

## Evaluation of Metabolic Effects of Mini Gastric Bypass Surgery in Diabetic Morbidly Obese Patients

Mohammed Mohammed Abdelrhman Alkurdi<sup>1</sup>, Ibrahim Abou Alfotouh Mohammed<sup>1</sup>, Ibrahim Metwaly Bauomy<sup>2</sup> and Abdelshaheed Mustafa Abdelshaheed<sup>1</sup>

<sup>1</sup>General Surgery Department, Faculty of Medicine, Al-Azhar University, Egypt

<sup>2</sup>Clinical Pathology Department, Faculty of Medicine, Al-Azhar University, Egypt  
Abdelshaheed88@yahoo.com

**Abstract: Background:**-Obesity is the most frequent chronic metabolic disease globally. **Aim:** The aim of this work is to evaluate metabolic effects of mini gastric bypass surgery on diabetic morbidly obese patients within 6 months regarding; Mean operative time, Hospital stay, Rate of weight loss during follow up period of 6 months, Intra-operative and Post-operative complications, Diabetic remission by follow HbA1c and fasting blood sugar. **Results:** In a comparative study between MGB and RYGB, the results showed that mean operative time was 105 min for MGB, 152 min for RYGB. There was higher EWL% with the MGB bypass group after 6 months post-operatively to in comparison to RYGB, while EWL % at the first 6 months post-operatively were the same in both MGB and RYGB (Disse et al., 2014). All co-morbidities as Diabetes mellitus type 2, dyslipidemia, sleep apnea and hypertension, were improved after MGB and RYGBP procedures. Remission rates of these co-morbidities were similar between both groups, 6 months after surgery (Disse et al., 2014). **Conclusion:** There was a significant reduction of mean BMI in LMGB, while %EWL and %BMIL more prominent in LMGB. There was significant shorter operative time and less post-operative hospital stay. There was obvious amelioration of obesity related DM in MGB but LMGB have higher rate of resolution.

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**Keyword:** Metabolic, Gastric, Diabetic, Morbidly, Obese Patients

### 1. Introduction

Severe obesity is one of the major problems in Western Countries and is associated with several co-morbidities and disabling diseases (e.g., cardiovascular disease, metabolic syndrome, type 2 diabetes, fertility, certain tumor types and increased mortality).

One of the major co-morbidities of obesity is type 2 diabetes mellitus (T2DM). In fact, the term “dia-besity” has been introduced to refer to obesity accompanied by T2DM.

With the exception of nutritional and some pharmacological treatments, bariatric surgery is performed more and more frequently as the treatment of choice in patients with severe obesity.

The recent widespread use of bariatric surgery has been attributed to the high success rate of weight loss and improvement of co-morbidities. This success was only dampened by a number of complications and technical difficulties that is innate to each procedure. These challenges have inspired the search for an ideal surgery and explain the dynamic nature and evolution of the field of bariatric surgery.

The efficacy of these surgical procedures in weight control has been widely described in several studies.

Additionally, one of the most relevant corollary effects reported following bariatric surgery is T2DM remission.

A variety of surgical procedures are available and, currently, it is difficult to identify the most effective option based on patient characteristics and co-morbidities. Furthermore, little is known regarding the effect of the various surgical procedures on glycemic control and on T2DM remission.

The aim of this study is to evaluate the metabolic effect of laparoscopic mini-gastric bypass (MGB) on type II diabetic morbid obese patients.

### 2. Patients and methods:-

This randomized prospective and retrospective study was conducted on 30 Morbid obese patients with type 2 diabetes admitted at Al-Azhar University and other Egyptian Hospitals. All patients were followed up for 6 months, from May 2017 to November 2017.

Apart from previous major abdominal surgery, body mass index (BMI) >60 kg/m<sup>2</sup>, patient's refusal of entry into clinical trial, patients with eating disorders (Bulimia), patients not suitable to undergo general anesthesia, treatable endocrine-pathology, active peptic ulcer disease and Reflux oesophagitis and psychological disturbances were excluded from this

study. Clear written consent was taken from patients according to Al-Azhar university committee and other Egyptian hospitals.

### 3. Results:

This study was carried out on thirty morbidly obese patients at Alazhar University Hospitals and other Egyptian hospitals. All patients had a pre-operative BMI  $\geq 35$  and  $\leq 60$  kg/m<sup>2</sup>. All patients were followed up for 6 months. They were managed by Laparoscopic Mini-Gastric Bypass. The choice of procedure was allocated to patients prior to the operation.

#### I- Operative analysis:

##### Operative time:

The operative time of (LMGB) the operative time range from 85.0 – 185.0 min. with mean duration  $125.75 \pm 26.454$ . It was observed that the operative time was declined with time due to improvement of learning curve in preparation of operating theater, establishment of surgical equipments and gaining more surgical experience of working team. Also, it was observed that increased operative time of converted cases to open procedure increased mean operative time.

##### Early post-operative morbidity (Table 1):

Early (<30 days) post-operative surgical complications are summarized in Table (1). It was divided to major and minor complications. Major complications include leakage, wound dehiscence, incisional hernia and DVT. Minor complications include trocar site infection, seroma and vomiting. Post-operative leakage happened in two cases of

LMGB (13.33%). There was no statistically significance in incidence of major post-operative complications (P value >0.05). Wound seroma was occurred in six cases in LMGB (20%). Trocar site infection occurred in four cases in Group (13.33 %). There was no statistically significance in incidence of minor post-operative complications (P value >0.05)). Wound seroma was more common in (LMGB). Bile reflux gastritis reported in two cases in (LMGB) (6.67%).

##### In (LMGB):

In post-operative period, two patients had leakage, one of those patients had leakage from gastro-jejunosomy (low output about 200 cc/day) which diagnosed clinically, by gastro-graffin follow-through and U/S abdomen and pelvis, this patient treated conservatively in ICU by parental hyper-allmentation nutrition and broad spectrum antibiotics. The fistula was completely resolved in about one week and during ICU admission the patient developed lung atelectasis. The 2<sup>nd</sup> leakage was diagnosed as a leak from the excluded stomach which appeared on the 3<sup>rd</sup> day post-operatively. It diagnosed by exclusion after normal gastro-graffin follow-through and presence of bilious contents in the drain. The fistula was managed conservatively and completely resolved 3 days later.

Six patients (20.0%) had wound seroma, which was treated in outpatient clinic by frequent dressing and drainage. Four patients (13.33%) had trocar site infection which was treated by antibiotic and dressing. Two patients (6.67%) developed bile reflux gastritis which managed by pro-kinetiks. There was no mortality in LMGB.

**Table 1: Early post-operative complications in the studied obese group**

Early post-operative complications	Group		Total		Fisher exact test
	N	%	N	%	P-value
<b>Major</b>					
Leak	4	13.33	2	6.67	0.296
Wound dehiscence	0	0.00	1	3.33	0.552
DVT	2	6.67	1	3.33	0.533
<b>Minor</b>					
Seroma	6	20.00	5	16.67	0.500
Trocar site infection	4	13.33	6	20.00	0.429
Presetting vomiting	0	0.00	1	3.33	0.480
<b>Medical</b>					
Lung atelectasis	2	6.67	1	3.33	0.533
Anemia	0	0.00	1	3.33	0.533
Mortality	0	0.00	0	0.00	1.000

#### Mean over-all cost:

As regarding mean operative time and hospital stay, we roughly consider the cost of operations by

calculation of stapler and cartilages reload prices. In all cases of LMGB we used five to seven cartiradges reloads plus stapler.

**II- Follow up:**

Patients were scheduled for follow up at 3 month and 6 month postoperative. This was done for all patients through regular visits at out-patient clinic.

**1-Weight loss and anthropometric data:**

Table (2) summarized the patients' weight throughout the follow-up period. Starting from 3

months post-operative, there was a statistically significant decrease of weight than initial weight and this significance increased with time during the follow-up period (P value of both groups  $\leq 0.05$ ). After 6 month post-operatively, there was also statistically significance difference in weight reduction (P value  $< 0.05$ ).

**Table 2: Pre- and post-operative patients' weight in the studied obese group**

		T-test			
		Group		T	P-value
Before	Range	112.000	- 181.000	0.494	0.625
	Mean $\pm$ SD	135.870	$\pm$ 19.870		
After 3 months	Range	82.000	- 140.000	3.039	0.005
	Mean $\pm$ SD	95.454	$\pm$ 18.454		
After 6 months	Range	72.000	- 105.000	2.076	0.047
	Mean $\pm$ SD	80.154	$\pm$ 7.870		
Paired T-test (P-value)	Before-A fter3ms	<0.001*			
	Before-A fter6ms	<0.001*			
	A fter3ms-A fter6m	0.047*			

Table (3) summarized the patients' BMI throughout the follow-up period. Starting from 3 months post-operative, there was a statistically significant decrease of BMI than initial BMI and this

significance increased with time during the follow-up period (P value of both groups  $\leq 0.05$ ). After 6 month post-operatively.

**Table 3: Pre- and post-operative patients' BMI in the studied obese group;**

		T-test			
		Group		t	P-value
Before	Range	38.990	- 58.458	0.685	0.499
	Mean $\pm$ SD	49.450	$\pm$ 7.415		
After 3 months	Range	27.000	- 44.154	2.670	0.012
	Mean $\pm$ SD	35.100	$\pm$ 4.540		
After 6 months	Range	25.540	- 34.548	2.351	0.026
	Mean $\pm$ SD	30.120	$\pm$ 2.870		
Paired T-test (P-value)	Before-After 3ms	<0.001*			
	Before-After 6ms	<0.001*			
	A fter3ms-After 6m	0.033*			

Tables (4) summarize the patients' percentage of excess body mass index loss (%EBMIL). In MGB, the mean % EBMI were  $60.454 \pm 11.248$  at 3 months and  $81.540 \pm 7.245$  at 6 month. There was a statistically difference in favor of MGB through-out the whole follow-up period (P value  $\leq 0.05$ ).

**Diabetic follow up:**

All patients were diagnosed with type 2 diabetes. Diagnosis of T2DM was made according to the American Diabetes Association guidelines. T2DM remission was defined as a fasting plasma glucose

level below 126 mg/dL in the absence of hypoglycemic drugs (Minno et al., 2011).

**Glycemia value (Tables 4):**

The mean glycemia value was  $169.87 \pm 35.76$ . Laboratory investigations were done post-operatively during the period of follow up. The mean levels of fasting blood glucose, In MGB ( $143.570 \pm 20.870$ ), ( $138.540 \pm 19.218$ ) after 3 and 6 months respectively. But, after surgical intervention, a significant and consistent reduction in glycemia values was observed relative to the base line values.

**Table 4: Glycemia values in the studied obese group**

		T-test			
		Group		t	P-value
Before	Range	143.56	- 183.32	2.352	0.025
	Mean±SD	161.874	± 22.874		
After 3 months	Range	122.98	- 159.43	0.976	0.337
	Mean±SD	143.570	± 20.870		
After 6 months	Range	118.112	- 154.76	1.023	0.315
	Mean±SD	138.540	± 19.218		
Paired T-test (P-value)	Before-After 3ms	<0.001*			
	Before-After 6ms	<0.001*			
	After 3ms-After 6m	0.156			

**HbA1c**

The mean HbA1c level was  $8.5 \pm 1.0$ . Laboratory investigations were done post-operatively during the period of follow up. The mean levels of HbA1c, In

MGB ( $6.708 \pm 1.984$ ), ( $6.522 \pm 1.338$ ) after 3 and 6 months respectively (**Table 5**).

But, after surgical intervention, a significant and consistent reduction in HbA1c values was observed relative to the base line values.

**Table 5: HbA1c in the studied obese group**

		T-test			
		Group		T	P-value
Before	Range	6.91	- 10.76	0.280	0.782
	Mean±SD	8.542	± 1.990		
After 3 months	Range	5.594	- 7.991	0.257	0.799
	Mean±SD	6.708	± 1.984		
After 6 months	Range	5.044	- 7.101	0.456	0.652
	Mean±SD	6.522	± 1.338		
Paired T-test (P-value)	Before-After 3ms	<0.001*			
	Before-After 6ms	<0.001*			
	After 3ms-After 6m	0.147			

**Diabetes remission;**

At 3 months post-surgical intervention, diabetes remission was reported by 18 subjects (66.67% in MGB, P= 0.710). At the 6-month follow-up diabetes remission was reported (86.67% for MGB, P=0.389). MGB showed a clear trend toward higher diabetes remission rate.

**4. Discussion:**

The recent widespread use of bariatric surgery has been attributed to the high success rate of weight loss and improvement of co-morbidities. This success was only dampened by a number of complications and technical difficulties that is innate to each procedure. These challenges have inspired the search for an ideal surgery and explain the dynamic nature and evolution of the field of bariatric surgery (**Melissas, 2008**).

However, in recent years, LMGB has been identified as an innovative approach to the surgical management of morbid obesity. It has attracted interest among surgeons as it is considered to be relatively safer than LRYGB.

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