Chapter 14
Bariatric Surgery in Patients with Cirrhosis

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Obesity and Nonalcoholic Fatty Liver Disease

Obesity is a worldwide epidemic and its prevalence is rising in the United States; one-third of the adults in the USA are obese. Further, obesity has strong associations with metabolic disorders such as type 2 diabetes (T2D), hypertension, hyperlipidemia, and fatty liver disease.

The prevalence of nonalcoholic fatty liver disease (NAFLD) is increasing along with the prevalence of obesity; between 84% and 96% of patients with obesity have NAFLD and 25–55% have nonalcoholic steatohepatitis (NASH) [1]. NASH is a histological diagnosis characterized by the presence of steatosis found in greater than 5% of hepatocytes, hepatocellular ballooning, and lobular inflammation [2]. Up to 15–20% of patients with biopsy-proven NASH will progress to cirrhosis [3]. Currently, the most common indication for liver transplant is hepatitis C virus infection [4], but with increasing obesity rates globally, NASH could soon become the leading cause of liver transplantation worldwide.

In addition to liver related morbidity and mortality, patients with NAFLD have a higher risk of cardiovascular disease (CVD) and mortality [5]. A recent meta-analysis that included 16 studies and 34,043 patients showed that patients with NAFLD have a higher risk of fatal and nonfatal CVD events when compared to patients without NAFLD (odds ratio [OR] 1.64, 95% confidence interval [CI] 1.26–2.13) [6]. Also, Adam et al. [7] reported on causes of mortality in a cohort of 420 patients with NAFLD with a mean follow-up of 7.6 years. The total overall mortality, cardiovascular (CV) mortality, and liver disease associated mortality was 7.6%, 3.6%, and 1.7%, respectively. Similar findings were reported by Jepsten et al. [8] and Ekstedt et al. [9]: the CV mortality rate in the NAFLD patients was 11% and

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12.4%, respectively, in those studies. It is clear that patients with NAFLD are more likely to die from CVD than liver disease; thus, treatment strategy should be prioritized accordingly.

Bariatric Surgery

Bariatric surgery has evolved since the 1950s and has been proven to be the most effective and long-lasting mode of treatment for severe obesity. Furthermore, it has consistently been shown to resolve both metabolic and other comorbidities related to obesity. The laparoscopic approach to bariatric surgery started in the early 1990s, and today most bariatric procedures (>95%) are performed laparoscopically throughout the world. The laparoscopic technique is associated with a significant decrease in postoperative morbidity, mortality, recovery time, and cost when compared to prior open techniques [10]. In the USA, a total of 196,000 bariatric procedures were performed in 2015. Sleeve gastrectomy (SG) is the most common (53.8%), followed by Roux-en-Y gastric bypass (RYGB), 23.1%, laparoscopic adjustable gastric banding (LAGB), 5.7%, and biliopancreatic diversion with or without duodenal switch (BPD ± DS), 0.6% (Fig. 14.1, [11]). SG and RYGB together are the most popular procedure (77%), while LAGB has become less popular due to poor long-term results. BPD is the least often performed procedure due to the significant risk of nutritional deficiencies (3–18%) [12, 13]. Outcomes of bariatric surgery in terms of resolving and improving comorbidities and reducing long-term mortality are well documented (Fig. 14.2, [10]).

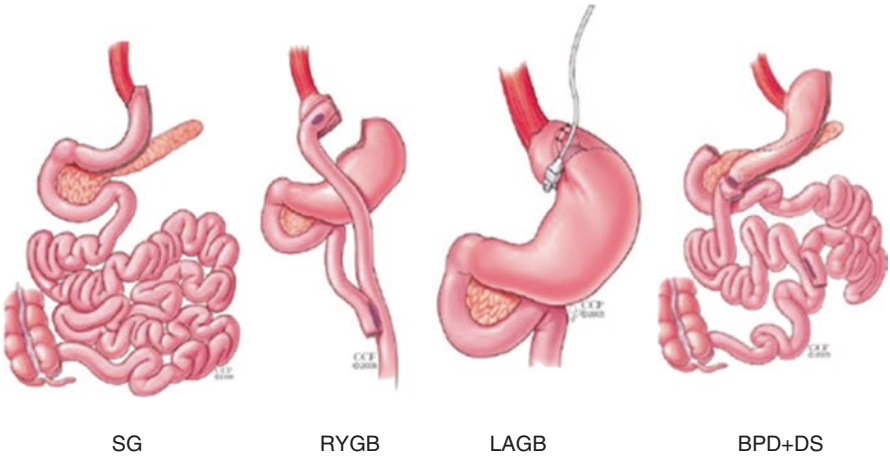

Fig. 14.1 Common bariatric procedures. Reprinted with permission, Cleveland Clinic Center for Medical Art & Photography © 2006-2016. All Rights Reserved

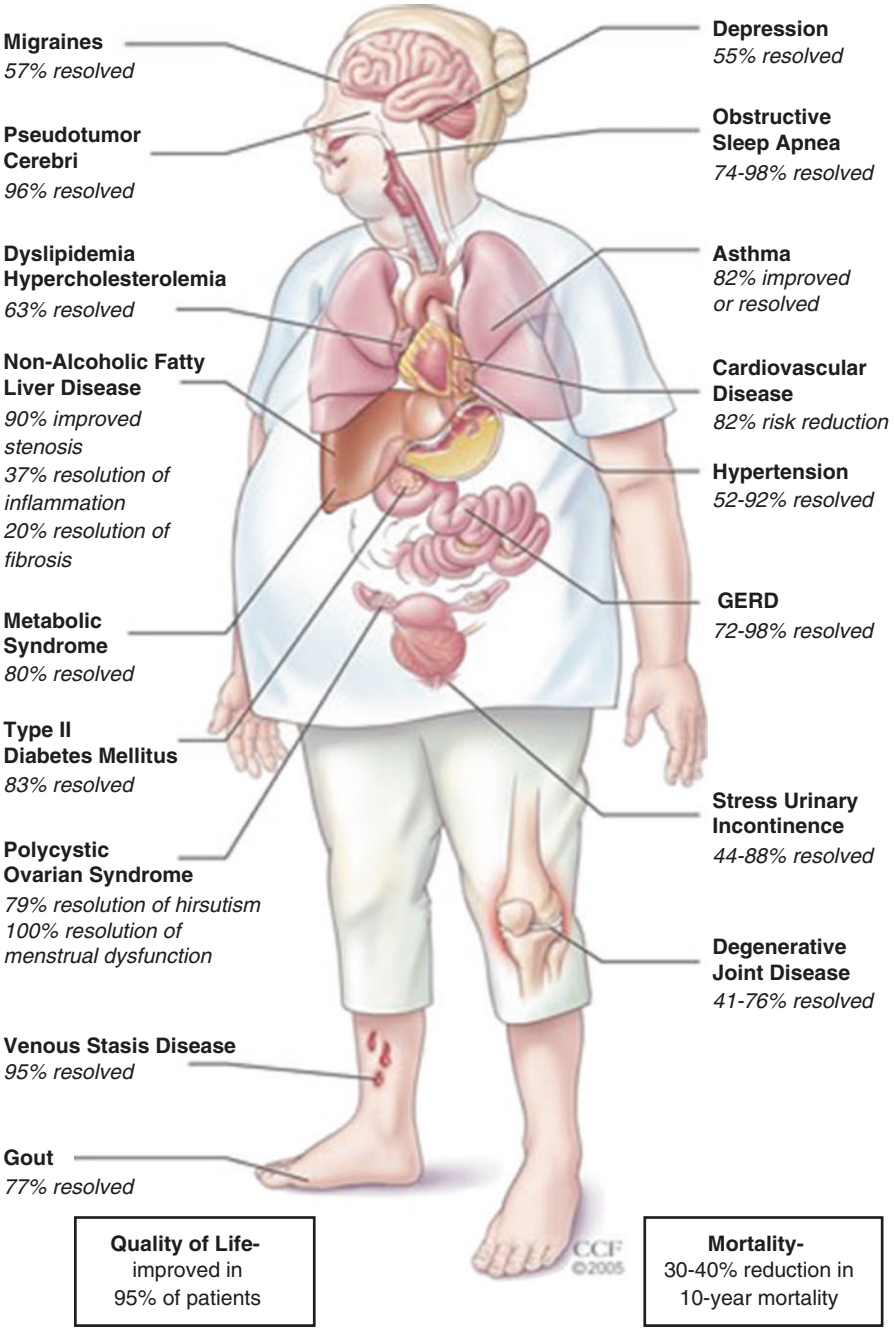

Fig. 14.2 Outcome of bariatric surgery in obesity-related comorbidities. Reprinted with permission, Cleveland Clinic Center for Medical Art & Photography © 2006–2016. All Rights Reserved

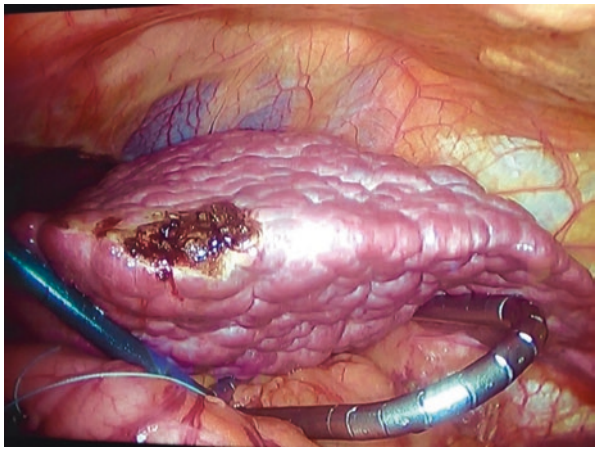

Fig. 14.3 Bariatric patient with cirrhosis after liver biopsy

Bariatric Surgery in Patients with NASH and Cirrhosis

Bariatric surgery in patients with cirrhosis was thought to be contraindicated due to the potential excessive risk of complications and mortality. More recently, however, studies involving cirrhotic patients have shown reasonable and lower rates of complication after bariatric surgery (see section on safety of bariatric surgery in patients with cirrhosis). The estimated prevalence of cirrhotic patients undergoing bariatric surgery is approximately 2%, with the diagnosis usually made incidentally at the time of surgery [14] (Fig. 14.3). Recent trends suggest that patients with known cirrhosis are being referred for bariatric surgery to improve both liver and CV-related outcomes. Patients with obesity and cirrhosis may benefit from bariatric surgery through both weight loss and resolution of metabolic comorbidities [15, 16]. Furthermore, surgically induced weight loss in patients with end-stage liver disease may enable them to qualify for liver transplantation based on the preoperative BMI requirement (BMI < 35 kg/m^2).

Weight Loss Improvement After Bariatric Surgery

Bariatric surgery is the only therapeutic intervention that has been proven to produce clinically significant and sustained weight loss for over 5 years in the severely obese. Typically, surgery results in 20 and 50 kg of weight loss and a 10–15 kg/m^2 BMI reduction. Weight loss varies between the bariatric procedures. In the SOS trial [17] of the long-term effects of bariatric surgery compared with nonsurgical weight management in patients with a BMI >34 kg/m^2, the mean weight loss after 10 years for gastric band plication, vertical banded gastroplasty, and gastric bypass was 14 kg, 16 kg, and 25 kg, respectively. The mean changes of body weight after 10, 15, and 20 years were −17%, −16%, and −18% in bariatric surgical groups as

compared to control group; 1%, −1%, and −1%, respectively. A meta-analysis by Buchwald et al. [18] showed that overall excess weight loss was 55.9% after bariatric surgery.

Weight loss in cirrhotic patients is comparable to noncirrhotic patients who underwent bariatric surgery (Child Pugh A or B; reported by Dallal et al. [19], 30 patients and Shimizu et al. [15], 23 patients). The 1-year excess weight loss was 62% and 67.4%, respectively.

Changes in Liver Histology After Bariatric Surgery

Studies involving bariatric patients with NASH have shown significant improvement in liver function studies, steatosis, inflammation, and fibrosis after surgery [5–7]. Rabl et al. [20] in a systematic review reported that NASH improved histologically after bariatric surgery irrespective of procedure type (Table 14.1). Mattar et al. [21] showed that there was a significant improvement in liver steatosis (from 88% to 8%, $p < 0.001$), inflammation (from 23% to 2%), and fibrosis (from 31% to 13%). Inflammation and fibrosis resolved in 37% and 20% of patients, respectively, corresponding to an improvement of 82% in grade and 39% in stage of liver disease ($p < 0.001$). Weight loss after bariatric surgery results in a reduction of visceral fat and an increase in insulin sensitivity, which is a major drive of histological improvement of NAFLD [2].

Cirrhosis Improvement After Bariatric Surgery

Due to the infrequency of bariatric surgery performed in patients with frank cirrhosis, data on histological changes in cirrhosis after bariatric surgery are limited. However, in this systemic review, Rabl et al. [20] showed that in patients with NASH and advanced liver disease, all the histological components of cirrhosis including steatosis, inflammation, and fibrosis generally improved with bariatric procedures, especially RYGB. Kral et al. [22] showed that after BPD in patients

Table 14.1 Liver histological changes following bariatric surgery

Bariatric procedures	Number of studies	Total number of patients	Histology changes in NASH post bariatric surgery
RYGB	12	576	Significant and consistent improvement
LAGB	2	441	Improvement/no change
BPD	2	182	Mostly improvement, worsening in some patients with fibrosis
VBG (vertical band gastroplasty)	4	303	Mostly improvement

with cirrhosis (n = 11/14, with pre- and postoperative biopsy), steatosis, inflammation, and fibrosis all improved significantly. However, in this study there were three patients without fibrosis at baseline who developed cirrhosis on follow-up. Whether bariatric surgery definitely results in histological improvement in frank cirrhosis requires further study.

Resolution of T2D After Bariatric Surgery

The prevalence of T2D in patients with severe obesity and cirrhosis is 70–80% [15, 19]. Bariatric surgery has shown significant improvement and sometimes resolution of T2D in both observational and randomized control trials (RCTs). A recent systemic review involving 73 studies with 19,543 patients showed 73% remission/improvement for T2D at a mean follow-up of 57.8 months [23]. Buchwald et al. [18] showed that diabetic patients had an overall 78.1% rate of complete resolution and an 86.6% rate of improvement in T2D. At 2 years, BPD-DS has the best T2D resolution (95.9%), followed by gastric bypass (70.9%), and gastric band (58.3%). In the STAMPEDE trial, Schauer et al. [24] showed that at 3 years after bariatric surgery versus intensive medical therapy, glycated hemoglobin level of 6.0% or less was achieved by 38% in the gastric bypass group, 24% in the sleeve gastrectomy group, and 5% in the medical-therapy group ($p < 0.001$). Shimizu et al. [15] reported 85.7% improvement in T2D with remission rate of 66.7% in the cirrhotic patients who underwent bariatric procedures (RYGB, SG, and LAGB).

CV Risk Reduction After Bariatric Surgery

Bariatric surgery has also shown improvement in obesity-related comorbidities such as hypertension, hyperlipidemia and CVD. The SOS trial [17] showed significantly decreased rates of myocardial infarction, stroke, CV mortality and all causes of CV risk, and cancer in women after bariatric surgery. Bolen et al. [25] showed 53% resolution or improvement in hypercholesterolemia in 5 years and Sugerman et al. [26] showed 66% of resolution or improvement in hypertension in 7 years. In a systematic review of CV outcomes after bariatric surgery, Vest et al. [23] showed that there was improvement and resolution of hypertension (63%) and hyperlipidemia (65%), and reduction in all-cause mortality compared to nonoperative controls. The study also showed evidence of left ventricular hypertrophy regression and improvement in diastolic function post bariatric surgery. In patients with advanced liver disease and NASH, Mattar et al. showed that bariatric surgery resulted in improvements in all metabolic conditions including diabetes, hypertension, and dyslipidemia [21]. In 23 patients with cirrhosis, Shimizu et al. [15] reported improvement of hypertension and dyslipidemia at rates of 88.9% and 66.7%, respectively, following bariatric surgery.

Safety of Bariatric Surgery in Patients with Cirrhosis

Patients with cirrhosis undergoing major abdominal surgery have a greater than tenfold higher mortality risk (9%) than patients without cirrhosis [27]. For this reason, the safety of bariatric surgery in cirrhotic patients has raised concern. Mosko et al. [28] conducted a study involving the Nationwide Inpatient Sample (NIS) Database from 1998 to 2007 and demonstrated that the mortality rate of bariatric surgery for patients without cirrhosis, decompensated cirrhosis and decompensated cirrhosis was 0.3%, 0.9%, and 16.3%, respectively. High-volume centers (>100 cases/year) compared to medium volume (50–100 cases/year) and lower volume (<50 cases/year) centers have significantly lower mortality rates (0.2%, 0.4%, and 0.7%, respectively) suggesting that bariatric surgery in cirrhotic patients should be performed in high volume centers.

A recent systemic review (11 studies including 122 patients) of patients with Child Pugh A cirrhosis who underwent bariatric surgery demonstrated major morbidity and mortality rates much lower than expected: 21.3% and 1.6%, respectively. Postsurgical liver decompensation was seen in only 6.6%, and the delayed mortality rate (>30 days) was only 2.5% [16]. Despite the greater risk of bariatric surgery in cirrhotic patients, both Dallal et al. [19] and Shimizu et al. [15] reported no postsurgical (1–3 years follow up) liver decompensation or related mortality in their series. These studies suggest that bariatric surgery in cirrhotic patients (Child Pugh A) is relatively safe with an overall benefit in terms of weight loss, metabolic improvement, and CV risk reduction. Outcomes of patients with more advanced cirrhosis (Child–Pugh B and C) are not well documented. Appropriate perioperative management of the cirrhotic patient with a multidisciplinary team approach is likely a key factor in achieving low complication rates in this population.

Complications

Complications following bariatric surgery are often influenced by preexisting risk factors and illness. Cirrhotic patients have higher morbidity and rates of postoperative complications compared to the general population. Jan et al. [16] showed that cirrhotic patients who underwent “restrictive” procedures (LAGB and SG) had less complications and mortality than those having malabsorptive procedures (RYGB and BPD) (Table 14.2). This study also reported that delayed mortality was observed, albeit rarely, in the RYGB and BPD groups due to liver decompensation and fulminant hepatic failure. Liver decompensation in cirrhotic patients postbariatric surgery may be related to malnutrition and malabsorption resulting from these procedures. The relative increase in risk of the malabsorptive procedures must be balanced with the relatively less effective weight loss and metabolic improvement observed with the “restrictive” procedures.

Table 14.2 Bariatric surgery morbidity and mortality in cirrhotic patients in a systemic review of 122 patients in 9 studies [16]

Bariatric procedure	Complication (%)	Liver decompensation (%)	Mortality (%)
LAGB ($n = 15$)	20	0	0
SG ($n = 41$)	14.6	12.5	0
RYGB ($n = 51$)	31.3	3.92	2
BPD ($n = 15$)	13.3	13.3	20

Other common postoperative complications include infection, bleeding, and venous thromboembolism (VTE). Infection can include wound infections, intra-abdominal abscesses, catheter-related infections, pneumonia, and surgical site infections. Cirrhotic patients with ascites have a higher risk of wound infections and breakdown. Therefore, prophylactic antibiotic such as a cephalosporin is recommended. Cirrhotic patients are often coagulopathic and demonstrate platelet dysfunction that can result in intra-abdominal bleeding. Therefore, careful tissue handling and hemostasis are essential and the usage of anticoagulants is recommended with caution.

Finally, the incidence of VTE is higher in obese patients and it is one of the main causes of mortality after bariatric surgery. More than 80% of these episodes of VTE occur after discharge [29]. Prophylactic perioperative VTE prophylaxis, as well as extended VTE prophylaxis in high risk surgical patients is recommended with caution. There is no standard guideline regarding type, dose and duration of VTE prophylaxis available for bariatric patients with cirrhosis but the American Society for Metabolic and Bariatric Surgery (ASMBS) [30] has recommended the following general recommendations for patients undergoing bariatric surgery; Mechanical VTE prophylaxis such as sequential compression devices or elastic compression stockings, and early ambulation are recommended in all bariatric surgical patients. Chemoprophylaxis is recommended for patients undergoing bariatric surgery provided there is no significant increased risk for major bleeding.

Patient Selection

General indications for bariatric surgery are based on the NIH Consensus Conference of 1991 [31]. More recently, international guidelines for patients with diabetes and metabolic disease suggest that bariatric surgery or metabolic surgery also be considered for patients with inadequately controlled T2D diabetes and a BMI as low as 30 kg/m^2 (27.5 kg/m^2 for high-risk populations such as Asians) [32]. A multidisciplinary team approach plays an important role in the care of obese patients, as does family and social support. There is no published clinical practice guideline for bariatric surgery in cirrhotic patients; the data available is only based on a few clinical studies. For patients with Child–Pugh B and C cirrhosis, any major surgical

procedure carries a higher perioperative risk and mortality. Notable to this textbook on surgery in patients with cirrhosis, with the exception of liver transplantation, bariatric, and metabolic surgery, is the only surgery that may actually improve cirrhosis.

Indications for bariatric surgery:

- BMI ≥ 40 kg/m^2 or BMI ≥ 35 kg/m^2 with significant obesity-related comorbidities or (New) BMI 30–34 kg/m^2 with uncontrolled T2D [32]
- The patient must be psychologically stable

Relative Contraindications for bariatric surgery:

- Inability to understand the procedure, its risks and benefits
- Inability or unwillingness to change lifestyle postoperatively
- Addiction to drugs or alcohol
- Psychological instability

Bariatric Procedure Selection for Cirrhotic Patients

The choice of which type of bariatric procedure is appropriate for each cirrhotic patient is based on the criteria below:

- Child–Pugh Scoring (A/B/C);
- Presence and severity of portal hypertension (mild/moderate/severe);
- And endoscopic evidence of portal gastropathy, varices, and gastroesophageal reflux disease (GERD)

Cirrhotic patients with Child–Pugh score A or B may be appropriate candidates for bariatric surgery after proper assessment and multidisciplinary evaluation. Studies have shown that these patients in general have reasonable risk and benefit after bariatric procedures and resolution of NASH [16]. LAGB, SG, RYGB, and BPD (ascending operative risk, respectively) are all options depending on the liver function and presence of portal hypertension. Adequate data to compare risks and benefits of these operations in patients with cirrhosis does not exist presently.

Portal hypertension is defined by the presence of thrombocytopenia, ascites, endoscopic evidence of varices and portal gastropathy. Grading of portal hypertension is as below:

- Mild: <8 mmHg
- Moderate: 8–10 mmHg
- Severe: >12 mmHg

Patients with mild portal hypertension can benefit from bariatric surgery. Any bariatric operation should be performed with caution because these patients have a higher likelihood of having gastric varices which may induce major bleeding. In cirrhotic patients with moderate portal hypertension, very little outcome data exists to make strong recommendations except consider the lower risk procedures. Bariatric surgery is relatively contraindicated in patients with severe portal hypertension as they are at an extremely high risk for bleeding. However, in patients

with preserved liver function, transjugular intrahepatic porto-systemic shunt (TIPS) placement can reduce portal pressure making it safer to perform surgery [33]. Shimizu et al. [15] demonstrated successful SG after TIPS procedure in cirrhotic patients. However, these patients should be jointly managed by hepatologist and transplant surgeon for optimal outcomes.

Up to 2% of bariatric surgical patients are incidentally diagnosed with cirrhosis at the time of surgery [14]. If this situation arises, we recommend that the surgeon should look for intraoperative evidence of portal hypertension such as ascites, varices or large dilated perigastric veins. If the patient has evidence of portal hypertension, a reasonable option is to perform a liver biopsy (if safe and feasible) and abandon the bariatric procedure until further assessment. If cirrhosis is diagnosed intraoperatively and there are no signs of portal hypertension, several studies suggest that bariatric procedures (LAGB, SG, RYGB) can be performed relatively with low complications rates and benefit to the patient [15, 16, 19, 22].

In summary, Fig. 14.4 shows the flow chart on selection of bariatric procedures in cirrhotic patients.

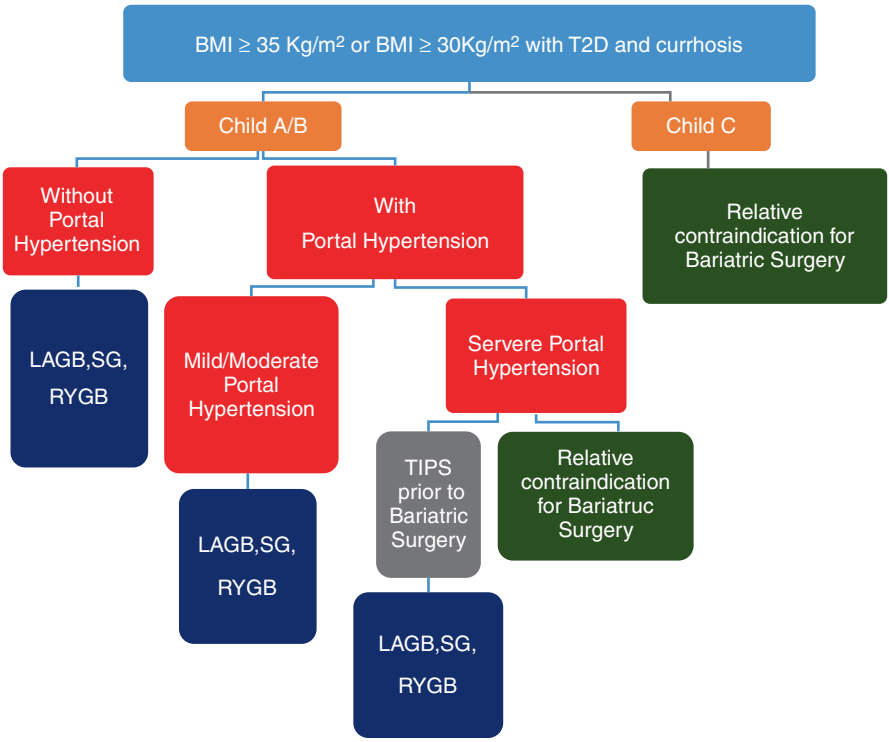

Fig. 14.4 Flow chart on selection of bariatric procedures in cirrhotic patients

Table 14.3 Preoperative evaluation for bariatric surgery

Complete history Physical examination	• Causes for obesity, related comorbidities and the treatment (history of portal hypertension complications and bleeding tendencies), history of blood transfusion and hepatitis infection, past surgical history, diet history, weight loss history and commitment to lose weight • Weight, height, BMI, signs of liver failure (Child–Pugh scoring)
Blood investigations	• Complete blood count/platelet, prothrombin time/INR, blood type, liver and renal function tests, hepatitis screening, fasting blood glucose and lipid panel, urine analysis
Nutritional assessment	• Appropriate clinical nutritional evaluation (RD), nutrient screening with iron studies, B_{12} and folic acid and 25-vitamin D levels
Cardiopulmonary assessment	• CXR, ECG, sleep apnea screening (± confirmatory polysomnography) • In patients with cardiac disease or pulmonary hypertension: echocardiogram and proceed • In patients with intrinsic lung disease or disordered sleep patterns: ABG, formal pulmonary evaluation • In patients with risk of VTE: DVT evaluation needed
Endocrine assessment	• Prediabetic or diabetic: HbA1c level Optimization of glycemic control: (including HbA1c $\leq$ 7%, fasting blood sugar $\leq$110 mg/dL, 2-h postprandial blood glucose of $\leq$140 mg/dL) In long standing diabetic patients: HbA1c 7–8% (if feasible) • Thyroid disease: thyroid function test (TSH) • Patient suspected with androgen with polycyctic ovarian syndrome: • Total or bioavailable testosterone, DHEAS, *D*4-androstenedione • Cushing's syndrome: • 1 mg overnight dexamethasone test, 24-h urinary free cortisol, 11 p.m. salivary cortisol
GI assessment	• Ultrasound or computed tomography of hepatobiliary system (presence of liver cirrhosis, ascites, splenomegaly, intra-abdominal varices, gallstone) • Portal hypertension (portal pressure measurement, role of TIPS) • Upper endoscopy (esophageal or gastric varices, portal gastropathy, GERD) Helicobacter pylori screening in high prevalence areas
Psychosocial-behavioral assessment	• Evaluation of environmental, familial and behavioral factors • In suspected patients with psychiatric illness or substance abuse: • Formal mental health evaluation
Medical documentation and informed consent	• Reason for bariatric surgery and complication of bariatric procedures in cirrhotic patients • Options available if incidental cirrhosis intra-operatively • Intra-operative liver biopsy
Preoperative weight loss	• Counsel patient prior to surgery
Counseling	• Childbearing women: Pregnancy and contraceptive • Smokers: stop smoking at least 6 weeks prior to surgery • Stop alcohol consumption
Cancer screening	• Verified by primary care physician • Screening for breast, colorectal, endometrium, cervix and prostate cancers

Table 14.4 Intraoperative care in cirrhotic patients

Port placement	• Beware of abdominal wall varices
Liver retraction	• Liver lobes are heavy and cirrhotic- watch out for bleeding and liver injury
Liver biopsy	• Percutaneous biopsy under laparoscopic guidance with cauterization using 16–18 gauge needle
Presence of gastric varices	• Caution for all bariatric procedures due to increased bleeding risk
Presence of ascites	• Perioperative antibiotic prophylaxis for gram-negative bacteria to prevent spontaneous bacterial peritonitis
Bleeding tendencies	• Prone to bleeding due to vitamin K coagulation factor derangement and thrombocytopenia • Extra precaution in tissue handling during dissection and retraction to prevent bleeding • Anticipate hemostatic problems: use of hemostatic agents hemoclips, cautery, ligation of bleeding vessel
VTE chemoprophylaxis	• Caution in usage of intraoperative anticoagulant especially if patient has bleeding tendencies or thrombocytopenia

Table 14.5 Early postoperative care

Cardiopulmonary care	• High risk of MI: At least 24 H telemetry monitoring • Pulmonary toilet, incentive spirometry • Early CPAP if required • DVT prophylaxis, encourage ambulation • If unstable: consider leak or VTE
Hydration	• Maintain adequate hydration (depends on the liver and renal function)
Healthy eating education	• Protocol derived stage meal progression • Caution in protein intake in cirrhotic patients
Monitoring	• Blood glucose levels monitoring • Watch out for hypoglycemic symptoms • Caution on opioids usage due to mental status deterioration, respiratory compromise, impaired gut function • Watch out for delirium or encephalopathy (avoid precipitating factors)
Pressure sore prevention	• Early ambulation • Adequate padding at pressure points • If suspected rhabdomyolysis: check for creatine kinase level
Medications	• 1- 2 adult multivitamin-mineral supplements containing iron, 120 0 to 1500 mg/d of calcium citrate, and a vitamin B-complex preparation

Table 14.6 Follow-up care

Follow-up visit (depends on the condition of patients and type of bariatric surgery)	• 1/3/6/12 months – 1st month: LAGB, SG, RYGB,BPD ± DS – 2nd month: LAGB – 3rd month: SG, RYGB, BPD ± DS – 6th month: SG, RYGB, BPD ± DS – 12th month (annually once stable): SG, RYGB
Monitoring	• Weight loss trend • Nutritional assessment • Psychological assessment (if support group needed) • Evidence of postoperative complications • Physical activity
Evaluation and adjustment	• Need for antihypertensive, anti-diabetic and lipid medications
Avoid	• Nonsteroidal anti-inflammatory drugs due to bleeding, ulcers
Prophylactic medication	• For gout and gallstone in appropriate patients
Investigations to be monitored	• SMA-21, CBC/platelet with each visit (and iron at baseline and after as needed) • Lipid profile every 6–12 months based on risk and therapy • Thiamine evaluation with specific findings • 24-h urinary calcium excretion at 6 months and then annually • B_{12} (annually; MMA and HCV optional) then 3–6 months if supplemented) • Folic acid (RBC folic acid optional) • Bone density (DXA) at 2 years • In malabsorptive surgery: – iron studies, 25-vitamin D, intact parathyroid hormone – vitamin A (initially and 6–12 months thereafter) – copper, zinc, and selenium evaluation with specific finding
Surveillance upper endoscopy	• In patients with cirrhosis with portal hypertension (for variceal assessment)

Perioperative Management

Preoperative evaluation of bariatric patients includes a complete medical history, psychological history, nutritional assessment, physical examination, and investigations to assess surgical risk. Further screening tests and a more detailed assessment involving a multidisciplinary team are advisable in patients with known or suspected cirrhosis. Perioperative care of these patients is summarized in Tables 14.3, 14.4, 14.5, and 14.6, based on ASMBS perioperative guidelines for bariatric surgery [34] and an update on abdominal surgery for patients with cirrhosis [35].

Conclusion

Obesity and NASH have been increasing globally leading to higher incidences of liver cirrhosis. Bariatric surgery is an effective long-term treatment of obesity and its associated comorbidities. Many studies show that NASH has significant histological improvement after bariatric surgery, and therefore, surgery has a role in preventing progression of NAFLD. Although bariatric surgery carries higher perioperative risks in cirrhotic patients than in the general population, morbidity, and mortality rates after bariatric surgery are less than expected in well-compensated cirrhotic patients. The overall outcomes in patients with Child Pugh A and B are good in terms of weight loss, metabolic improvement, and CV risk reduction.

Thorough preoperative evaluation and management with a multidisciplinary approach involving an experienced bariatric surgeon, bariatric physician, hepatologist, liver transplant surgeon, cardiologist, anesthesiologist, radiologist, psychologist, and dietician can yield very good outcomes in cirrhotic patients. Preoperative counseling specific to the risks associated with liver disease is advised.

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