

## Bariatric surgery and Diabetes mechanisms of improvement

Professor of surgery, University of Minnesota, Minneapolis, USA  
Sayeed Ikramuddin, MD

Traditionally bariatric surgery has been applied for obesity. Numerous observations demonstrate remarkable improvement in comorbid disease, in particular type II diabetes. Improvements have been ascribed principally to weight loss. Indeed those operations that produce the greatest weight loss have the most impressive impact on hyperglycemia. Changes in insulin resistance, insulin secretion and improved hepatic and muscular insulin signaling have all been demonstrated. There are however many changes that are weight independent and they fall into two categories. First is the response to oral intake of glucose. In patients who are matched by baseline BMI, insulin resistance (HOMA), and duration of diabetes, and weight loss there is an augmented incretin effect in the surgical patients. A second phenomena is that with small amounts of matched weight loss there appears to be greater improvement of glycemia in gastric bypass patients compared with sleeve gastrectomy patients. Finally, the impact of very early weight loss on whole body insulin sensitivity remains poorly studied. Sensitive markers of insulin resistance comparing patients undergoing dietary management and gastric bypass before any appreciable weight loss shown no differences in whole body insulin resistance despite improved glycemia . Suggesting that the role of controlled and strict caloric restriction may be very impactful in improvement of diabetes. Other factors that impact acute improvements in glycemia may be reduced hunger principally by reduction of “hunger hormones” e.g. ghrelin. More recently, the role of the intestine in control of hepatic insulin sensitivity via the Vagus nerve may play a role. Additionally intestinal enzyme production in this setting of nutrient deficit may have impacts on hepatic insulin sensitivity.