

Case Report

# A Case of Grade III Obesity in the Elderly Combined with Multisystem Disease Patient Underwent Sleeve Gastrectomy Nursing Throughout Hospitalization

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## Abstract

**Background:** Obesity is a complex, multifactorial disease that has a negative impact on health. In 2020, obesity affects about 42% of the global population, and the prevalence of overweight and obesity in Chinese adults is expected to reach 61% by 2030. **Methods:** Summarize the nursing experience of a case of elderly grade III obesity combined with multisystem disease treated with laparoscopic sleeve gastrectomy. Nursing points include acute heart failure care, coronary heart disease care, obesity other related comorbidities care, skin care, medication care, SG perioperative care, nutritional care, pipeline care, anticipatory psychological care and health education. **Results:** After the patient underwent individualized treatment and nursing, his vital signs were stable, the abdominal incision healed well, no adverse events occurred during hospitalization, and he was discharged smoothly 11d after surgery. **Conclusion:** This patient has a variety of metabolic diseases, during hospitalization, we should track the patient's examination and laboratory tests, and pay attention to their physical and psychological care. Older people due to the degradation of various physiological systems, their metabolic function and the poor ability to respond to various diseases, the weight loss effect may be not as good as that of young patients. It is necessary to explain the patients and a longer follow-up time to observe the weight loss effect.

## Keywords

Grade III Obesity, Sleeve Gastrectomy, Perioperative, Nursing

## 1. Introduction

Obesity, a chronic metabolic disease caused by excessive accumulation of body fat, has become a thorny public health problem in the 21st century [1, 2]. Obesity is a major cause of Metabolic Syndrome (MS), Type 2 Diabetes Mellitus (T2DM), Cardiovascular Disease (CVD), Chronic Kidney Disease (CKD), and Sleep apnea syndrome (SAS), hyperten-

sion (HTN), hyperlipidemia, hyperuricemia, osteoarthritis [3, 4] and osteoarthritis. With the aging of the population, the prevalence of obesity in the elderly population continues to rise [5], and is often accompanied by symptoms of restricted activity and multiple organ involvement.

Metabolic and Bariatric Surgery (MBS) is the most effec-

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tive and long-lasting treatment for obesity and its coexisting conditions, and is the last option for effective weight loss that cannot be achieved after a lifestyle. Commonly used are Sleeve Gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB) [6]. Since the elderly usually have multiple chronic diseases, low metabolic function, and the number of postoperative complications is higher than that of young patients, and the weight loss effect is poor, MBS is usually not recommended for elderly obese patients under traditional concepts [7]. However, But the International Surgical Federation for Obesity and Metabolic Disorders (International Federation for the Surgery of Obesity and Metabolic Disorders, IFSO) and the American Society for Metabolic and Bariatric Surgery (American Society for Metabolic and Bariatric Surgery, ASMBS) indicates, Age is not a limiting factor for receiving MBS in elderly patients, and surgical risk should be assessed based on the risk of obesity-related disease and frailty, cognition, smoking status, and end-organ function [8].

Currently, there is a lack of domestic and international evidence to identify MBS as the most effective and safest for the elderly population. On May 31, 2024, a case of elderly obesity combined with multiple organ diseases was admitted to our hospital. After multidisciplinary consultation (MDT) discussion, coronary angiography (CAG) + right heart catheterization and LSG were performed respectively. The nursing experience is summarized as follows.

## 2. Information and Methodology

### 2.1. Clinical Information

Patient, female, 73 years old, height: 155 cm, weight: 115 kg, Body Mass Index (BMI): 47.9 kg/m<sup>2</sup> (class III obesity [9]), neck circumference: 48 cm, chest circumference: 129 cm, waist circumference: 145 cm (central obesity [10]). She was admitted to the hospital by wheelchair on May 31, 2024 for "recurrent shortness of breath for 10 years, exacerbated for 5 days", and was diagnosed with 1. acute heart failure (AHF), 2. grade III obesity, 3. obesity hypoventilation syndrome (OHS), severe OSA; 4. HTN grade 3; 5. Type 2 diabetes mellitus, and so on. Past history of obesity for more than 40 years and OSAHS for more than 10 years. Coronary heart disease history of more than 10 years, irregularly taking aspirin enteric-coated tablets, the details are not known; hypothyroidism for 8 years, long-term use of "sodiumlevothyroxine 50ug qd"; HTN history of 7 years, the highest blood pressure of 180mmHg, The medication was not known; Medical history of T2DM for 7 years, irregular use of "Metformin".

Admission examination temperature: 36.2 °C, heart rate: 92 times / min, blood pressure: 164/94 mmHg, physical examination of both lower limbs depressed edema, measured central venous pressure (CVP) was 21.76 cmH<sub>2</sub>O. random blood glucose 9.3 mmol / L, glycated hemoglobin A1c (HbA1c) 6.6%, total The random blood glucose was 9.3 mmol/L, total cholesterol (TCHOL) was 6.02 mmol/L, tri-

glyceride (TG) was 1.83 mmol/L, uric acid (URIC) was 672.0 umol/L, and thyroid-stimulating hormone (TSH) was 32.107 mIU/L. Troponin I was 0.029 mg/L, and B-type brain natriuretic peptide(BNP) was high at 3530 ng/L. The cardiac function score of the NYHA was class III [11], and GRACE score was 148 (high risk [12]). The patient was at high risk for a heart attack, pressure of carbon dioxide (PCO<sub>2</sub>) was 8.26 kPa, partial pressure of oxygen (PO<sub>2</sub>) was 7.3 kPa, and the carbon dioxide level (TCO<sub>2</sub>) was high at 60.3 mmol/L, suggesting the presence of type II respiratory failure. Urea (UREA) was 12.60 mmol/L. Creatinine (CREA) was 138.8 umol/L, and glomerular filtration rate (eGFR) was 23.5 ml/min/1.73 m<sup>2</sup> (<30), suggesting the possibility of combined diabetic nephropathy. Urine culture showed positive Escherichia coli (+), urine erythrocytes 50 ERY/uL, leukocyte esterase 75 LEU/uL, and urine protein (PRO) 0.5 g/L suggesting urinary tract infection. Electrocardiogram was suggestive of sinus rhythm with widening of the P wave and altered T wave. Cardiac ultrasound showed Pulmonary Artery Systolic Pressure (PASP) 108 mmHg, severe pulmonary hypertension (PH), thickening of right and left ventricular walls and apical myocardium, reduced left ventricular diastolic function, bilateral atherosclerosis of the common carotid artery and multiple plaque formation on the right side. CTA of the pulmonary artery showed that the main pulmonary artery was atherosclerotic. CTA of pulmonary artery showed widening of pulmonary artery trunk and aortic atherosclerosis. Multiple solid nodules and calcified foci in the right lung, Lung-RADS grade 2, cranial MRA: cerebral atherosclerosis. DR of both knees showed Degenerative osteoarthritis of bilateral knees.

### 2.2. Treatment

The patient suffered from open-mouth breathing, recurrent shortness of breath, chest tightness, dyspnea, and painful twitching of the right lower extremity. She was admitted to the hospital with cardiac monitoring, mask oxygen, Peripherally Inserted Central Catheter (PICC), indwelling urinary catheter, antiplatelet, plaque stabilization, anti-heart failure, ventricular rate control, reversal of myocardial remodeling, diuresis, hypoglycemia, blood pressure control, lipid regulation, improvement of renal function, and thyroid hormone replacement therapy. Coronary angiography + right heart catheterization under local anesthesia was performed on June 5, 2024, and the patient's postoperative PaO<sub>2</sub> 5.1 kPa (critical value) was still uncomfortable with shortness of breath, chest tightness, and coughing up sputum. Nocturnal oxygen saturation decreased (minimum 83%). After the MDT of cardiovascular, respiratory medicine, endocrinology, and weight loss center, the patient's multi-organ disease was considered to be caused by obesity, and bariatric surgery was recommended to improve the patient's symptoms, and antiplatelet drugs were discontinued for 7 days, with restriction of rehydration and BiPAP treatment, and the patient was instructed

to move around in bed and insist on cardiopulmonary exercise. After the cardiopulmonary and renal functions improved, ( $PO_2$  8.8 kPa, BNP 185 ng/L, high-sensitivity troponin I 0.088 ng/mL, UREA 12.60 mmol/L, CREA 135.2  $\mu$ mol/L, eGFR 33.5 ml/min/1.73 m<sup>2</sup>) was performed on June 25, 2024, with a three-hole "seven-hole" ventilation system. On June 25, 2024, the patient underwent a three-hole "seven-step" LSG. After returning to the ward, the patient continued cardiac monitoring and oxygen intake, and oxygen saturation was maintained at 84%~88% before going to sleep, and she was given oxygen by mask, BiPAP, anti-heart failure, gastric protection, anti-infection, and limited rehydration, and he was also given cardiorespiratory exercises, guide the bed to roll over, the ankle pump movement. The patient had recurrent postoperative nausea and vomiting (PONV) within 39h after surgery, and the vomit was brown liquid. She was given metoclopramide dihydrochloride injection, ondansetron hydrochloride injection, dexamethasone sodium phosphate injection, etc. After the operation, the anus did not exhaust for 45h, and the exhaust after 2 times of enema glycerini. After 11d, the PICC and ureter were removed and was successfully discharged from hospital, weight lost 5 KG during hospitalization.

### 3. Nursing

#### 3.1. Anticipatory Psychological Care

This patient is elderly, with bilateral lower limb weakness, long-term wheelchair mobility, class III obesity BMI 47.9 kg/m<sup>2</sup>, with a combination of coronary artery disease, AHF, OHS, severe OSAHS, HTN, T2DM, bilateral degenerative osteoarthritis of the knee joints, hypothyroidism, hyperlipidemia, hyperuricemia, and other diseases. He was admitted to the hospital with "recurrent shortness of breath, aggravated for 5 days", and his symptoms of chest tightness and shortness of breath were obvious after admission. The patient and his family showed obvious concern and anxiety about the patient's condition and the prognosis of LSG surgery and disease. After the nurse in charge, the weight-loss case manager and the doctor in charge educated the patient about her condition and surgical treatment, the patient's anxiety was reduced and she actively cooperated with the treatment.

#### 3.2. Care of Cardiovascular Diseases

##### 3.2.1. Nursing Care of AHF

AHF is a serious clinical syndrome whose pathological features mainly include systolic or diastolic dysfunction of the heart, resulting in the heart's inability to efficiently pump blood throughout the body, causing stagnation of the pulmonary and somatic circulations, as well as hypoperfusion of tissues and organs. This patient had significant chest tightness and shortness of breath with significant

bilateral lower extremity depressed edema, NYHA cardiac function score class III [11] and a GRACE score of 148 (high risk [12]). The patient was admitted to the hospital with continuous electrocardiographic monitoring. After admission to the hospital, he was given continuous cardiac monitoring, mask oxygen, oxygen flow 4min/L, after the symptoms were stabilized, he switched to nasal cannula oxygen, oxygen flow 2min/L, he was given injectable recombinant human brain natriuretic peptide continuous pumping, sakubutaviral valsartan sodium tablets 100 mg bid anti-heart failure, ventricular rate control, reversal of myocardial remodeling, furosemide combined with torasemide pumped at 2ml/h, spironolactone tablets 20mg bid diuretic, with the addition of Potassium chloride extended-release tablets 1g bid to prevent hypokalemia. Pay close attention to the patient's heart rate and rhythm changes. In order to avoid aggravating the symptoms of heart failure, it is necessary to carry out reasonable rehydration and diuresis, control the amount of liquid intake (including infusion, soup, porridge, milk and fruit in the amount of water) within 800~1000mL, every shift nurse in charge of the patient's access to record on time (maintained at -500~1000 mL/d), especially the amount of urine. CVP tid (normal value 8~10 cmH<sub>2</sub>O) was recorded, and the results of blood gas analysis were followed up. On June 7, 2024, the patient's shortness of breath was relieved compared with the previous period, and the edema of both lower limbs basically subsided without any other discomforts. the B-terminal brain natriuretic peptide decreased (3530 ng/L-627 ng/L-185 ng/L), and the CVP fluctuated from 6.8 to 13.6 cmH<sub>2</sub>O, and there was no sudden drop of blood pressure, heart rate, or heart rate in the process of hospitalization. During the hospitalization, there was no sudden drop in blood pressure, rapid heart rate, weak pulse, cold extremities, or low cardiac output.

##### 3.2.2. Nursing Care of Coronary Artery Disease

The patient was diagnosed with coronary artery disease in 2017, taking aspirin enteric-coated tablets irregularly for a long time, following up the patient's Blood coagulation four items during the hospitalization, controlling the prothrombinogen international normalized ratio (INR) in the range of 1.8~2.3, and paying attention to the fact that the patient has a skin with no bleeding spots. After admission, CTA of pulmonary artery showed brightening of pulmonary artery trunk and aortic atherosclerosis, and cardiac ultrasound showed bilateral atherosclerosis of common carotid artery and multiple plaques on the right side, which further clarified the diagnosis. Given aspirin enteric tablet 100 mg qd, clopidogrel sulfate tablet 75 mg qd and ticagrelor tablet 75mg bid, and enoxaparin sodium injection 0.3 ml qd antiplatelet to stabilize the plaque.2024 June 4 urinary catheter drainage of hemorrhagic urine, no special treatment was done after informing the doctor.2024 June 5 local anesthesia under the right upper limb radial artery, right lower limb femoral vein coronary arteriography (CAG) + right cardiac catheterization,

the visible left coronary dominant type, the left main stem LM (I), left anterior descending branch (LAD) plaque, limited stenosis of 50% in the middle, forward flow TIMI grade 3 [13]; plaque formation in the left circumflex branch (LCX), forward flow TIMI grade 3, plaque formation in the right posterior descending branch (RCA), forward flow TIMI grade 3 [13] Right cardiac catheterization. Right heart catheterization: right atrial pressure: 15mmHg, right ventricular systolic pressure: 60mmg, pulmonary artery pressure: 60mmHg, pulmonary artery wedge pressure: 2 0mmHg. Postoperatively, an inflatable tourniquet was applied to the puncture port of the right radial artery for hemostasis, and an adhesive bandage was applied to the puncture port of the right femoral vein for hemostasis, and it was considered that the patient might have complications such as hemorrhages and hematomas at the puncture site, occlusion of the radial artery, pain, swelling and numbness, and tension blisters. Considering that the patient may experience postoperative bleeding at the puncture site and hematoma, radial artery occlusion, pain, swelling and numbness, tension blisters and other complications, pay close attention to whether the puncture port oozes blood and pay attention to the blood flow and skin temperature of the operated limb. The patient was instructed to keep the wrist joint straight, move the fingers, loosen the tourniquet once after 3h, withdraw the tourniquet without abnormality in 6h, instruct the patient to move the ankle pump on the bed, and withdraw the bandage without abnormality in 6h; and drink more water (800~1000 ml) to promote the excretion of contrast medium.

### 3.3. Care of Respiratory Diseases

The patient was admitted to the hospital with open mouth breathing, PCO<sub>2</sub> 8.26kPa, PO<sub>2</sub> 7.3kPa, TCO<sub>2</sub> 60.3mmol/ L. After MDT consultation, type II respiratory failure, OHS, severe OSAHS was considered, and BiPAP symptomatic treatment was given according to the doctor's instructions, with the inspiratory phase orthostatic pressure (IPAP) at 8 cmH<sub>2</sub>O, the expiratory phase orthostatic pressure (EPAP) at 4 cmH<sub>2</sub>O, and the pressure difference between IPAP and EPAP (pressure support) at 4 cmH<sub>2</sub>O, not exceeding 10 cmH<sub>2</sub>O. Vital signs were closely monitored, airway patency was maintained, respiration was facilitated, and emotional support was provided, and during the hospitalization period, PCO<sub>2</sub> fluctuated at 27.54-9.84 kpa, PO<sub>2</sub> fluctuated at 5.1-11.8 Kpa, and TCO<sub>2</sub> fluctuated at 50.7-71.4 mmol/L, and the blood oxygenation level fluctuated at 50.7-71.4 mmol/L. Blood oxygen saturation could be stabilized at 90~95% while wearing the ventilator. Blood gas analysis before discharge PCO<sub>2</sub> 5.86 kPa, PO<sub>2</sub> 8.8 kPa, TCO<sub>2</sub> 50.7 mmol/L.

### 3.4. Care of Obesity-related Comorbidities

The patient diagnosed with combined T2DM, HTN, hyperlipidemia, hypothyroidism, hyperuricemia, renal

insufficiency and other metabolic related diseases, During hospitalization, he took metformin 10 mg qd and Gliczide 30 mg qd to control blood glucose. Dapagliflozin could aggravate urinary tract infection and obesity combined with renal insufficiency. On June 8, he was changed to metformin hydrochloride 30 mg qd. Amlodipine 10 mg qd, bisoprolol fumarate 10 mg qd, metoprolol succinate sustained-release tablets 47.5mg qd, and atorvastatin calcium tablets 10 mg qd. Levothyroxine sodium tablets, 50 ug qd for hypothyroidism, and 5g tid for urine toxicity particles improved renal function. and regular monitoring of blood glucose, blood pressure, blood lipids, and thyroid function, during the hospitalization, the patient's fasting blood glucose fluctuated at 6.1~12.3 mmol/L, C-peptide 26.86 ng/ml on June 18, insulin 32.39 mIU/L. Systolic BP fluctuated between 90 to 154 mmHg and diastolic BP fluctuated between 49 to 90 mmHg. Lipid metabolomics indicators at the time of discharge were TC 3.45 mmol/L, TG 1.64 mmol/L, and URIC 672.0 umol/L, UREA 7.07 mmol/L. CREA 132 umol/L, eGFR 34.5 ml/min/ 1.73m<sup>2</sup>, reduced from admission.

### 3.5. Skin Care

The patient was admitted to the hospital by wheelchair on May 31, 2024, with weakness of both lower limbs and difficulty in standing, considering that the history of obesity for more than 40 years, overweight will add compression of the knee cartilage to accelerate the wear and degradation of the articular cartilage and double and meniscus damage. [14] On June 17th, the DR of both knees showed that the medial joint space of the left and right tibiofemoral joints was narrowed, the patellofemoral joint space was narrowed, and osteophytic changes were seen in the medial and lateral ankle of the femur, lateral edge of the tibial plateau, medial and lateral inter-ankle elevation, and the patella, which led to the diagnosis of degenerative osteoarthritis of the bilateral knee joints. The patient was hospitalized for a long time in bed, the sacrococcygeal part of the skin flushing, pressure of the discoloration, the patient was instructed to wipe and turn over diligently, to keep the sacrococcygeal skin dry, and to give the pressure of the external foam dressing. Turn over in bed bid, and encourage the patient to carry out ankle pump movement and bed activities or out of bed wheelchair activities. Instruct family members to massage the patient's lower limbs and assist the patient in bending the knees and lifting the legs. When lying in bed soft pillow under the knee to elevate the lower limbs.

### 3.6. Medication Care

The patient is taking multiple medications during hospitalization, and the nurse in charge of each shift teaches the patient about the proper way to take the medications, timing, dosage, and possible side effects, focusing on the total

amount of fluids to be infused, rationalizing the order of rehydration, being mindful of the speed, and preventing extravasation of the medications.

### 3.7. Perioperative Care of the LSG

#### 3.7.1. Preoperative Care

Patient BMI 47.9kg/m<sup>2</sup>, class III obesity, combined cardiopulmonary insufficiency, in addition to diuresis, BiPAP-assisted ventilation, hepatoprotection, renal protection, restriction of rehydration, control of blood pressure, blood glucose and other symptomatic supportive treatments, instruct the patient and his family members to assist the patient with pulmonary function training tid (a total of 8 days), elastic band training program: 30 times / group, 20 times / 3 times per group. Blow the balloon 30 / 3 groups, lip breathing 7~8 times / minute, 10~15 minutes. When the patient's cardiopulmonary and renal function improved after the doctor's assessment to determine the operation, The patient was instructed to stop drinking and fasting at 22:00 PM before surgery, and the patient's family was instructed to help the patient scrub the body and mark the operation before surgery. The patient did not show symptoms of heart failure before surgery, and his blood pressure and blood glucose were stable.

#### 3.7.2. Postoperative Care

After returning to the ward after surgery, the patient was given ECG monitoring, nasal catheter oxygen inhalation (oxygen flow rate 4 mmol/L), and BiPAP ventilation therapy to ensure the stable vital signs of the patient. After LSG, cefoperazone sodium for injection and sulbactam sodium for anti-infection are given, supplemented by infrared therapy bid (6d) to reduce the seepage and promote the absorption of the seepage. It is usually recommended to start physical activity on the day after MBS, leave the bed and walk [15] to promote gastrointestinal function recovery, and encourage patients to leave the bed to prevent DVT on the second day. Patients complaining of pain in the operative area on the 1st postoperative day with a numerical pain score of 4 should be treated with nonsteroidal drug-based multimodal analgesia (2d). On postoperative day 2d patients were instructed in abdominal breathing, deep breathing and coughing techniques [15, 16] (slow nasal inhalation, oral exhalation, using a pillow to apply pressure to the abdomen in order to touch the cough), The patient still did not undergo the first flatus on the second day after the surgery, and 2 Glycerol Enema were given to the anus after ventilating and defecating smoothly. The patient had recurrent PONV in the 39h postoperative period, which could not be relieved. Metoclopramide hydrochloride injection The patient was given metoclopramide hydrochloride injection, Flurbiprofen Axetil Injection, ondansetron hydrochloride injection, dexamethasone sodium phosphate injection, and

other drugs for antiemetic treatment (9d). The patient has a high risk of falling (Braden score 17 points). Warning signs are set up at the bedside to remind all nursing staff of the risk of falling, use bedside guardrail, tell the patient's family about the importance of fall prevention, and help the patient slowly change position (bed - wheelchair).

### 3.8. Nutritional Care

Patients with T2DM, guide patients with diabetes diet, and guide patients to eat low-fat, low-salt, easy to digest food (such as porridge, noodles, buns, etc.), limit sodium intake, and appropriate limit the intake of protein and energy, calories of 800~1200Kca1/ day, to reduce the burden on the heart. And keep your bowels open. The daily protein intake can be controlled at 25 to 30 grams, and the protein sum will gradually increase after the heart function improves. Due to the change of gastric anatomical structure after LSG, the patient was abstented from drinking and fasting on the day after surgery, and had a clear diet for one week after surgery: on the first day after surgery, warm water was consumed in the morning without discomfort and functional drinks could be consumed in the afternoon, following the 1-2-3 principle: 100 ml in the morning, 200 ml at noon, and 300 ml in the afternoon. On the 2nd day after surgery, thin rice soup/fruit juice can be eaten; Follow the 3-4-5 principle: 300 ml in the morning, 400 ml at noon, 500 ml in the afternoon, after 3 days of surgery can eat thin rice soup/lean meat soup/vegetable soup, etc., follow the 4-5-6 principle: 400ml in the morning, 500ml at noon, and 600ml in the afternoon. Similarly, the 5-6-7 principle was followed on the 4th to 7th day after surgery. In the second week after the operation [16], cloudy liquid diet, such as thick rice soup, skinless chicken soup, fish soup, lean meat soup, beef soup, fish soup, etc., the intake of 50 to 100 ml, and the daily liquid intake is 1500 to 2000 ml.

### 3.9. Pipeline Care

PICC was inserted into the patient at admission, and left and right abdominal drainage tubes were placed after the operation of urinary tube and LSG. Properly fix the pipeline, keep it unobstructed, and prevent discounting, distortion, and falling off. If there is no skin redness, blood seepage or fluid seepage at the PICC puncture, the dressing should be changed every Monday. In order to prevent infection, the patient had a long-term indwelling catheter, and perineal qd was washed. The patient's family members were asked to discharge the urine bag regularly to avoid overfilling the urine bag and reduce the chance of bacterial growth. The color and amount of urine were observed and recorded, as well as whether there were signs of infection such as fever and abdominal pain. The catheter was replaced on 30 June. Placing an abdominal drainage tube after LSG to remove fluid, blood and gas in time is helpful to prevent infection and promote wound healing, and early detection and treatment of possible

postoperative complications such as bleeding or gastric leakage. The color of postoperative drainage fluid was dark red - light red - clear, and the amount was 30~50ml. The drainage fluid was removed on July 1, and the PICC and urinary tube were removed on July 5.

### 3.10. Discharge Health Education

The patient was advised to pay attention to rest and nutrition after discharge. In the first month after surgery, the patient was overfed with clear fluid (week 1), cloudy fluid (week 2) and semi-fluid (week 3 and 4). The food was mainly thin, rotting and mush. The staple food was three meals a day, and the patient should chew and swallow fully and eat slowly for about 30 minutes per meal. Avoid indigestion, in the middle can drink liquid as an aid; In the second month after the operation, the soft diet was transferred to the general diet, and the water intake was 1500~2000 ml/d. If there was nausea, reflux, acid reflux, etc., the diet was returned to the previous stage. Discontinue T2DM medications after discharge. According to the doctor's advice, take stomach medicine for 1 month, chewing tablets of aluminum magnesium carbonate (3 times/day, 1 tablet/time), esomeprazole magnesium Enteric-coated tablets(1 tablet /1 time/day, taken on an empty stomach), and take complex vitamin B for > 6 months (3 times/day, 2 tablets/time); Ursodeoxycholic acid capsules were taken from the 3rd week after surgery for 3 to 6 months, multidimensional element tablets (once a day, 1 tablet/time) and calcium carbonate D3 tablets (1 tablet/time/day) were taken from the 3rd week after surgery for > 2 years. The patients were asked to return to the hospital for reexamination 1, 3, 6, 12 months, 1 year and once a year after discharge

## 4. Summary

The patient was old and had a combination of chronic diseases. At the time of admission, she had open mouth breathing, repeated shortness of breath, chest tightness, and was given LSG after adjusting her condition with antiplatelet, anticardiac failure, diuretic, hypoglycemic, blood pressure control, lipid regulation and other medications. The focus of perioperative care for this patient was on the control of preoperative blood pressure and blood glucose, cardiopulmonary exercise, care of the PONV, and nutritional care during the entire hospitalization process, prevention of infections and bleeding, plumbing, skin care, and anticipatory psychological care. The patient was successfully discharged from the hospital in 11d after the operation, and in the first month after the operation, she returned to the hospital for a review of her weight of 102 kg, BMI of 43.6 kg/m<sup>2</sup>, neck circumference of 39 cm, chest circumference of 115 cm, and waist circumference of 116 cm. Metabolic indicators TC 7.67 mmol / L, TG 2.28 mmol / L, LDL-C5.20 μmol / L, HDL-C1.45 μmol / L, CREA109.5 μmol / L, UREA 6.05 μmol / L, URIC519μmol / L, eGFR43.4 ml/min/1.73m<sup>2</sup>,

BNP35pg / mL, troponin 0.091, C peptide 6.16, insulin 10.64 mIU / L, glucose 7.09. The overall index is on an improving trend. However, elderly patients may not be better than younger patients in the various postoperative indicators, but this may be related to their preference for static life and lower metabolic rate, Long-term observation of the weight-loss effect is needed. Guide patients to continue to take drugs, low-salt and low-fat diet according to the doctor's advice, eat more fresh fruits and vegetables, eat more high-quality protein, ensure the quality of sleep, and develop good living habits. Do lower limb exercise or massage, such as limb flexion and extension movement, ankle pump movement, etc., 2-3 hours / time / day, 10-15min / time.

## Abbreviations

MS	Metabolic Syndrome
T2DM	Type 2 Diabetes Mellitus
CVD	Cardiovascular Disease
CKD	Chronic Kidney Disease
OSA	Obstructive Sleep Apnea
HTN	Hypertension
MBS	Metabolic and Bariatric Surgery
LSG	Sleeve Gastrectomy
LRYGB	Roux-en-Y Gastric Bypass
IFSO	International Federation for the Surgery of Obesity and Metabolic Disorders
ASMBS	American Society for Metabolic and Bariatric Surgery
MDT	Multidisciplinary Consultation
CAG	Coronary Angiography
CVP	Central Venous Pressure
HbA1c	Glycated Hemoglobin A1c
TCHOL	Total Cholesterol
TG	Triglyceride
URIC	Uric Acid
TSH	Thyroid-Stimulating Hormone
CREA	Creatinine
eGFR	Glomerular FiltrationRate
PASP	Pulmonary Artery Systolic Pressure
PH	Pulmonary Hypertension
BMI	Body Mass Index
PICC	Peripherally Inserted Central Catheter
AHF	Acute Heart Failure
OHS	Obesity Hypoventilation Syndrome
PCO <sub>2</sub>	Carbon Dioxide
P0 <sub>2</sub>	Partial Pressure of Oxygen
TCO <sub>2</sub>	Carbon Dioxide Level
BNP	Brain Natriuretic Peptide

## Author Contributions

**Man Hu:** Data curation, Investigation, Methodology, Project administration, Writing – original draft, Writing – review

& editing

**Qingran Lin:** Methodology, Supervision, Validation, Writing – review & editing

**Huixiang Lai:** Data curation, Investigation, Project administration

**Min Liu:** Data curation, Investigation, Project administration

## Ethics Approval and Consent to Participate

Not applicable.

## Consent for Publication

Not applicable.

## Conflicts of Interest

The authors declare that they have no competing interests.

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