

The Principle And Method Of Laparoscopic Weight-Loss Surgery

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Abstract. *with the Development of Economy and the Improvement of People's Living Standards, the Number of Overweight and Even Obese People Has Increased Dramatically. At Present, Obesity is Not Only an Independent Disease, But Also Easily Combined with a Series of Other Diseases. How Does Oxidative Stress Level Change in Laparotomy and Laparoscopic Surgery? is It Preventable? At Present, There is No Consistent Conclusion. Especially for Patients with Severe Obesity, Laparoscopic Bariatric Surgery is Effective for a Long Time to Improve or Even Completely Alleviate Obesity-Related Complications. Therefore, Anesthesia for Severely Obese Patients Undergoing Laparoscopic Bariatric Surgery Poses New Challenges to Anesthesiologists. This Article Reviews the Principles and Surgical Methods of Laparoscopic Bariatric Surgery.*

Keywords: *Laparoscopic Bariatric Surgery, Obesity, Type 2 Diabetes, Metabolic Syndrome*

1. Introduction

At Present, Obesity Has Become an Increasingly Serious Problem in the World. Foreign Data Show That among Adults, the Prevalence Rate of Obesity is 24% for Men and 25% for Women, and the Prevalence Rate of Grade Iii Obesity Exceeds 3% [1]. Obese Patients over 50 Years Old Often Suffer from Many Serious Concomitant Diseases. in the Treatment of Obesity, Surgery is the Most Effective Method. Randomized Controlled Studies of Multiple Large Samples Show That Bariatric Surgery is the Most Effective Method to Treat Morbid Obesity and Its Concomitant Diseases [2]. Obesity Can Cause or Combine Various Diseases, Such as Diabetes, Heart Disease, Some Cancers, Sleep Apnea Syndrome, Osteoarthritis, Etc., Which Seriously Affect the Life Span and Quality of Life of Patients. Weight Loss Surgery is the Most Effective Method to Treat Morbid Obesity and Its Concomitant Diseases [3]. Surgery Can Cause a Series of Changes in the Body's Homeostasis and Lead to Stress Reactions. Reactive Oxygen Species (Ros) Are the Key Substances in Stress Reactions. side Effects Caused by Anatomical Changes of Digestive Tract after Operation and Complications Caused by Operation Itself. This Article Introduces How to Recognize and Deal with the Principle and Choice of

Laparoscopic Bariatric Surgery Based on Literature and Clinical Practice.

2. Indications for Surgical Treatment of Obesity

Indications for Surgical Treatment of Obesity At Present, Most Countries in the World Adopt Overweight and Obesity Standards Recommended by Who in 1997, Namely, Body Mass Index (Bmi) ≥ 25 is Overweight and Bmi ≥ 30 is Obesity. However, the Remission of Diabetes in Many Patients Occurs Before Obvious Weight Loss. Therefore, the Changes of Internal Environment, Especially the Changes of Hormone Levels, Caused by Surgical Methods Are More Noteworthy Mechanisms. in Our Country, Laparoscopic Sleeve Gastrectomy is the Main Method of Bariatric Surgery At Present Because of Its Simple Operation Mode, Low Operation Risk and Good Bariatric Effect. Compared with Non-Obese Patients, Obese Patients Have Significantly Higher Risk of Hypoxemia during Operation. in 2000, the Asia-Pacific Conference on Obesity Proposed a New Asian Standard, Namely, Overweight If Bmi ≥ 23 and Obesity If Bmi ≥ 25 . for Surgical Indications of Obesity, Bmi is the Main Reference Index in Europe, America and Asia Pacific. Gastric Wall Edema Can Be Treated by Conservative Anti-Inflammatory Therapy. If the Bandage is Placed Incorrectly, the Bandage Needs to Be Readjusted Surgically. European and American Countries Encourage Patients to Take Liquid Diet Several Hours after Surgery. Wang Runping Study Believes That in General Anesthesia for Laparoscopic Surgery, Compared with Non-Obese Patients, the Bronchial Smooth Muscle of Obese Patients is Not Completely Relaxed, So the Incidence of Airway Spasm is Significantly Increased [4]. This is the Cause of Many Surgical Complications and Ultimately Leads to an Increase in the Mortality Rate Associated with Surgery. Therefore, It Has Positive and Far-Reaching Significance for the Evaluation, Detection and Prevention of Oxidative Stress Level during and after Operation.

Friedman et al. Mentioned as Early as 1955 That Hypoglycemia after Subtotal Gastrectomy May Improve the Condition of Diabetes Mellitus, But It Has Not Attracted Much Attention. It May Be That Fat is Thick in Abdomen of Obese Patients, Fat Liquefaction Necrosis and Local Skin Infection Are Easily Formed during Operation, or the Puncture Device Presses the Skin At the Puncture Site, Causing Ischemic Necrosis and Then Triggering Infection. Clinical and Epidemiological Studies Show That Obesity, Especially Abdominal Obesity, is Strongly Associated with Cardiovascular Risk Factors. Obesity is Also Closely Related to the Onset of Type 2 Diabetes. in Addition, Obesity Can Also Lead to Increased Load Before and after the Heart. Especially Untreated Obese Patients May Have Associated Pulmonary Hypertension and Heart Failure. Weight Loss of 6% ~ 10% within 6 ~ 12 Months Can Improve Cardiovascular and Diabetes Risk Factors in Metabolic Syndrome, Including Insulin Resistance. Long-Term Preload Increase in Obese Patients Will Lead to Decreased Compliance of Left Ventricular Wall, Myocardial Enlargement and Hypertrophy, Decreased Left Ventricular Systolic Function, Increased End-Diastolic Pressure, and Ultimately Left Ventricular Dysfunction. Surgery is Stimulated by Various Internal and External

Factors Such as Trauma, Hemorrhage, Hypotension, Hypoxia, Tissue Reperfusion, Etc. a Large Number of Free Radicals or Reactive Oxygen Species Are Generated through Various Mechanisms Such as Mitochondrial Sources, Capillary Endothelial Cell Sources, Leukocyte Sources and the Like, So That the Human Body is in a High Oxidation Reaction State during and after Operation. Liu Gang Believes That Obesity, Especially Abdominal Obesity, is the Central Link in the Onset of Metabolic Syndrome, and Obesity is the Primary or Primary Objective of Metabolic Syndrome Intervention [5].

Displacement of Gastric Ligature is a Serious Complication. Tian Feng et al. Found That 25 (25.3%) of 95 Patients with Lagb Had Bandage Displacement [6]. > 65 Years Old, Obesity-Related Complications Are Stubborn and Complicated. We Should Weigh the Pros and Cons of Surgery Before Deciding Whether to Perform Surgery According to the Preoperative Examinations. Whether There is a Family History of Hereditary Obesity and My Willingness. Taking Laparoscopic Sleeve Gastrectomy as an Example, Its Function of Promoting Diabetic Remission is More Significant Than That of Adjustable Band, Which is Equivalent to Laparoscopic Gastric Bypass Surgery. However, Compared with Bypass Surgery, This Operation Has No Obvious Change to the Continuity of Digestive Tract, and Has No Relevant Components of Foregut Hypothesis and Hindgut Hypothesis. Therefore, the Reason for Diabetic Remission Cannot Be Explained Accordingly. in Addition, Compared with Non-Obese Patients, the Incidence of Arrhythmia in Obese Patients is Significantly Increased. Secondly, Sinus Node Dysfunction is Easy to Occur, Which Will Greatly Increase the Incidence of Atrial Fibrillation and Sudden Cardiac Death. Shao Yulin et al [7] Have Continuously and Dynamically Detected the Level of Oxidative Stress in Laparoscopic Surgery, and Also Found That Prolonged Pneumoperitoneum Can Lead to Oxidative Stress, and the Level of Oxidative Stress Increases More Obviously after Pneumoperitoneum is Relieved, Suggesting That Ischemia-Reperfusion Injury Plays a Stronger Role in the Occurrence and Development of Oxidative Stress. the Patient Understands the Bariatric Surgery, and Understands and Accepts the Potential Complication Risks of the Surgery. to Understand the Importance of Changing Lifestyle and Eating Habits after Surgery for Postoperative Recovery and Have the Ability to Bear It, and to Actively Cooperate with Postoperative Follow-Up.

3. the Application, Indications and Effects of Several Commonly Used Bariatric Surgical Procedures At Present

3.1 Laparoscopic Adjustable Gastric Bandage (Lagb)

Adjustable gastric banding is a surgical method to reduce body weight by limiting food intake. This method of bariatric surgery was proposed by U.S. physician Kuzmak in 1983. He used an adjustable gastric band made of silica gel and placed it into the patient through traditional laparotomy. Incision of the soft tissue of the posterior gastric wall through the small curvature of the stomach increases the upward and downward mobility of the posterior gastric wall. Only 2

stitches were sutured when the ligature was embedded in the bottom of the stomach. Most of the stomach forearm was free and mobile. Sun guojuan et al. [8] compared 202 patients with type 2 diabetes undergoing laparoscopic surgery. Although there was no significant difference in the therapeutic effect between obese group ($BMI \geq 35$) and non obese group ($BMI < 35$), the data difference between the two groups was worth exploring. The bandage is internally provided with a silica gel inner bladder and is connected with a subcutaneous water injection pump, and the caliber of the inner bladder can be adjusted by pumping water or injecting water by the water injection pump after surgery, so that the size of an output port can be adjusted, and the weight loss effect can be achieved by limiting the patient to eat. During the operation, a small gastric bag was built to limit food intake, transection of the gastric body under the cardia was carried out, and the antrum, duodenum and part of jejunum were left out. The proximal remnant stomach and distal jejunum underwent Y-shaped anastomosis, allowing food to bypass most of the stomach, duodenum and the first jejunum, thus reducing the body's absorption of most of the heat and nutrition. LAGB is the simplest and safest method of weight loss surgery. It is currently the most frequently performed weight loss surgery in the world every year and is most popular in Europe and Australia [9].

3.2 Sleeve Gastrectomy

Sleeve gastrectomy (also known as vertical sleeve gastrectomy, sleeve gastrectomy, great curvature gastrectomy, partial gastrectomy, etc.) is a kind of limited weight-loss surgery. The operation indications of sleeve gastrectomy are similar to other weight-loss surgery. The operation did not involve partial gastrectomy, but only transection of the gastric body, exclusion of the antrum and re-anastomosis of the intestine. Therefore, resection or gastrectomy cannot be used as the dominant word. Bypass is selected for the conversion of dominant words. The ligature is empty during the operation, which can prevent postoperative gastric wall edema from causing the ligature to be too tight and causing obstruction. After the improvement, only 4.2% of the patients had bandage displacement or dilatation of gastric capsule. In Asia Pacific region, sleeve gastrectomy can be performed for patients with $BMI > 35$ or $BMI > 30$ and complications. For the patients with obesity in Asia Pacific region, sleeve gastrectomy can be used as a separate weight-loss operation without the need to continue the second stage of gastric short circuit operation, which can achieve good weight-loss effect [10]. Liu diangang et al. [11] analyzed the effect of surgical treatment of diabetes in 343 patients with $BMI < 35$, suggesting that 84.2% of patients had near-normal fasting blood glucose and glycated hemoglobin indicators. The mechanism of hypertension in obese patients may be related to increased sympathetic nerve activity, increased peripheral vascular resistance, increased cardiac output, and activation of the renin-angiotensin aldosterone system during hypoxemia. Liang Hui, et al [12] reported that 126 patients with high-risk obesity underwent sleeve gastrectomy, and their complications associated with obesity were significantly treated and their quality of life was significantly improved.

3.3 Laparoscopic Roux-en-y Gastrointestinal Short Circuit Operation

Roux-en-Y gastrointestinal short circuit operation (also known as Roux-en-Y gastric short circuit operation, Roux-en-Y gastric shunt operation, gastric bypass operation, RYGBP, etc.), as a kind of restrictive and absorption non benign weight reduction operation, is the earliest gastric operation for the treatment of obesity. It can effectively reduce the surgical risks and postoperative complications of these high-risk patients [13]. Common complications include infection, hemorrhage, perforation, gastrointestinal fistula, etc. , including adjustable gastric band and port insertion; Repair or replacement of restricted gastric operation under laparoscope. In Europe and the United States, Roux-en-Y gastrointestinal short-circuit surgery is optional for patients with $BMI \geq 40$ or $BMI \geq 35$ and complicated with serious complications such as metabolic complications (type 2 diabetes, fatty liver, hyperlipidemia), cardiovascular complications (hypertension, coronary heart disease, cerebrovascular accident), etc. The establishment of these indicators is mainly based on the influence of diabetes condition and course of disease on islet function. If islet β cell function is basically lost, the probability of surgical treatment of diabetes will be greatly reduced. Complications such as hypertension, high TG, hypercholesterolemia, arthritis, sleep apnea syndrome and the like of patients after Roux-en-Y gastrointestinal short circuit surgery are obviously improved, and the quality of life after surgery is greatly improved. At the same time, hypoxia can also cause endothelial dysfunction, increasing the release of vasoconstrictor endothelin and decreasing the release of diastolic nitric oxide, thus causing an increase in blood pressure.

3.4 Mini Gastric Bypass

Laparoscopic Mini gastric bypass is an improvement of Roux-en-Y gastric bypass. After the small curved resection of the stomach, bilroth II gastrojejunostomy was performed to form a mini gastric bypass, reducing 2 anastomoses to 1. The incidence of large number of cases was 5.7% - 6.3%. Generally, it also occurs at the stoma of stomach and jejunum. The early occurrence may be related to local edema and can be relieved by conservative treatment. When obese patients are complicated with kidney diseases, the clinical manifestations are mostly proteinuria. Although obese patients have no clinical symptoms, most of them are complicated with localized glomerulosclerosis and/or diabetic nephropathy. The length of proximal jejunal loop can be selected between 40 cm and 200 cm according to the patient's obesity degree. The longer the length of proximal jejunal loop, the better the weight loss effect. However, postoperative patients are prone to iron deficiency anemia and malnutrition. At the same time, after a long period of non-surgical treatment, the patient's effect is not good or can't tolerate it. After fully understanding the operation mode of diabetes treatment, the patient understands and is willing to bear the risk of potential complications of the operation. Lin Jitong et al. [14] suggested that if BMI is less than 35 and the length of the proximal jejunal loop is about 150cm, the length of the proximal jejunal loop can be adjusted according to BMI. The gastric band is wrapped around the upper part of the stomach body, and the whole stomach

is artificially divided into two parts, with the upper part limited to about 15ml. The advantage of gastric banding is that it does not change the structure of digestive tract and the operation mode is reversible. As the diameter of gastrointestinal anastomosis is usually only 10mm, a small amount of scar tissue hyperplasia at the anastomosis will squeeze the anastomosis to narrow it and some patients will vomit. Compared with LRGBP, laparoscopic mini gastric bypass undoubtedly has significant advantages. It provides a new surgical method for morbid obesity patients to lose weight, but the long-term efficacy remains to be observed [15].

4. Conclusion

Surgical treatment of obesity has been deeply involved in BMI since its inception. Too much emphasis has been placed on the value of BMI in evaluating surgical indications. However, it is not clear how low the postoperative BMI is before the surgery is successful or perfect. Perioperative general anesthesia management for weight loss surgery has always been an important and difficult problem in anesthesia, and it is directly related to the prognosis of patients. Therefore, anesthesiologists should be able to predict and prevent possible serious complications. However, I believe that in the near future, with the increasing maturity of laparoscopic technology and the continuous improvement of instruments and equipment, especially the research enthusiasm aroused by the introduction of surgical technology into traditional medical disease treatment, it will have a strong impetus to the surgical treatment of type 2 diabetes. With the deepening of basic research and the improvement of clinical efficacy, it can be predicted that the future development of bariatric surgery will inevitably focus on the improvement of concomitant diseases and the treatment of metabolic disorders as the main criteria for indications and efficacy determination.

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