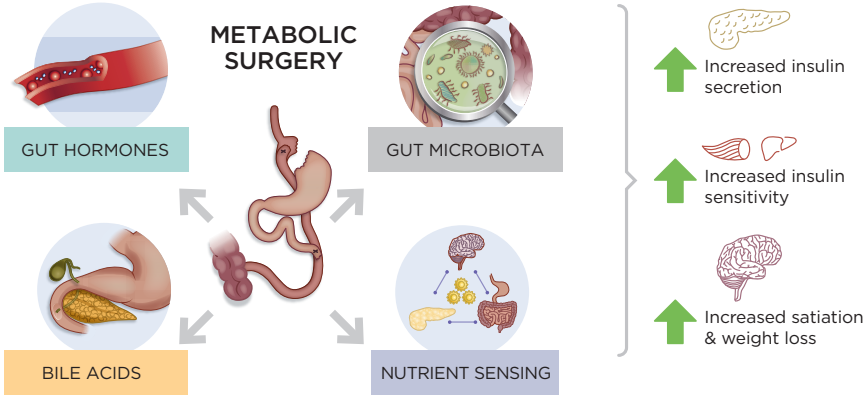
Surgical Treatment for Type 2 Diabetes

Metabolic surgery is now among the recommended treatment options for Type 2 diabetes among select obese individuals

– American Diabetes Association-Standards of Care 2017 [1]

How does surgery improve diabetes

Metabolic surgery changes various mechanisms of GI physiology involved in metabolic regulation [3,4]



Indications for Surgical Treatment

There is now sufficient clinical and mechanistic evidence to support inclusion of metabolic surgery among antidiabetes interventions for people with Type 2 diabetes (T2D) and obesity." DSS-11 [2]

Algorithm for patients with Type 2 Diabetes

Non-Obese BMI < 30kg/m² or 27.5 for Asians	Obese BMI ≤ 30kg/m² or 27.5 for Asians		
	Class I	Class II	Class III
	Optimal lifestyle & Medical Rx (including injectable meds & insulin)	Optimal lifestyle & Medical Rx	Expedited Assessment for Metabolic Surgery
	Good Glycemia Control / Poor Glycemia Control	Good Glycemia Control / Poor Glycemia Control	
	Nonsurgical Treatment	Consider Metabolic Surgery	Recommend Metabolic Surgery

Class I
BMI ≥ 30-34.9 kg/m² or 27.5-32.4 for Asians

Class II
BMI ≥ 35-39.9 kg/m² or 32.5-37.4 for Asians

Class III
BMI ≥ 40 kg/m² or 37.4 for Asians

- **"Metabolic surgery should be a recommendation option to treat T2D in appropriate surgical candidates with class III obesity (BMI 40 kg/m2, regardless of the level of glycemic control or complexity of glucose-lowering regimens, as well as in patients with class II obesity (BMI 35.0-39.9kg/m2) with inadequately controlled hyperglycemia despite lifestyle and optimal medical therapy." DSS-II [2]**
- **"Metabolic surgery should also be considered to be an option to treat T2D in patients with class 1 obesity (BMI 30.0-39.9 kg/m2) and inadequately controlled hyperglycemia despite optional medical treatment by either oral or injectable medications (including insulin)." DSS-II [2]**
- **"All BMI thresholds should be reconsidered depending on the ancestry of the patient. For example, patients of Asian descent, the MBI values above should be reduced by 2.5 kg/m2." DSS-II [2]**

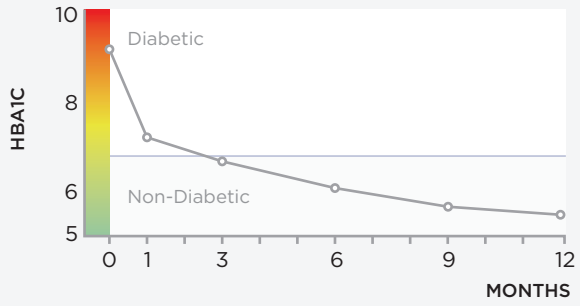
Clinical Evidence [2,5]

Observations that Type 2 Diabetes (T2D) can be improved or even resolved by surgical operation have been reported for almost a century. Since the 2000's experimental evidence that changes in GI anatomy can directly influence glucose homeostasis provided a mechanistic rationale for the use of surgery as an intentional treatment of diabetes. DSS-I and DSS-II assessed clinical evidence, including numerous Randomized Clinical Trials (RCTs) performed over the last decade, leading to current guidelines.

11 randomized trials (RCTs – Level 1 evidence) as well as large, long-term case controlled studies (Level 2 evidence) comparing surgery in overweight/obese people with Type 2 diabetes show that metabolic surgery results in:

- **Greater improvement of glycemic control (Level 1 evidence)**
- **Reduction of medication usage (Level 1 evidence)**
- **Reduction of cardiovascular disease (CVD) risk (Level 1 evidence)**
- **Reduction of heat attacks, strokes, cancer and overall mortality (Level 2 evidence)**
- **Greater weight loss (Level 1 evidence)**
- **Better quality of life (Level 1 evidence)**

Major Improvement of Glycemia



Chance of Disease Remission: A substantial proportion of patients (between 30% and 60%, depending on the procedure) experience durable (≥5 year) normalization of blood sugar levels without the need for ongoing pharmacologic treatment (disease remission)

Cost Effectiveness: Economic analyses have also shown that surgical treatment for diabetes are cost-effective. Cost per quality adjusted life-year (QALY) is approximately $3,200-$6,500, well below $50,000/QALY (which is deemed appropriate for coverage).

References

(1) ADA Standards of Medical Care in Diabetes 2017 Diabetes Care; Jan. 2017; vol. 40 Issue Suppl. 1

(2) Rubine F. et al. Diabetes Care Diabetes Care 2016; Jun. 39 (6): 861-877

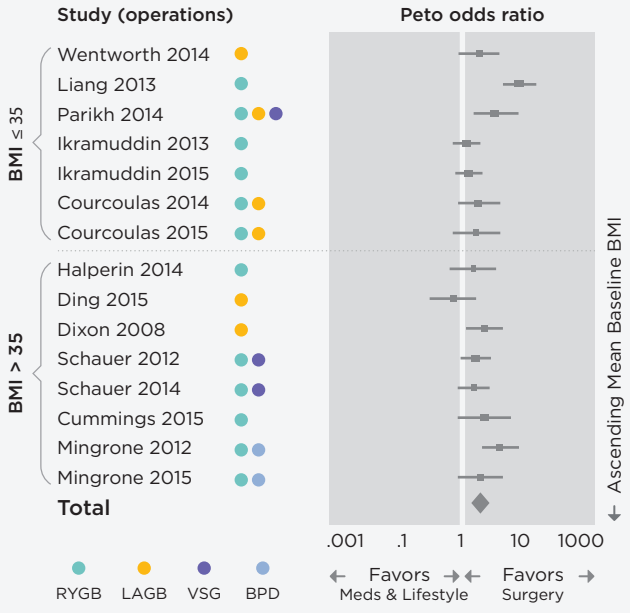
(3) Rubine F. Nature 2016; 533(7604)459-61

(4) Evers SS et al. Annu Rev Physiol. 2017 Feb 10; 79313-334

(5) Cummings DE and Cohen R. Diabetes Care 2016 Jun; 39 (6): 924-933

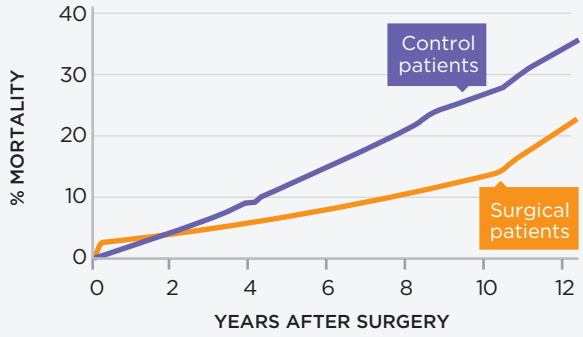
Randomized Clinical Trials - Level 1 Evidence

Surgery vs LIfestyle & Pharmocotherapy



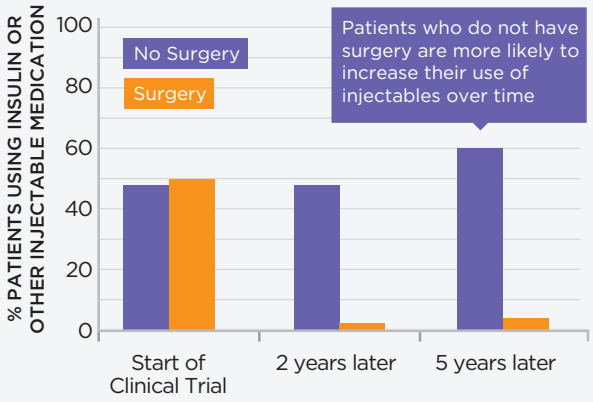
Based on Rubino F. et al. Diabetes Care 2016; 39, 861-877

Reduction of CVD & Mortality Risk



Based on Arterbum D. et al; JAMA. 2015; 313 (1); 62-70

Reduction of Medication Usage



Based on Migrone G. et al; Lancet 2015; 386 (9997): 964-973

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