Initial One Year Pioneering Experience in Advanced LaparoscopicBariatric Surgery

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Background: Obesity is a health and economic risk; individuals with a BMI of ≥30 kg/m² have 50%-100% increased risk of early death.

Objective: To assess the outcomes of advance bariatric procedures namely: Biliopancreatic Diversion (BPD), Mini Gastric Bypass (MGB) and Sleeve Gastrectomy.

Design: A Retrospective Study.

Setting: King Hamad University Hospital, Bahrain.

Method: Eighty-five patients operated for bariatric surgery between July 2012 and August 2013 were reviewed. The following vitals were monitored: excess weight loss, diabetes mellitus (DM), hypertension (HTN), hypercholesterolemia, degenerative joint disease and obstructive sleep apnea (OSA).

Result: Forty-one (95.34%) BPD patients had complete resolution of dyslipidemia, 22 (88%) of DM and 15 (78.94%) of HTN. MGB resulted in complete resolution of HTN in 7 (87.5%) patients and DM in 10 (83.33%). Dyslipidemia had improved in 2 (66.66%) patients who had Sleeve Gastrectomy and 4 (66.66%) patients with degenerative joint disease.

Conclusion: From our experience, bariatric surgery is a feasible and reliable modality for treating obesity and its associated comorbidities. Long-term results may help to enlighten us on the most appropriate procedure for the Arabian Gulf population.

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Obesity is defined as increased weight for a given height or a body mass index (BMI) of ≥30 kg/m² [1,2]. The World Health Organization (WHO) criteria defines metabolic syndrome as a combination of insulin resistance with any two of the following: obesity, HTN, dyslipidemia or an abnormal albumin-creatinine ratio[3].

Individuals with BMI of ≥30 kg/m² have 50%-100% increased risk of early death[4,5]. Obese individuals are at increased risk of "developing more than 40 obesity-related diseases", such as DM, HTN, ischemic heart disease (IHD), dyslipidemia, stroke, degenerative joint disease, OSA and depression[6]. It is also considered a causative factor in a number of malignancies[7].

In 2005, up to 40% of the Gulf population was defined as obese[3]. Bahrain, Kuwait, Saudi Arabia, Oman and United Arab Emirates are among the top ten obese countries, and the top five with regards to diabetes prevalence of the world[8]. The number of overweight adolescents and children in Bahrain has increased considerably during the past two decades[9]. Hubail et al concluded that obesity is increasing at a greater rate than the global average, which corresponds to the high prevalence of type 2 DM[6].

There are numerous surgical procedures for the treatment of obesity, including purely gastric restriction, a combination of malabsorption and gastric restriction or primary malabsorption[10]. Although originally used for weight reduction, bariatric procedures have been found to improve type 2 DM and reduce the rates of cardiovascular disease and death, while also positively impacting on metabolic syndrome[11-13]. The Sleeve Gastrectomy is a restrictive procedure because it involves reduction of the luminal diameter of the stomach; however, the passage of food through the digestive tract is not altered except excluding certain segments[14]. A malabsorptive procedure aims to reduce the area of intestinal mucosa available for nutrient absorption, such as BPD[20]. MGB is considered to be a restrictive procedure with some malabsorptive ability[14].

The exact mechanisms through which improvements occur are multifactorial and still being studied. It is likely that the effects occur because of a change in calorie consumption, psychological mindset and glucose metabolism[15].

The aim of this study is to assess the outcomes of advanced

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bariatric procedures namely Biliopancreatic Diversion (BPD), Mini Gastric Bypass (MGB) and Sleeve Gastrectomy.

METHOD

Eighty-five Bahraini adults who had bariatric surgery from July 2012 to August 2013 were reviewed. The age range was 20-60 years; patients were selected based on the National Institutes of Health (NIH) guidelines.

Data documented were as follows: social and personal characteristics, lifestyle habits, medical, obstetrics, gynecological, surgical and drug history, previous attempts of weight loss and any relevant laboratory and imaging results.

Pre and post-procedure, weight and height were documented by the bariatric nurse to the nearest 0.1 kg using digital scale with the patients wearing light clothing and no shoes. Height was measured to the nearest 0.5 cm using Detecto scale. BMI was calculated as body weight in kilograms divided by height in meters squared.

Fasting blood sugar level (FBS) was measured using the enzymatic hexokinase method (pre-diabetes, FBS between 100 and 125 mg/dL and diabetes, FBS of 126 mg/dL and higher)[16]. HBA1C was measured by the Turbidimetric Inhibition Immunoassay (TINIA).

HTN was defined as systolic blood pressure of 140 mmHg and/or a diastolic of 90 mmHg or more. Hypercholesterolemia was defined as fasting total cholesterol ≥5.2 mmol/L, high-density lipoprotein ≥1.86 mmol/L, +/- triglycerides ≥170 mmol/L, +/- low-density lipoprotein ≤1.6 mmol/L or the use of statins. OSA was diagnosed based on patients' subjective assessment of symptoms.

Patients had a multidisciplinary evaluation by a bariatric surgeon, anesthetist, cardiologist, endocrinologist, dieticians and specialist nurse. Patients were assessed by a psychiatrist to rule out a potential eating or depressive disorder.

All patients were operated on by a single surgeon with a standard and absolute laparoscopic approach without conversion.

The patients' age ranged between 20 to 60 years with BMI≥50 kg/m^2 with or without comorbidities; those assessed as being high-protein eaters were selected for the BPD. Patients within the same age range but with BMI ranging between 30-50 kg/m^2 with comorbidities were considered suitable for the MGB. Finally, younger patients underwent Sleeve Gastrectomy because the age range for this procedure is between 12 and 60 years and the BMI range is between 30 and <50 kg/m^2 without comorbidities. Patients with DM and HTN were excluded from Sleeve Gastrectomy procedure.

Patients with major psychiatric disabilities and other comorbid illnesses that were unlikely to resolve with weight reduction such as end-stage renal, hepatic or cardiac disease were excluded.

A uniform approach and technique was used after anti-embolic precautions and appropriate antibiotics administration in all three types of surgery.

The anastomoses were evaluated with Gastrografin swallow study on the first postoperative day to rule out an obstruction or leak. The average length of stay was three days.

RESULT

DM, HTN, dyslipidemia, degenerative joint disease and OSA had improved, see table 1.

Table 1: Patient Characteristics, Type of Bariatric Surgery and Comorbidities (N=85)

Male to Female ratio	46 (54.11%):39 (45.88%)
Age range	12–60
BMI range	30–70
Biliopancreatic Diversion	59%
Mini Gastric Bypass	31%
Sleeve Gastrectomy	10%
Diabetes Mellitus	37%
Systemic Hypertension	27%
Dyslipidemia	64%
Osteoarticular disease	42%
Obstructive sleep apnea	19%

The BPD procedure had improved dyslipidemia, DM and HTN; 41 (95.34%), 22 (88%) and 15 (78.94%) of patients respectively had complete resolution, see table 2. MGB improved hypertension in 7 (87.5%) diabetes mellitus in 10 (83.33%), see table 3. The Sleeve Gastrectomy improved dyslipidemia in 2 (66.6%) and degenerative joint disease in 4 (66.6%) patients. No mortality was recorded, see table 4.

Table 2: Biliopancreatic Diversion (N=50)

Comorbidities	Prevalence of Diseases Before Surgery	Complete Resolution
Diabetes	25 (50%)	22 (88%)
Hypertension	19 (38%)	15 (78.94%)
Dyslipidemia	43 (86%)	41 (95.34%)
Degenerative Joint Disease	12 (24%)	10 (83.33%)
Sleep Apnea	16 (32%)	16 (100%)

Table 3: Mini Gastric Bypass (N=26)

Comorbidities	Prevalence of Diseases Before Surgery	Complete Resolution
Diabetes	12 (46.15%)	10 (83.33%)
Hypertension	8 (30.76%)	7 (87.5%)
Dyslipidemia	18 (69.23%)	5 (27.77%)
Degenerative Joint Disease	24 (92.30%)	15 (62.5%)
Sleep Apnea	2 (7.69%)	1 (50%)

Table 4: Sleeve Gastrectomy (N=9)

Comorbidities	Prevalence of Diseases Before Surgery	Complete Resolution
Dyslipidemia	3 (33.33%)	2 (66.66%)
Degenerative Joint disease	6 (66.66%)	4 (66.66%)
Sleep Apnea	1 (11.11%)	0

On average, all 85 patients achieved good weight loss outcomes, see table 5.

Table 5: Weight Loss

	1 month postoperatively	3 month postoperatively	6 month postoperatively	9 month postoperatively	12 month postoperatively
MGB	8.26%	13.22%	57.75%	57.75%	57.75%
BPD	9.34%	14.72%	63.23%	63.88%	64.03%
Sleeve Gastrectomy	8.90%	12.50%	36.0%	44.0%	44.0%

Three cases of postoperative bleeding in BPD patients were seen; two were managed conservatively and one required re-exploration. Two cases of protein malnutrition required hospitalization. Two cases of excessive vomiting and intra-abdominal abscess were managed conservatively. Two marginal ulcers required esophagogastroduodenoscopy.

Three patients had repeat surgery after the MGB for the anastomotic leak and one case of postoperative bleeding required repeat intervention; one patient suffered distal esophageal perforation. There were no postoperative complications recorded following the Sleeve Gastrectomy procedures, see table 6.

Table 6: Postoperative Complications (N=85)

Complication	
Bleeding	4 (4.70%)
Intra-abdominal abscess	1 (1.17%)
Iatrogenic-esophageal perforation	1 (1.17%)
Hypoalbuminemia	2 (2.35%)
Marginal Ulcer	2 (2.35%)
Leak	1 (1.17%)

DISCUSSION

The positive impact of bariatric surgery on DM, HTN and dyslipidemia was significant. Our finding in Sleeve Gastrectomy procedure was similar to a recent systematic review which found that weight loss and diabetes resolution were significant in Biliopancreatic Diversion[17].

A study revealed that medical management over 10 years led to 1.6% increase in body weight while bariatric surgery allowed patients to have a weight loss of up to 20%[18]. Surgery should be an option for all obese diabetic patients with BMI≥35 and those with BMI≥30 if their diabetes is poorly controlled or uncontrolled[19].

MGB has been found to be effective in DM and HTN. MGB works through mechanisms similar to the Roux-en-Y gastric bypass, which is believed to have weight independent anti-diabetes effects due to surgical alteration of the digestive tract[20].

Some authors believe that aging and ongoing weight change had a greater impact on blood pressure than the initial weight and initial weight reduction[21,22]. Sustained weight loss, whether induced surgically or otherwise, does not affect significantly the blood pressure but does reduce pulse pressure[21].

Buchwald et al found that hyperlipidemia, hypercholesterolemia and hypertriglyceridemia were significantly improved in all surgical procedures at 2 years follow-up[21,23]. Buchwald et al revealed that 85.7% improvement of OSA. Greenburg et al found similar results[24].

This study used subjective assessment for the improvement of OSA; a more scientific approach could have been used through apnea–hypopnea index (AHI) by the American Academy of Sleep Medicine.

The main strength of this study is the sample size and all patients attended and received treatment from a single center and operator. Although longer follow-up is required to prove the true efficacy of these procedures, we believe that a large enough number of patients were included in this study to validate the procedures. In addition, our results are comparable to other recent studies[11-13,21].

Although a single surgeon is considered strength, it might lead to selection bias and limitation.

CONCLUSION

This study demonstrates that bariatric surgery is safe and beneficial through a multidisciplinary approach; careful selection of patients could result in sustainable weight loss, improvement and even resolution of obesity and its associated comorbidities.

Further study with long-term follow-up might be needed to establish a database in this field.

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