

Exploring the Role of Bariatric Surgery in Diabetes Remission and Long-Term Management in Obese Individuals

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Introduction

Obesity and type 2 diabetes are closely linked, with obesity being one of the leading risk factors for the development and progression of diabetes. The rising global prevalence of both conditions has prompted ongoing research into effective management strategies. Bariatric surgery, a surgical procedure that induces weight loss by altering the digestive system, has emerged as a promising intervention for individuals with obesity and type 2 diabetes. Bariatric surgery not only helps in weight reduction but has also been shown to lead to significant improvements in blood glucose control, often resulting in diabetes remission. This article explores the role of bariatric surgery in diabetes remission and long-term management in obese individuals, examining the mechanisms behind its effectiveness, potential benefits, challenges, and the implications for clinical practice [1].

Mechanisms of Action

Bariatric surgery promotes weight loss through various procedures, including gastric bypass, sleeve gastrectomy, and adjustable gastric banding, each of which works differently to reduce the size of the stomach and limit food intake. While the primary goal of bariatric surgery is weight loss, research has shown that it can have profound effects on glucose metabolism, making it an effective treatment for type 2 diabetes in obese individuals. The mechanisms by which bariatric surgery leads to diabetes remission are not yet fully understood, but several factors likely contribute to its success. One important factor is the rapid and significant weight loss that occurs after surgery. Obesity is a major driver of insulin resistance and by reducing excess fat, bariatric surgery improves insulin sensitivity, which helps to regulate blood glucose levels. Additionally, bariatric surgery has been found to affect gut hormones that play a key role in glucose metabolism, such as GLP-1 (glucagon-like peptide-1), ghrelin, and peptide YY. These hormones help regulate appetite, insulin secretion, and glucose homeostasis, and their altered secretion following bariatric surgery contributes to improved glucose control. For example, gastric bypass surgery, which reroutes a portion of the small intestine, has been shown to increase the secretion of GLP-1, a hormone that enhances insulin sensitivity and insulin secretion. The changes in gut microbiota, which are also associated with bariatric surgery, may further contribute to improved metabolic health by influencing systemic inflammation and insulin resistance [2]. Another potential mechanism is the direct effect of bariatric surgery on the liver. Obesity often leads to non-alcoholic fatty liver disease (NAFLD), a condition that is closely linked to insulin resistance and type 2 diabetes. Bariatric surgery, particularly gastric bypass, has been shown to improve liver function and reduce hepatic fat accumulation, further aiding in blood glucose control [3].

Diabetes Remission after Bariatric Surgery

One of the most striking findings in bariatric surgery research is its potential for inducing diabetes remission. In many cases, individuals with type 2 diabetes experience a significant improvement or complete resolution of their diabetes symptoms after undergoing bariatric surgery. Studies have shown that a large proportion of patients

achieve normal blood glucose levels within a few months following surgery, and this effect is often sustained for years. The remission of type 2 diabetes following bariatric surgery is particularly evident in individuals with early-stage diabetes, where the pancreas is still capable of producing insulin. In these patients, the combination of weight loss, improved insulin sensitivity, and changes in gut hormone levels leads to significant improvements in glucose control, often eliminating the need for diabetes medications. In fact, some studies have shown that up to 80% of patients experience remission of their diabetes within one to two years after bariatric surgery [4]. However, the long-term success of bariatric surgery in achieving and maintaining diabetes remission can vary depending on several factors, including the type of surgery performed, the patient's age, the duration of diabetes prior to surgery, and adherence to lifestyle changes after surgery. In some individuals, diabetes may return over time, particularly if weight is regained or if the patient does not maintain healthy eating and exercise habits [5].

Long-Term Management of Diabetes after Bariatric Surgery

While bariatric surgery can lead to significant improvements in diabetes control and, in some cases, remission, long-term management of diabetes remains an ongoing process. Even in cases of remission, patients are still at risk of developing complications associated with diabetes, such as cardiovascular disease and neuropathy, and require continued monitoring of their blood glucose levels. Post-surgery, patients must adhere to a structured long-term management plan that includes regular follow-up visits with healthcare providers, lifestyle modifications, and potential pharmacological interventions. For some individuals, the reduction in weight and improvements in insulin sensitivity may be sufficient to maintain normal blood glucose levels without the need for medication. However, others may require medications such as metformin or GLP-1 receptor agonists to maintain glycemic control [6]. In addition to pharmacological management, lifestyle interventions such as diet and exercise remain crucial components of long-term diabetes management after bariatric surgery. Patients are encouraged to follow a balanced, nutrient-dense diet to maintain their weight loss and support overall health. Physical activity is also essential for maintaining insulin sensitivity, preventing weight regain, and improving cardiovascular health. Psychological support and counseling may be necessary for some individuals to address emotional

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and behavioral aspects of weight loss and diabetes management. It is important to recognize that bariatric surgery is not a cure for obesity or diabetes; rather, it is a tool that can significantly improve metabolic health when combined with ongoing lifestyle changes [7].

Benefits of Bariatric Surgery for Obese Diabetic Patients

Bariatric surgery offers numerous benefits for obese individuals with type 2 diabetes, both in terms of weight loss and metabolic improvements. The most immediate and significant benefit is the potential for diabetes remission, which can reduce or eliminate the need for insulin and other diabetes medications. This can lead to improved quality of life, fewer side effects from medications, and reduced healthcare costs associated with long-term diabetes management. In addition to improved blood glucose control, bariatric surgery has been shown to reduce the risk of diabetes-related complications, such as cardiovascular disease, retinopathy, and nephropathy. Weight loss achieved through bariatric surgery helps to lower blood pressure, improve lipid profiles, and reduce the risk of heart disease—complications that are common in individuals with obesity and diabetes [8]. Furthermore, bariatric surgery may improve other obesity-related health conditions, such as obstructive sleep apnea, osteoarthritis, and non-alcoholic fatty liver disease, leading to an overall improvement in patients' health and well-being. These improvements contribute to better long-term outcomes and a reduced burden of comorbidities associated with obesity and type 2 diabetes [9].

Challenges and Considerations

While bariatric surgery offers significant potential for diabetes remission and long-term management, there are several challenges and considerations that must be taken into account. First, not all individuals with obesity and diabetes are candidates for bariatric surgery. The eligibility criteria for bariatric surgery typically include a body mass index (BMI) of 40 or higher, or a BMI of 35 or higher with obesity-related comorbidities such as diabetes. Additionally, patients must be evaluated for their ability to undergo surgery and their willingness to commit to the post-surgery lifestyle changes required for long-term success. Surgical risks and complications, such as infection, bleeding, and blood clots, are inherent to any surgical procedure, including bariatric surgery. Moreover, some patients may experience long-term complications, such as nutritional deficiencies, which require ongoing monitoring and supplementation. For example, bariatric surgery can interfere with the absorption of key nutrients like vitamin B12, iron, and calcium, necessitating regular blood tests and supplements. Psychological factors also play a significant role in the success of

bariatric surgery. The emotional and behavioral changes required to maintain weight loss and adhere to a healthy lifestyle can be challenging for some individuals. Psychological counseling and support groups are often recommended to help patients navigate the challenges of post-surgery life and ensure continued success in diabetes management.

Conclusion

Bariatric surgery has emerged as a powerful tool in the management and potential remission of type 2 diabetes in obese individuals. Through mechanisms such as weight loss, improved insulin sensitivity, and changes in gut hormone secretion, bariatric surgery can significantly improve blood glucose control and reduce the need for diabetes medications. While diabetes remission following bariatric surgery is achievable for many patients, long-term management still requires ongoing monitoring, lifestyle modifications, and potentially pharmacological interventions. As research continues to uncover the full extent of bariatric surgery's impact on diabetes and metabolic health, it is becoming clear that this intervention offers a promising option for obese individuals with type 2 diabetes, improving not only their glucose control but also their overall health and quality of life.

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