

Obesity Management-Bariatric Surgery vs Lifestyle Modification

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ABSTRACT

Role of Bariatric surgery for obesity is briefly outlined. Selection criteria, contraindications, evaluations of patients before surgery, types of bariatric surgery with their merits and demerits are discussed. Results of lifestyle modifications is compared with that of bariatric surgery.

Keywords: Types of Bariatric Surgery; Selection Criteria; Contraindication; Merits and Demerits; Lifestyle Modification

1. Introduction

Bariatric surgery is becoming more popular for morbid obesity. Not only it helps in rapid weight reduction but also improves co-morbid conditions, like diabetes and hypertension. With lifestyle modification weight loss is gradual. Often it is difficult for the obese to follow life-long lifestyle modification. Hence compliance is poor. Surgery for obesity is the last option but is most effective. Life-long medical surveillance is needed to prevent micronutrient and vitamin deficiencies after surgery. Conservative treatment is less effective than bariatric surgery in terms of weight reduction.

2. Criteria for Selection for Bariatric Surgery

BMI ≥ 35 to $40 \text{ kg}\cdot\text{s}/\text{m}^2$ with significant co-morbid diseases or obesity with $\text{BMI} > 40 \text{ kg}/\text{m}^2$; well informed, motivated patient who understands and accepts risk of surgery; long-time commitment to life-style changes and follow-up; supportive social environment and absence of psychosis or depression are the usual criteria for selection for bariatric surgery.

3. Contra Indications

- Severe mental or cognitive disorders
- Severe non-stabilized feeding behaviour disorders
- A foreseeable incapacity on the part of the patient to participate in a long-term medical follow-up
- Dependence on alcohol and other toxic substances
- Absence of previous medical management
- Diseases which influence the short term and mid-term

vital prognosis

- Contraindications for general anesthesia

4. Essential Points for Bariatric Surgery

- It is recommended that the medico-surgical team suggest the technique, the principles, the benefits, the risks and inconveniences of each technique and the possibility of recourse to repair surgery after weight loss to patient.
- Patient should have understood the necessity of modifying his feeding behaviour, his life style, and of adhering to a follow-up all through life.
- Patient may be given a booklet giving information about the bariatric surgery.

5. Evaluation of the Patient before Bariatric Surgery

- Systemic investigations and management of co-morbidities
- Evaluation of feeding behaviour
- Psychiatric evaluation
- Lab investigation into pre-existing vitamin deficiency
- Upper GI endoscopy to investigate an infection by *H. pylori*

There are two types of surgeries namely malabsorptive and restrictive (**Table 1**).

6. Laparoscopic Adjustable Gastric Banding (LAGB)

Widely practiced simple surgery with less complications and low mortality (0.05%) [1]. Weight is lost slowly but

Table 1. Types of weight-loss surgeries.

Mal absorptive	Restrictive
Jejuno ileal bypass	Vertical banded gastroplasty
Bilio pancreatic diversion & duodenal switch	Laparoscopic adjustable gastric band
	Gastric bypass

for prolonged period. Restrictive procedures, hence vitamin deficiency is not common as there is intact GI tract. Folic acid deficiency has been seen due to different eating habits after surgery viz. taking less fruits, vegetables and whole-meal bread. Patient has to take 4 - 6 small feeds to avoid vomiting or intense pain which usually occurs if one eats a heavy meal. Re-operation is less, results are good. Complications of this surgery are—prolapse of gastric wall through the band with acute stromal obstruction and vomiting. Devise erosion and devise malfunction.

7. Laparoscopic Gastric Bypass Surgery (RNY)

Complex and major surgery for those whose BMI is over 40. Significant weight loss occurs in 18 months. There is evidence that surgery can help to achieve complete remission, especially in morbid obese patients with diabetes. It is not effective in T2 DM with low BMI [2]. Elderly patients with T2 DM with a prolonged duration were less likely to achieve euglycemia at 12 months. Higher rates of remission is seen in diabetic patients with shorter duration. Complete remission was observed with BMI above 32 [3]. This surgery carries a mortality rate of 0.4. Rouen Y Gastric Bypass in women with polycystic ovarian syndrome is effective in alleviating symptoms [4].

8. Mechanism of DM Control in RYGB (Roux-en-Y Gastric Bypass)

Nutrients reach the distal ileum within 5 minutes of ingestion of food and this stimulates the secretion of GLP1 by L cells located in this area [5].

9. Sleeve Gastrectomy (Gastric Sleeve or Sleeve Resectomy, VSG)

Done in patients with BMI over 35. Involves removing a major portion of the stomach. Once done, this surgery is not reversible. It is a type of restrictive surgery. First described by Hess in 1988. It provides acceptable percentage of weight loss (70% - 80%). Late nutritional complications occur after this surgery [6]. Main complications are diarrhoea, hepatic failure, metabolic derangement, protein malnutrition, iron deficiency anaemia, vitamin deficiency and metabolic bone diseases.

10. Vertical Banded Gastroplasty (VBG) [7]

A small pouch of stomach, is created with gastric banding (stomach stapling). Revisional surgery is needed in VBG due to stoma, stenosis, pouch enlargement or stapler dysfunction. Long-term weight loss and improved co-morbidities occur. In 65% of cases, there is failure of surgery and need revision and conversion surgeries.

11. Jejuno Ileal Bypass [7]

JIB is created by division of proximal jejuno distal to ligament of Terez, creating anaestomosis to Ileum 10 cm from ileocaecal valve.

Procedure creates short-gut syndrome. It becomes a malabsorptive procedure and results in weight loss. Patient develops nephrolithiasis, dental caries, renal failure, bypass enteritis, cirrhosis, hepatic failure, arthritis and severe metabolic deficiency.

Weight loss occurs with all types of bariatric surgery from a minimum of 47.5 to maximum of 70%. Weight losses with different bariatric surgery are shown in **Table 2**.

Amelioration of co morbid condition occurs mainly with JIB given below (**Table 3**).

Risk of T2DM and CAD risk factors reduced after gastric bypass and not after restrictive surgery.

12. Benefits of Bariatric Surgery [8]

- Appetite decreases
- Weight loss of 70% of excess of body weight* occurs
- 70% patients can stop blood pressure medication

Table 2. Effect of bariatric surgery on weight loss (EWL).

Type of surgery	Percentage weight loss (EWL)
All types of surgery	61.2
Gastric banding	47.5
Gastric bypass	61.2
Gastroplasty	68.2
BPD/DS	70

Table 3. Effect of bariatric surgery on weight loss and amelioration of comorbid conditions [7].

Type of bariatric surgery	Weight loss after 2 years	Comorbid conditions corrected after JIB
RYGB	30%	70% dyslipidemia 70% hypertension
GB	20%	Obstructive sleep apnoea improved 90% T2DM reverted
BPT	35%	Gastro oesophageal reflex Cured in 100%

*Percentage excess weight loss is—weight loss/total weight—normal weight (EWL). Expected EWL after bariatric surgery is 50% - 70%.

- Lipids come to normal in 70% of patients with dyslipidemia
- GERD is completely cured
- 90% of type-2 DM become euglycemic
- Sleep apnea syndrome is completely cured
- Long-lasting effect on weight and co-morbidities

Various hormonal changes occur after bariatric surgery (Table 4).

Long term complication are more with LAGB (Table 5).

13. Complications of Gastric Bypass

- Anastomosis leakage, stricture and ulcer
- Perforation and peritonitis
- Thrombo embolic complications
- Dumping syndrome
- Nutritional deficiencies
- Iron, Zinc, B1, Vitamin B12 (due to lack of intrinsic factor), Pica develop due to iron deficiency
- Infection
- Haemorrhage
- Hypo parathyroidism is due to inadequate calcium absorption

- Hypochlorohydria leads to positive hydrogen breath test which is due to bacterial overgrowth in small bowel

- Muscle weakness due to protein deficit

- Psychological problems like depression

Comorbidity resolution is greatest with BPD and DS (Table 6).

Describes comorbidity resolution with sleeve gastrectomy (Table 7).

Systolic/Diastolic BP, Plasmagluucose, HbA1C, Total cholesterol and triglyceride, all above parameters decreased to normal after bariatric surgery.

Clinically beneficial weight loss in patients with morbid obesity is possible with conservative non-surgical interventions particularly residential intermittent program and weight loss camps. Despite much larger weight loss observed in surgical group, small weight losses of 5% - 15% achieved through life-style intervention can result in similar reduction in risk factors and resolution of comorbidities at one year [12].

Compares lifestyle modifications with bariatric surgery (Table 8).

Table 4. Hormonal changes after bariatric surgery [9].

Hormone/Peptide	Changes Seen	
	Post bariatric surgery	Obesity
Ghrelin	Increased	Increased
Post Prandial PYY	Increased	Decreased
GLP-1	Increased	Increased
Enteroglucagon	Increased	Decreased
GIP	Decreased	Increased
C-Peptide	Decreased	Increased
Adiponectin	Increased	Decreased
Leptin	Normalises	Increased
Resistin	Decreased	Increased
TNFA	Decreased	Increased
IL-6	Decreased	Increased
Plasminogen Activator Inhibitor-I (PAI-I)	Decreased	Increased

Table 5. Long-term complications of bariatric surgery [10].

Complications	LAGB	VBG	RYGB
Reflux	6%	6%	0%
Vomiting	42%	41%	0%
Dysphagea	2%	6%	4%
Port related problem	10%	0%	0%
Re-operation	33%	26%	8%
Conversion	10%	63%	0%
Second re-operation	5%	8%	0%

Table 6. Comorbidity resolution [11].

Resolution criteria	Gastric banding	Gastroplasty	Gastric bypass	BPD and DS	Total
EWL	47%	68%	62%	70%	61%
Mortality	0%	0.1%	0.5%	1.1%	
Resolution of DM	48%	72%	84%	99%	77%
Resolution of hyper-lipidemia	50%	74%	97%	99%	79%
Hypertension	43%	69%	68%	83%	62%
Sleep apnea syndrome	95%	78%	80%	92%	86%
Resolution of fatty liver	Improved with all surgeries	Improved with all surgeries	Improved with all surgeries	Improved with all surgeries	Improved with all surgeries

Table 7. Comorbidities resolved or improved after laparoscopic sleeve gastrectomy [12].

Comorbidity	No. of patients	Resolved	Improved	%
Hypertension	119	81	35	97.5
DM	58	41	16	98.3
Hyperlipidemia	98	47	48	96.3
Depression	103	41	61	99.0
Obstructive sleep apnea	73	53	18	97.3
GERD	113	43	69	99.1
Arthritis	72	37	34	98
Chronic joint pains	44	26	18	100
Stress inconvenience	44	41	3	100
Asthma	34	21	13	100

Table 8. Comparison between life-style modification and bariatric surgery [13].

Features	Life-style modification	Bariatric surgery
Cost	No cost	Costly
Side effects	Nil	Vitamin deficiency and malabsorption. With LGB, problems are less
Weight loss	Long term results, moderate loss	Severe weight loss in short time
Weight loss maintenance	Not maintained. Weight gain occurs after few years	Forever
Nutrient deficiency	No	Usually occurs
Effect on comorbid disorders	Mild to moderate	Marked amelioration to cure
Psychological problems	No	Can occur
Patients cooperation	Needed, motivated to continue life-style modification for ever	Not needed
Food habits	Must learn to eat healthy foods	Must learn to eat slowly and 4 - 6 small feeds to prevent vomiting and epigastric pain
Post-operative complications	Not applicable	Can develop. Needs revision or redo surgeries at times
Useful	In all age groups	Not much effective with low BMI, oldage and with long-duration of comorbid disorders

14. Cardiovascular Outcomes after Bariatric Surgery [14-16]

Swedish obese subject study looked into cardiovascular outcomes after bariatric surgery. Patients have followed for 2 to 10 years. There were 2000 surgically treated patients for obesity who are compared with 2000 controlled subjects with life-style modification. In surgically treated cases, normalization of Triglyceride, Hyperglycemia of Diabetes, Hyperuricemia were seen.

Despite reduction in disease related deaths after gastric bypass, surgery risk of non disease related deaths such as accidents and suicides increased as compared to control group due to psychological problems [17].

15. Pregnancy after Bariatric Surgery

Pregnancy after bariatric surgery is not exception; it is even anticipated, taking into account the prevalence of obesity in women of a reproductive and women having recourse to surgery and the possible improvement in fertility after surgery. Pregnancy has better prognosis after surgery.

- Contraception is recommended as soon as surgery is planned, and thereafter generally for 12 to 18 months after the intervention.
- Investigation into vitamin and nutritional deficiencies should be systematic and best done before planning for any pregnancy. Supplements of iron, folates, vitamin B12, vitamin D and calcium must be instituted in case of pregnancy after a malabsorptive surgery. For any type of surgery, supplements of folates must be instituted as soon as a pregnancy is desired.

16. Conclusions

Various types of surgeries done in morbid obesity are described with their merits and demerits. Resolution of comorbid diseases with obesity occurs depending upon the amount of weight loss, age of the patients, and duration of comorbid disorders. Low BMI patients may not fully benefit by these surgeries. After malabsorptive surgeries, patient has to be on life-long vitamin supplement and often after bariatric surgery patient has to take small 4 - 6 frequent meals as large meal ingestion will lead to vomiting and intense abdominal pain. Even in restrictive surgery, patient needs folic acid supplement. Hormonal changes after bariatric surgery are described. Bariatric surgery is compared with lifestyle modification.

It seems bariatric surgery is useful in morbid obesity with comorbid conditions where lifestyle modification has failed or patient is unable to do. For other obese patients lifestyle modifications should be preferred treatment.

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