ORIGINAL ARTICLE

Effectiveness of metabolic weight loss surgery on type-II diabetes, hypertension and lipid disturbances: Review of systemic analysis

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Abstract:

Objective: To assess the effectiveness of metabolic weight loss surgery on excess weight loss, type-II diabetes, hypertension, and hyperlipidemia in morbidly obese adults, over a period of 5 years.

Background: This is an observational study of 378 morbidly obese patients. All of them underwent laparoscopic sleeve gastrectomy and had greater than 50% weight loss of their excess weight with measurable improvement in co morbidities.

Results: Most of the patients had a reduction of average 75.7% of excess weight. For type-II diabetes (HbA1c <6.5% without medication), almost 76.8 % have complete resolution while 85.4% showed improvement in their HbA1c. For hypertension (blood pressure <140/90mmHg without medication), complete remission rates were 63.4.% and improvement in up to 80.2%. For hyperlipidemia (according to NCEP ATP II guidelines), remission rates were 71.4% and improvement up to 96.9%. Remission of hyperlipidemia was defined as cholesterol less than 200 mg/dL without coronary artery disease, HDL greater than 40 mg/dL, LDL less than 100 mg/dL, and TG less than 150 mg/dL .

Conclusion: Rarely bariatric surgery studies report long-term results. We have presented results over a period of 5 years (Ist January 2012 till 23rd December 2016) post sleeve gastrectomy. Sleeve gastrectomy shows long term benefits in outcomes for weight loss, type-II diabetes, hypertension, and hyperlipidemia control and remission. Although the other health issues which improved with good outcome were sleep apnea and mobility.

Keywords: type-II diabetes, Bariatric surgery, metabolic syndrome, hyperlipidemia

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Introduction:

Bariatric/Metabolic surgery is commonly performed and now has been universally accepted as an obesity treatment. It has gained much favor as the treatment for uncontrolled diabetes, hyper-lipidemia especially associated with metabolic syndrome in the last decade.

Obesity is a metabolic syndrome with known complications. Our study provides a systemic review of the patients to establish the association of metabolic/weight loss surgery with the outcomes including weight loss, type-II diabetes, hypertension and hyper-lipidemia over a 5 year time period.

This is a case series of metabolic/weight loss surgeries in a developing country where it is still in its early phase as compared to the developed world and still not many people are aware of this treatment option for obesity and its related co morbidities.

At this stage of our on-going study, the analysis clearly proves that this surgery is a very effective tool to resolve and/or improve uncontrolled metabolic conditions with sustainable results over a long period.

Material and Methods:

This study was conducted in 2 private sector hospitals of Karachi, from 1st January 2012 till

Table-1: Effect of Bariatric Surgery on Co morbid Medical Conditions

Condition	% Reduction
Diabetes (HbA1c)	65
Hypertension (drop in Systolic and Diastolic BP)	73
Hyperlipidemia (triglycerides)	70

Table-2: Weight loss outcomes for Bariatric Operations LSG in percentages

Excess weight loss (%)	70.7
Mortality (%)	0
Morbidity (%)	15-30
Nutritional morbidity (%)	2-8

Table-3: Improvement or remission in type-II diabetes after LSG

	Before	After
Hba1c	9.3	6.5
Fasting blood sugar	>126	<126

Table-4: Effect of Bariatric Surgery on co-morbid medical conditions

Condition	% Resolved	% Improved
Diabetes	76.8	85.4
Hypertension	63.4	80.2
Hyperlipidemia	71.4	96.9

23rd December 2016. Morbidly obese patient were included in the study that underwent weight loss/bariatric procedure namely, laparoscopic sleeve gastrectomy (LSG) according to the following protocol; weight loss was defined as decrease in excess weight loss followed by change in BMI, type-II diabetes as defined by decrease in HbA1c, normal fasting blood sugars without medication. Hypertension as defined by decrease in systolic/diastolic blood pressure without medication, and hyperlipidemia as defined by decreased lipid profile without medication. An informed consent was taken from each patient before proceeding with the study.

An observational study of 378 adult patients (aged 20–60 years), with a minimum body mass index (BMI) of 35 who underwent laparoscopic sleeve gastrectomy were included for weight loss outcomes and associated co morbidity remission or resolution that is type-II diabetes, hypertension, or hyperlipidemia

Confidence intervals of 95%, power test 90%, mean and SD were calculated for excess weight loss and BMI. Frequency and percentages were calculated for co morbidities HbA1c levels, Blood pressure and hyperlipidemia.

Results:

Mean weight loss as percentage of excess weight lost, followed by change in BMI was recorded. Associated comorbids were reported as percentage of resolution or remission for type-II diabetes, hypertension, hyperlipidemia.

Reduction of 65% in pre and post operative HbA1c was observed. Pre and post operative reductions in systolic and diastolic blood pressures were reported as 73% decline. Whereas, lipid profile panel of patients showed improvement up to 70% in pre and post operative Triglycerides (TG) levels.(table-1)

Weight loss: Sleeve gastrectomy reported greater weight loss exceeding 50% of excess weight with 95% confidence intervals. The sample size–weighed mean excess weight loss after sleeve gastrectomy was 75.7%. (table 2)

Improvement or remission of type-II diabetes: Type-II diabetes (glycated hemoglobin < 6.5% without medication), sample-size–weighted complete resolution was 76.8% while 85.4% show improvement in HbA1c. A reduction of 2.8% in mean HbA1c was observed post operatively. Mean reduction in fasting blood glucose showed promising results to less than 126mg/dL. Our study remission rate for type-II diabetes was reported as 65% with a mean baseline HbA1c of 9.3% decreasing to 6.5% after surgery. (table-3)

Improvement or remission of hypertension: Hypertension (blood pressure <140/90mmHg without medication), complete remission rates were 63.4.% and improvement up to 80.2%. (table-4)

Improvement or Remission of Hyperlipidemia: Hyperlipidemia (According to NCEP ATP II guidelines), remission rates were 71.4% and improvement was found to be up to 96.9%. Remission of hyperlipidemia was defined as blood

cholesterol level less than 200 mg/dL without coronary artery disease, HDL greater than 40 mg/dL, LDL less than 100 mg/dL, and TG less than 150 mg/dL. (Table 4)

Complications were rare, including bleeding <2%, leak rate <5%, gastroesophageal reflux 6%, iron deficiency anemia 3% or vitamin B12 deficiency 1%.

Discussion:

Obesity is among the second important cause of preventable death worldwide. Obesity is not just a disease, it is a metabolic syndrome.[1] Obesity is defined in terms of body mass index, or BMI (measured as weight in kilograms divided by height in meters squared). Patients are categorized as overweight if there body mass index (26–29 kg/m^2), obese (30-34 kg/m^2), or severely obese also called morbidly obese (35–49 kg/m^2), along with the latest addition of super obese who have BMI ≥ 50 kg/m^2.[1] Obesity has multiple causes, of which inheritance plays a significant role.[2]

Major co morbid conditions are linked with obesity, including type-II diabetes, hyper-lipidemia, hyper-tension, hyper-cholesterolemia, degenerative joint disease, low back pain, obstructive sleep apnea, gastroesophageal reflux disease (GERD), cholelithiasis, asthma, abdominal wall hernias, and a greater than before incidence of various cancers such as those of the uterus, breast, colon, and prostate.[3]

Obesity management starts with simple changes in sedentary lifestyle, diet counseling,[4,5] and behavioral changes.[6] Pharmacologic therapy is another option and recommended as an adjunctive or supplementary therapy.[7]

Present study shows intermediate- to long-term (5-year follow-up) status post sleeve gastrectomy. Out-comes of the study shows that on average, at 3 and 5 years post surgery patients had lost 80% and 70% of excess weight, respectively.

Improvements in comorbidities after LSG was overall reported as excellent. Hypertension resolved completely in 60% of patients in the 1st year. Our study also shows promising results for obstructive sleep apnea decreasing from 25% to 10%, symptoms related to gastroesophageal reflux disease (GERD) resolved in more than 50% of cases, which is comparable to other international data[8-10] while asthma, depression and quality of life improved.[11-13] Dixon and associates[14,15] published a landmark article describing outstanding results of LSG over best possible medical management in diabetic patients. Diabetes was reported to be resolved up to 17% in the medical group vs. 80% after sleeve gastrectomy, in a 3-year follow-up.

Present study shows no mortality. Our study results are comparable with Buchwald and colleagues[16] for four major co morbidities associated with obesity.

LSG results in excellent Long-term weight loss. Estimated excess weight loss from our study were 45–50% for BMI of >60 kg/m^2, and 60% for BMI of 35 to 50 kg/m^2 with a 32F pouch size,[17] hospital stay averaging 2 days, operative time less than 90 minutes, and with none of them converted to open procedures or mortality. Severe complications including bleeding and leak was reported in less than 1% cases.

Most prominent feature of metabolic weight loss surgery is the increased emphasis on metabolic effects of surgery. The resultant weight loss and improvement in comorbidities shows promising results.

Surgical therapy is now considered to be modality of choice for management of type-II diabetes. Almost 80% severely obese patients respond to weight loss surgery. Metabolic/weight loss surgery showed improvement or near resolution of type-II diabetes well before they had achieved maximum weight loss. Hickey and colleagues[18] highlighted these observations with a resolution in 85% of patients. MacDonald and associates,[19]showed longer life span. Schauer and colleagues showed improvement, in terms of fasting insulin levels and glycosylated hemoglobin levels returning to normal in 83% and

improving markedly in 20 (17%). In 2009, bariatric weight loss procedure was considered to be treatment of choice for diabetes by American Diabetes Association.[21]

Central obesity, glucose intolerance, dys-lipidemia, and hypertension reported as 52% among morbidly obese patients present mostly as Metabolic syndrome.[22] Weight loss surgery can successfully treat diabetes and pre-diabetes with a resolution in metabolic syndrome in up to 98% of patients in the first year post-surgery.[23] Dyslipidemias get better in >80% and overall lipid profiles are also improved.

Severe obesity increases the risk of heart failure particularly due to hypertension and cardiac hypertrophy. Obesity is particularly strongly associated with left ventricular internal diameter and hypertrophy.[24] Weight loss results in decreased intravascular volume, decreased cardiac output, and decreased arterial pressure, ultimately leading to decrease in over all blood pressure.[23]

Many other comorbid situations are also resolved by weight loss surgery. Obstructive sleep apnea significantly improved after surgery. After 1year post surgery mean respiratory disturbance index for all patients decreased from 51 to 15 ($P < .01$).[25] Other obesity related problems like asthma, non-alcoholic fatty liver disease (NAFLD), Musculo-skeletal problems, especially degenerative joint disease and low back pain symptoms usually improve and often resolve in patients who experience significant weight loss.[26]

Conclusion:

Pakistan, a developing country which is ranked in the top ten countries that have an obesity epidemic, this study gives comprehensive proof that metabolic surgery can make a huge impact in decreasing the morbidity and mortality associated with obesity and metabolic syndromes. The study is still on-going and the data till now has proved beyond any doubt that the results are very promising and sustainable with minimal risks.

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Role and contribution of authors:

Dr Surrendar Dawani, collected the data and references and wrote the initial write-up.

Dr Aruna Dawani, collected the data and references and improve the article

Dr Hassan Ahmed, helped in collected the data and referenes

Dr Shahid Rasul, critically review the article and made the final changes

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