

Evaluation of the Results after Biliopancreatic Diversion (BPD), and Sleeve Gastrectomy Operations as a Treatment for Morbid Obesity

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Abstract: Severe obesity is associated with multiple co morbidities which reduce the life expectancy and markedly impair the quality of life. Obesity-related problems begin at the head and end at the toes, affecting almost every organ in between. This study was begun on June 2011 and continued through June 2014 to evaluate the results after operations had done for morbid obese patients, Bilio pancreatic diversion (**BPD**) (Scopinaro) and Laparoscopic sleeve gastrectomy (**LSG**) in Al Hussein hospital. 54 were females (90%) and 6 were males (10%), after three years follow up of the patients: the scopinaro operation result in complete cure of most of comorbidity except osteoarthritis, also result in rapid weight loss with more nutritional complications. On the other hand the sleeve gastrectomy result in gradual weight loss, less nutritional complications, but less effect on co morbidity, also needs more time for follow up. BPD need much post operative nutritional and vitamin supply for life which is not available for most of the patients due to their economic stat.

[Yasser Hussain. **Evaluation of the Results after Biliopancreatic Diversion (BPD), and Sleeve Gastrectomy Operations as a Treatment for Morbid Obesity.** *J Am Sci* 2016;12(2):111-117]. ISSN 1545-1003 (print); ISSN 2375-7264 (online). <http://www.jofamericanscience.org>. 13. doi:[10.7537/marsjas12021613](https://doi.org/10.7537/marsjas12021613).

Keywords: Biliopancreatic Diversion, Sleeve Gastrectomy, Morbid Obesity, results, surgery.

1. Introduction

Obesity is a common disease affecting more than 300 million adults worldwide (1) Obesity is the most common form of malnutrition and has been increased over the last few decades, not only in western society but also globally, it is paradoxical that in a world where a millions of humans are dying from hunger and starvation, many others suffer from over eating. By damaging our heath reducing the quality of our lives and leading as to premature deaths, obesity is becoming the greatest health problem in developed world (2) Obesity imposes devastating health and financial tolls on society and those who suffer from it. Despite the growing awareness of the problem. The obesity epidemic along with its associated complications continues to expand at alarming rate (3). Laparoscopic sleeve gastrectomy (LSG) has shown promise as an operation that can be done with reduced rate of complications (4) Biliopancreatic diversion is unanimously considered the most effective procedure for the surgical treatment of obesity. It can be dangerous if used improperly. (5)

2. Patients and Methods:

This study was begun from June 2011 and continued through June 2014 to evaluate the results after operations had done for morbid obese patients; Bilio pancreatic diversion (**Scopinaro**) and sleeve gastrectomy in Al Hussein University hospital. This study included 60 patients, 30 patients in each group. They were over 45 kg of their IBW or more than BMI 40 kg/m². All scopinaro operations done by open

surgery, all sleeve gastrectomies operations done by laparoscopic surgery.

Perioperative Management: Generally:

All patients were reassured, informed about the details of the operation. Complete laboratory tests, Chest x-ray, pulmonary function tests, E. C. G, Echocardiography. Abdominal ultrasonography, duplex US on the lower limbs were done for them. A third-generation cephalosporin is given preoperatively and continued for only 24 hours. Measures are used for prophylaxis against thromboembolism as early ambulation, sequential compression device stockings and low-molecular-weight heparin subcutaneously twice daily until discharge and continue for 10 days.

Technique: 1. Laparoscopic sleeve gastrectomy:

The abdomen is insufflated by veress needle. Three 5-mm, one 12-mm, and one 15-mm ports are placed as pictured (**Fig. 1**). A liver retractor is used to support the liver. The pylorus is identified, and an area approximately 5 to 6 cm from the pylorus is chosen to begin ligating and transecting the greater curvature vessels with a Harmonic Scalpel. The greater curvature of the stomach is mobilized to the angle of His, with particular attention paid to mobilizing the entire fundus to the mid-portion of the left crura of the diaphragm. A 34-French bougie is passed by anesthesiologists, and positioned in the distal antrum. Resectioning of the antrum is started tangentially from the right lateral port using a green load (4.1 mm), positioning the tip of the stapler to give a distance of one and a half times the width of a bougie at the area of the incisura angularis. All stapling is performed using the 60 Endopath stapler, holding initial

compression for a minimum of 15s of compression between strokes of the device. Resection of the body and fundus of the stomach is achieved using blue loads (3.5 mm) via the 15-mm left mid-clavicular port site.

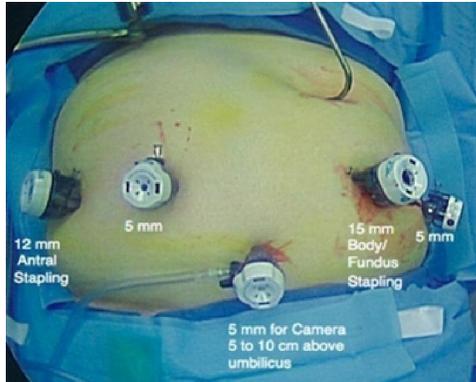


Figure (1): port sits of LSG

2. Bilopancreatic Diversion (Scopinaro):

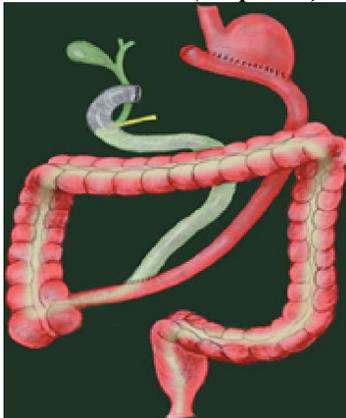


Figure (2) BPD

The distal part of the stomach is resected. The duodenum is divided distal to the pylorus. The remaining pouch of the stomach ranging between 150 -250 cm according to BMI if less than 50kg/m² gastric pouch is 250 cm, if 50 kg/m² pouch is 200 cm and if more than 50 kg/m² is 150 cm. The small bowel is divided 250 cm proximal to the ileo-cecal valve and

anastomosed to the gastric remnant. The bilio-pancreatic limb (from the duodenum) is anastomosed 50 cm proximal to the ileo-cecal valve, to form a 200 cm Alimentary limb and 50cm common limb. **Fig (2) BPD operation quated from scopinaro (5)**

3. Results

This study was carried out on 60 obese people in Al Hussein Hospital, Department of surgery from June 2011 till June 2014. 54 were females (90%) and 6 were males, (10%) [We reviewed 3 patients (5%) 3 years after VBG by BPD Scopinaro. The age of these obese patients ranged from 17 to 43 years old with mean age 30 years old, BMI ranged from 40 to 65 m² with mean value of 58 kg/m² old and all of them were Egyptians.

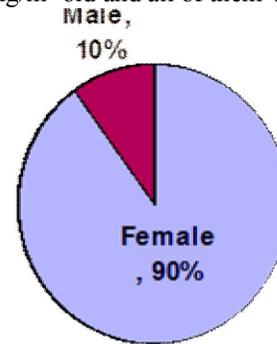


Figure (3): Male and Female presentation

Pattern of weight loss:

Weight reduction after BPD in unversed patient when expressed as percentage of loss of initial excess weight (IEW %) was 40% at 6 months, 55% after 1 year, and 73% at 18 months 90 ± 7.5 at 24 month and lastly 100% at 3 years, while after LSG the percent was 38%, 65%, 70%, 77%, 74% respectively at the same intervals. The majority of patient succeeds in keeping excess weight between 50% to 70%. BPD had achieved an excess weight loss at 18month after surgery average in 83%.

1) Common presentations of the patients of these obese patients tab (1):

No	presentations	Percent %
1-	Cardiac troubles,hypertension,ischemic heart disease	33%
2-	Chest troubles as asthma, sleep apnea syndrome	10%
3-	GIT affection as gastritis,GERD	36%
4-	Interference with physical activity	10%
5-	Musculoskeletal as osteoarthritis	43%
6-	Psychic and social problems	33%

2) Abnormal Investigations:

Table (2): Shows number and percentage of abnormal laboratories and radiology

1-Abnormal laboratories		NO of pts	surgery
a	-Dyslipidemia	33(55%)	undergo surgery
b	-High liver enzymes	2(3.3%)	postponed
c	-Diabetes	7(11.6%)	undergo surgery
2-Abnormal radiological investigation			
a	-chest x-ray		
		-asthma signs	6(9%) undergo surgery
b	-US	-gall stones	7(11.6%) undergo surgery
		- fatty liver	60(100%) undergo surgery
		-ovarian cyst	4(6.6%) undergo surgery
		-old DVT	5(9%) undergo surgery

Table (3): Shows changes in body weight within 3 years postoperative

Time in month	LSG(BMI)	BPD(BMI)
0 month	134.5 ± 15(50 ± 9.8)	157.5 ± 26.9(61 ± 15)
6 months	108 ± 1.8(41 ± 7.1)	133.0 ± 15.4(53.4 ± 5.6)
1 year	90 ± 10.2(33 ± 5.9)	113.0 ± 12.4(40.9 ± 4.3)
18 months	72 ± 8.3(30 ± 5.6)	83.5 ± 12.4(32.8 ± 3.7)
2 years	72.4 ± 8.5(28 ± 4.3)	87.0 ± 11.0(24 ± 3.2)
3 years	73.5 ± 8.7(28 ± 4.3)	89.4 ± 13.0(22.6 ± 2)

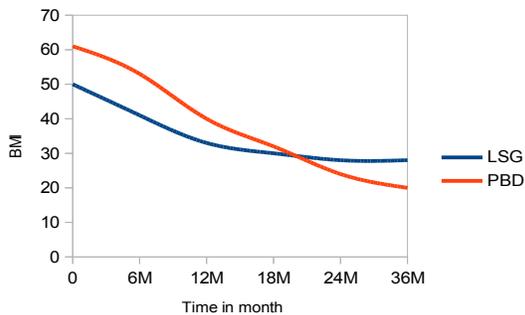


Fig (4): shows the rate of decrease in BMI by time after the two operations

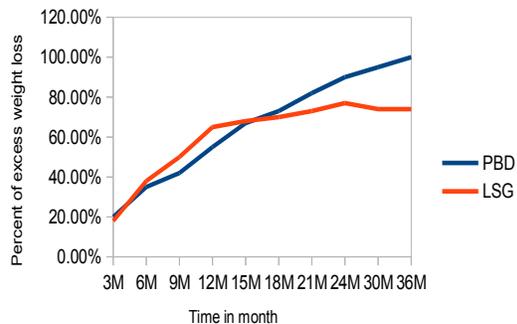


Fig (5): shows the relation between excess weight loss by time

Complications:

Intra Operative:

1. There was a single case (1.6%) of iatrogenic injury of the spleen in LSG, splenectomy was done.

2. There were a single case (1.6%) of staples failure and under running suture was done in LSG.

Early Post-Operative:

1-only a case (1.6%) developed mild chest pain, diagnosed as mild pulmonary embolism, managed, improved and discharged from the ICU after 72 hours after BPD operation.

2-One case (1.6%) of internal Hemorrhage, a bleeding branch of left gastric artery was found and ligated after BPD.

3-Two (3.3%) case of anastomotic leakage. The leakage was from gastrojejunostomy site in PBD, stipler line in sleeve gastrectomy. Which need exploration on 3rd day?

4-One case (1.6%) had wound infection and debridement of necrotic tissue was done, repeated dressing. secondary sutures were taken in PBD.

Late Complications:

1-The most significant and specific complication seen after BPD (Scopinaro) was protein malnutrition in all the patients. At first this managed by supplementing these patient with a liquid, high protein and high vitamin preparation such as Ensure plus and biogeners and this may take weeks to make euproteinaemia.

Hypoproteinaemia were severe in some patients, so hospitalized with total parenteral nutrition for two weeks. In these patients recurrence of hypoproteinaemia occurred in spite of they were discharged from the hospital after complete correction of hypoproteinaemia. Hypoproteinaemic patients came by bilateral lower limb pitting edema and this was confirmed by checking serum albumin and total proteins. By the end of 2nd year The achievement satisfactory serum albumin needs frequent hospital admission, in spite of that patients became not satisfied and this problem was severe, manifest itself in the third year of follow up period post operatively and require reoperation in all PBD patients either by reverse the BPD (Scopinaro) completely in 18 patients (60%) or to lengthen the common channel in 12 patients (40%) of BPD (Scopinaro). Mild hypoproteinaemia occurred in two cases after LSG not affecting the general health of the patient.

2-Other important complications was severe generalized bone ache and low back pain and joint pain in 18 case (60%) after BPD (patients were unable to stand up or walk in severe cases) this due to low calcium level which lead to osteoporosis, osteoarthritis and this managed by supplementation with 1200-1500 mg calcium and 800 IU of vitamin D per day for the next check up. While after LSG, two cases of mild hypocalcaemia treated by oral calcium.

3-Anemia occurs in 3 patients (10%) of patients after LSG, 18 patients (60%) after (Scopinaro). This problem is easily treated in most cases with oral iron supplements. The gluconate form of iron is best absorbed in a nonacid environment.

4-The incidence of vitamin B12 deficiency after these operations is reported as being 15% to 20%, vitamin B12 injection given weakly for month monthly for long period (*Table 4*).

Tab (4) shows the complication in each group

complication	PBD	LSG
no of pt	30	30
1-mortality	0.00%	0.00%
2-revesion	100.00%	0.00%
3-pulmonary embolis	3.30%	0.00%
4-splenectomy	0.00%	3.30%
5-GIT HGE	0.00%	3.30%
6-leak	3.30%	3.30%
7-wound infection	3.30%	-
8-incisional hernia	3.30%	0.00%
9-iron defec anemia	43.00%	10.00%
10-hypoprotinemia	100.00%	6.60%
11-low calcium	60.00%	6.60%
12-low VIT B12	20.00%	6.60%

Evaluation of Specific Co-Morbidity after Surgery:

1-Hypertension: 20 patients (33.3%) with hypertension were responding to weight loss in a good manner and by the end of the first year we can classify them as follow: **LSG** group; there were (26.6%) 8 patients from 30, 6 patients (75%) were became normotensive, the other two patients (25%) show improvement, their reading became much lower while in **BPD** group; were 12 patients from 30 (40%) by the end of the first year: 10 patients (83%) became normotensive and the other 2(17%) patients there reading become lowered.

2- Diabetes mellitus: were 7 patients (23%) and by the end of the first year they can classified as following: **LSG** 3 patients (10%) from 30 patients, 2cases (66.6%) completely resolved and one case (33.3%) improved by decrease units of insulin, while after **BPD:** were 4 patients (13.6%) from 30 completely resolved (100%)

3-Hyperlipidemia: In this study hyperlipidemic patients submitted to Scopinaro were 20 patients out of 30 (66%) completely cured (100%). In **LSG** it was in 13 (43%) patients out of 30, 9 patients (70%) completely cured and 3 patients (30%) showed improvement by decrease level of triglycerides and serum cholesterol.

4-Also by the end of the first year 3 patients (3.3%) from 60 of **chronic asthma** no longer get any attacks of dyspnea or shortness of breath.

5-Esophagitis and GERD: there was 22 (36%) patients complaining of GERD symptoms, 12 (20%) operated by LSG: 7(58%) the symptoms improved and 5 (42%) the symptoms persist while the other 10 (16%) operated by BPD: 7 (70%) completely cured and 3 (30%) improved the symptoms.

6-Ostorarthritic changes: improved by 18% (in L.S group), osteoarthritis worsen after BPD because of bone resorption due to lack of Vit. D and calcium.

4. Discussion

This study evaluate the results after two bariatric operations done for 60 cases, 30 patients in each operation reported no intraoperative or post operative deaths in comparison to *Scopinaro et.al., (6)* who reported (0.7%) in BPD, in LSG *Bellanger and greenway (7)* who reported (0.2%) deaths rate in the first 4 days post operative due to massive pulmonary embolism. But in this study there was only one case of diagnosed as mild pulmonary embolism.

In LSG group of this study there were 24 patients (80%) out of 30 achieved (65%) excess weight loss after 1 years in comparison to *Karamanakos et. al. (8)* who reported (69%) and *Lee et. al.,(4)* who reported (76%). After three years in LSG average EWL was (74%) stationary or decreasing in comparison to *Kehagios I et.al., (9)* who reported (68%).

Table (5): shows the outcome after LSG, BPD on different co-morbidity

1-Effect on hypertension	No of Pts	cured	improved
LSG	8(13.3%)	6(75%)	2(25%)
PBD	12(20%)	10(83%)	2(17%)
2-Effect on diabetes			
LSG	3(5%)	2(66.6%)	1(33.3%)
PBD	4(6%)	4(100%)	–
3-Effect on dyslipidemia			
LSG	13(21.7%)	9(70%)	4(30%)
PBD	20(33.3%)	20(100%)	–
4-effect on esophagit,GERD			
LSG	12(20%)	–	7(58%)
PBD	10(16%)	7(70%)	3(30%)

But in **PBD** weight loss was achieved in the first year and patients were very happy by their weight in spite of eating well they lose weight. But after 2 years weight loss continue to reach (100%). But in 25 patients (83.6%) in PBD (Scopinaro) group, they continued losing weight to become below normal and this considered failure of the operation, as it was associated with severe complications threatened the life of patients like severe drop in serum albumin, severe anemia, hypocalcaemia, hypovitaminosis D. (Patients were much worried about their loss of weight after they reached normal BMI) and that it was contradicting the results of other researches which had no results of dropping of weight below normal like *Scopinaro et al., (6)*, who reported (78%) of excess weight loss, *Marceau et al.,(10)* (86%) of excess weight loss after 2 years in PBD group, *Hess and Hess, (11)*, who reported (80%) of excess weight loss, *Anthon, et al., (12)* who reported (66%).

Outcome Effects on Co morbidities as follow:

1. Hypertension:

In **LSG** there were 6 (75%)of hypertensive patient submitted to this operation were completely cured, the residual2 (25%) patients show improvement, their reading became much lower and amount of their dosage of drugs decreased, in comparison to *Moon Han et al.(13)* who reported resolution of the disease in (93%).

But hypertensive patients submitted to **BPD** procedure were 10 patients from 12 (83%) they completely cured without needing for any medications, in comparison to *Scopinaro (6)* who reported (87%), and *Marceau et.al., (10)* who reported (58%) improvement in BPD group.

2. Diabetes Mellitus:

In **LSG** group there were 3 diabetic patients out of 30 patients 2 patients (66%) completely cured, and one patient (33%) improved his blood glucose level

decreased, dosage of drugs became low. In comparison to *Grill RS et. al., (14)* who reported 66% improvement and *Kiong kL et. al., (15)* who noted 60-80 % cure rate.

But all diabetic patients submitted to **BPD** were 4 patients out of 30 (13.3%) all of them completely cured by (100%) in comparison to *Scopinaro* who reported 100% improvement *Scopinara et al. (16)*.

3-Hyperlipidaemia:

In this study hyperlipidemic patients submitted to (**PBD**). *Scopinaro* were 20patients out of 30 (76, 6%), a cured by (100%). Like *Scopinaro et. al., (16)* who reported (100%) improvement of hyperlipidemia, *Marceau et al., (10)* who reported (97%) improvement.

In **LSG** it was in 13 patients (33.3%) out of 30, 9 patients (70%) completely cured and 4patients (30%) showed improvement by decrease level of triglycerides and serum cholesterol. In comparison to *Moon et al. (13)* who noted 75% improvement.

4. GERD (Castro Esophageal Reflux Disease):

In **LSG** group there were 12 patients from 30 had symptoms of GERD and esophagitis: 5 patients (41.7%) no improvement or increase the symptoms and 7 patients (58.3%) improved after **LSG** in comparison to *Chiu et. al., (17)* who reported (63%) improvement and (36 %) increase the symptoms after the surgery.

But in **BPD** procedures they were10 patients from 30 had the symptoms of GERD and esophagitis: after surgery 7 (70%) patients cured and 3 (30%) patients improved in comparison to *Scopinaro (16)* who reported (68%) cure and (32%) improvement. *Schneider (18)*, referred that to resection of the antrum which is the main site for gastric gland in *Scopinaro* and resection of most of the stomach result in improvement of eating habits, and decreased abdominal fat decreased intra abdominal pressure.

Complications:

After **LSG** there single case of leakage from stappler line managed by laparotomy and drainage, repair in comparison to *Melissas J et al. (19)* who report up to 5%, also there one case of GIT bleeding in the form of hematemesis and melena and managed conservatively in comparison to *Frezza EE (20)* who report 4%.

In **BPD** patients there were one case of postoperative leakage, no internal hemorrhage postoperative period, there was a single case of incisional hernia (3.3%) out of 30, wound infection was a single patient (3.3 %), in comparison to *Scopinaro et. al., (16)* who reported (0.24 %) of postoperative leakage, *Marceau et.al., (21)* who reported post operative leakage in (1.4%), wound infection in (0.8%).

Nutritional deficiencies: After **LSG** low calcium level occurred in 6.6% and low vitamin B 12 manifestations in 6.6% in comparison to *Gehrer S et. al., (22)* who noted that iron deficiency anemia 3%, vitamin B 12 deficiencies in 3% and no hypoproteinemia, no hypocalcemia. Increase percent of patients had nutritional deficiencies may be due to decrease intake of food rich in protein and vitamin in this study. But In **BPD** group in this study iron deficiency anemia (43 %) out of 30, low serum calcium in (60%), vitamin B12 deficiency in 20% and hypoproteinemia in 100%. In comparison to *Scopinaro* who reported and iron deficiency anemia in (40%), and low serum calcium in (29%).

But now we completely stopped BPD (Scopinaro) operation after revision of all the patients due to many factors:

- This operation bypasses the first part of the duodenum and upper jejunum which are the major part of absorption for most of nutrients vitamins and trace elements.
- Most of the patients were poor and their poverty affecting the quality of their diet.
- Also affecting their ability to buy vitamins and minerals as external supplementation for prolonged period.
- So the financial state of the patients was very unique challenge against prevention of these complications *Marceau et. al., (21)*

Conclusion

Surgery as a treatment for morbid obesity must be safe, effective with significant improvement or resolution of pre-existing co-morbid conditions with minimal long term nutritional deficiency and good quality of life. In this study we found that: **LSG** operation result in gradual, safe weight loss with resolution of most co-morbidity and improvement of the remaining, with low complication rate and low

post operative nutritional deficiencies but after the third year the patients weight loss rate decrease or stop even some patient start to gain weight again, so long term follow up is needed also the need for second operation like bypass of gastric banding may be needed.

In spite the **BPD** operation result in cure of most co-morbidity of the obese patients or improvement of them like hypertension, diabetes asthma, hyperlipidemia, GERD, Biliopancreatic diversion generally results in unsafe weight loss and weight loss maintenance that is superior to that provided by LSG. However, this greater weight loss is associated with an increased risk of a variety of metabolic problems. The patient of biliopancreatic diversion develop severe protein malnutrition, severe hypovitaminosis, deficiency in all minerals, loss of hair, loss of tooth, osteomalacia, early aging manifestations, the patients by time can't walk or work, can't perform his daily activities, need frequent hospital admissions for parenteral protein and vitamin supply even with this supply and frequent hospital admission the patient continue with lose weight and complaining of severe malnutrition so we stopped this operation and we revise most of the patient by complete reversion in severely debilitating patient or elongating the common channel to one meter, so we this operation not advised for poor patients.

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2/17/2016