825.6±105.2	76.2±98.8*	1060.0±113.3	856.5±101.7	197.3±90.8*	0.039

SUPPLEMENTARY DATA

Supplementary Table 3. Comparison of RYGB and LAGB at 10% matched weight loss. Mean ±SD. **Δ** change with intervention, p value reported is for difference between change with LAGB and with RYGB: *p<0.05 vs. pre-intervention; †p<0.05 vs. IV; #p<0.05 vs. LAGB.

	LAGB (n=15)			RYGB (n=26)			p
	Pre-LAGB	**10% Wt Loss**	**Δ**	**Pre-RYGB**	**10% Wt Loss**	**Δ**	
Age (years)	50.5±10.2	-	-	43.0±8.9#	-	-	-
DM duration (months)	50.7±52.7	-	-	27.6±29.2	-	-	-
Oral DM medication use (# subjects)	8/15	-	-	14/26	-	-	-
Insulin (# subjects)	0/15	-	-	2/26	-	-	-
HbA1c (%)	6.7±1.0	-	-	6.8±0.7	-	-	-
Weight (kg)	112.7±14.7	102.0±14.5	10.7±2.2*	119.6±15.7	107.9±15.5	11.8±2.1*	0.148
Fasting insulin ($pmol \cdot L^{-1}$)	199.7±112.1	143.7±79.0	41.9±137.6*	204.5±75.6	116.9±62.5	87.6±94.3*	0.267
Fasting GLP-1 ($pmol \cdot L^{-1}$)	9.4±6.3	7.2±4.5	2.2±5.4	8.2±7.1	7.9±8.4	0.3±3.5	0.242
Fasting GIP ($pmol \cdot L^{-1}$)	11.2±4.9	10.7±6.2	0.4±3.0	10.1±4.6	8.7±3.2	2.0±5.4	0.226
GLP-1 peak ($pmol \cdot L^{-1}$)	18.0±8.2	14.4±5.5	3.5±7.2*	14.3±10.0	56.9±40.8#	42.6±33.2*	<0.001
GLP-1 AUC ($pmol \cdot L^{-1} \cdot min^{-1}$)	9.8±5.7	8.2±1.0	1.4±2.2	8.6±6.0	25.7±21.7#	17.1±16.5*	<0.001
GIP peak ($pmol \cdot L^{-1}$)	50.9±17.0	44.3±15.9	5.7±13.1	35.7±13.9#	54.5±21.2	18.8±16.8*	<0.001
GIP AUC ($pmol \cdot L^{-1} \cdot min^{-1}$)	32.2±11.8	30.8±3.4	1.4±9.0	21.7±8.15#	27.6±11.9	5.1±8.4*	0.063
% C-peptide Incretin Effect	10.0±19.3	8.5±34.4	1.5±58.5	10.9±18.3	29.5±15.1#	18.8±21.3*	0.329
$DI_{O\ (ISI)}$	190.9±306.3	282.1±403.0	91.3±267.0	152.7±97.6	425.1±269.1#	272.4±283.3*	0.009

SUPPLEMENTARY DATA

Supplementary Table 4. Comparison of LAGB and RYGB at 10% and 20% matched weight loss. Mean ±SD. Reported p value is for the overall effect of each surgical intervention; *p<0.05 vs. pre-intervention; †p<0.05 vs. IV; § p<0.05 vs. 10% weight loss; #p<0.05 vs. LAGB.

	LAGB (n=8)			p	RYGB (n=8)			p
	Pre-LAGB	**10% Wt Loss**	**20% Wt Loss**		**Pre-RYGB**	**10% Wt Loss**	**20% Wt Loss**	
Age (years)	46.8±9.5				47.8±9.1			
DM duration (months)	35.3±39.8				34.0±22.7			
Oral DM medication (# subjects)	5/8	1/8	2/8		5/8	0/8	0/8	
Insulin (# subjects)	0/8	0/8	0/8		0/8	0/8	0/8	
HbA1c (%)	6.8±1.0		5.8±0.8		7.0±0.5	-	5.4±0.7*	
Weight (kg)	116.4±9.3	104.9±3.1*	88.6±8.2*§	<0.001	117.4±14.7	107.4±4.8*	92.0±12.3*	0.017
BMI ($kg \cdot m^{-2}$)	43.4±5.2	38.8±1.6*	32.8±3.3*§	0.001	43.7±4.1	40.0±1.4*	34.4±3.8*§	<0.001
Weight loss (%)		9.9±0.8	23.6±7.6§	0.002		8.5±1.9	21.8±1.8§	0.048
Weight loss duration (weeks)		4.9±3.5	62.7±28.2§	0.001		3.8±1.1	43.5±30.2§	0.008
Glucose infused (Iso-IVGC) (g)	45.1±24.3	44.3±5.6	28.0±7.9§	0.034	50.5±15.7	40.0±8.2	34.7±9.6*	0.034
Fasting glucose ($mmol \cdot L^{-1}$)	8.3±1.8	6.3±0.4*	6.0±1.3*	0.017	7.9±1.9	6.6±0.3*	5.4±0.4*§	0.037
Fasting insulin ($pmol \cdot L^{-1}$)	230.7±140.7	148.4±31.9	95.5±43.9	0.171	153.1±41.3	131.3±17.5	67.8±19.0*§	0.011
Fasting GLP-1 ($pmol \cdot L^{-1}$)	8.7±3.9	8.8±5.2	7.9±3.8	0.878	6.0±4.1	6.6±1.1	6.8±5.5	0.982
Fasting GIP ($pmol \cdot L^{-1}$)	10.6±5.7	11.7±1.8	11.0±3.9	0.960	4.3±2.7#	6.8±0.7#	4.8±2.5§#	0.030
120' glucose ($mmol \cdot L^{-1}$)	11.2±3.7	10.8±1.4	8.2±2.5§	0.163	11.7±2.1	7.3±0.7#*	6.2±2.0*	<0.001
Glucose AUC ($mmol \cdot L^{-1} \cdot min^{-1}$)	11.3±3.2	10.0±1.0	8.0±1.9*§	0.121	11.3±1.9	8.6±0.6#*	7.6±1.5*	0.001
GLP-1 peak ($pmol \cdot L^{-1}$)	17.9±9.8	14.7±1.9	14.7±7.9	0.418	13.4±4.0	98.0±21.2#*	112.1±69.1#*	0.005
GLP-1 AUC ($pmol \cdot L^{-1} \cdot min^{-1}$)	10.7±5.3	9.7±1.4	8.3±4.0	0.364	6.3±2.0	26.4±3.5#*	23.5±17.1#*	0.001
GIP peak ($pmol \cdot L^{-1}$)	55.6±19.0	48.4±3.9	55.1±10.8	0.486	38.3±14.2	58.3±8.7*	41.3±18.4	0.090
GIP AUC ($pmol \cdot L^{-1} \cdot min^{-1}$)	36.1±13.8	34.2±8.4	38.1±4.6	0.117	55.4±101.4	24.3±1.2#	16.2±4.7#	0.124
O-ISRAUC$_{0\text{-}180}$ ($pmol \cdot kg^{-1} \cdot min^{-1}$)	880.6±418.2	902.0±127.3†	751.2±361.4†	0.754	939.9±398.0	1103.6±176.0†	1137.2±508.0†	0.176
O-ISRAUC$_{0\text{-}60}$ ($pmol \cdot kg^{-1} \cdot min^{-1}$)	287.0±149.8†	273.6±39.1†	272.0±140.4†	0.906	275.5±104.6†	484.0±68.3†#*	616.1±321.1†#*	0.010
IV-ISRAUC$_{0\text{-}180}$ ($pmol \cdot kg^{-1} \cdot min^{-1}$)	719.6±592.1	737.0±110.7	521.9±231.0	0.363	800.0±317.7	698.7±83.0	782.1±345.7	0.363
IV-ISR AUC$_{0\text{-}60}$ ($pmol \cdot kg^{-1} \cdot min^{-1}$)	182.6±124.1	198.2±35.0	165.0±78.8	0.495	195.8±83.7	210.3±26.1	245.8±102.4	0.758
HOMA-IR	12.5±8.3	5.9±1.3*	3.0±5.2*	0.096	8.2±4.4	5.2±2.2*	2.3±0.7*§	0.036
ISI	2.1±1.6	3.1±0.6*	5.8±3.6*	0.037	2.1±0.5	2.6±0.4	4.6±1.6*§	0.001
O-BCGS ($pmol \cdot kg^{-1} \cdot min^{-1} \cdot mM$)	0.71±0.54	0.81±0.15†	1.10±0.62†	0.164	0.52±0.36†	1.57±0.35†*	2.21±1.56†*	0.001
IV-BCGS ($pmol \cdot kg^{-1} \cdot min^{-1} \cdot mM$)	0.31±0.19	0.48±0.07*	0.66±0.55	0.012	0.33±0.26	0.38±0.11	0.39±0.25	0.873
$DI_{IV\ (iso\text{-}IVGC)}$	3.5±7.7	5.7±5.5	7.0±26.8	0.345	1.2±2.4	3.8±3.1	6.0±3.2	0.025
$DI_{O\ (HOMA\text{-}IR)}$	14.2±27.6	19.8±7.7	30.2±24.7	0.398	11.8±8.6	28.4±7.1*	47.7±30.1*	0.022

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$DI_{O\ (ISI)}$	192.7±347.8	215.3±169.9	376.8±269.5	0.245	166.7±107.0	315.4±175.3	525.4±359.9	0.041
Insulin Incretin Effect (%)	26.9±26.9	39.5±5.2	30.8±12.9	0.376	17.4±20.0	46.6±5.0*	44.3±15.9#*	0.012
C-peptide Incretin Effect (%)	23.5±30.6	20.8±5.5	19.7±24.4	0.962	12.5±15.1	34.8±6.3*	30.9±11.3*	0.037

SUPPLEMENTARY DATA

Supplementary Table 5. Predictive value of surgery type and weight loss on outcomes at 1 year
Results of Multivariate Mixed Model Regression Analysis testing the predictive value of surgery type (RYGB or LAGB) and weight loss % for the following outcome measured 1 year after surgery: glucose, insulin sensitivity, incretin effect, GLP-1 release and insulin secretion.

	Surgery	**Weight Loss (%)**
	p	**p**
Fasting Glucose (mmol/L)	0.043	<0.001
120' Glucose (mmol/L)	<0.001	<0.001
Glucose AUC (mmol/L/min)	0.005	<0.001
HOMA-IR	0.069	<0.001
ISI	0.765	<0.001
Insulin Incretin Effect (%)	<0.001	0.762
C-peptide Incretin Effect (%)	0.033	0.734
GLP-1 Peak (pmol/L)	<0.001	0.174
GLP-1 AUC (pmol/L/min)	<0.001	0.351
O-BCGS (pmol/kg/min/mM)	0.018	0.007
$DI_{IV\ (iso\text{-}IVGC)}$	0.372	0.083
$DI_{O\ (HOMA\text{-}IR)}$	0.024	<0.001
Insulin $AUC_{0\text{-}60}$ (pmol/L/min)	0.089	<0.001