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OAGB/MGB for childhood and adolescent patients: a report of 20 cases done at a single centre in India

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ABSTRACT

Background: Morbid obesity has risen in an alarming rate in children and adolescent patients. Bariatric surgery is playing an increasing role in pediatric surgery. However, current evidence is limited regarding its safety and outcome. The aim of this study is to evaluate the efficacy of Mini/One Anastomosis Gastric Bypass (MGB/OAGB) in treating obesity and its co-morbidities among childhood and adolescent patients.

Methods: A retrospective study was conducted of patients aged <18 who underwent OAGB/MGB in this series at Mohak Bariatric and Robotic Surgery Center (MBRSC) is a tertiary-care center. The major outcome measures were percent excess body weight loss (%EBWL) over a 2-year follow-up period, resolution of co-morbidities, and occurrence of complications.

Results: A total of 20 childhood and adolescent patients underwent the procedure, of which, 11 (55.0%) of being males. The patients had a median age of 15 years (range 6–18). The average age was 15.5±3.17 year (range 6-18 years). The initial average weight and BMI was 112.13±26.52 Kgs and 40.86±8.17 kg/m² respectively. Postoperative average weight loss was 28 kgs, 33 kgs and 37.2 kgs in 6 months, 1st year and 2nd year respectively. The %EBWL at 1st and 2nd years was 75% and 80% respectively. Overall post-operative complication rate was 5.0% (two cases) of which one had gastroesophageal reflux and the other had protein caloric malnutrition. There was no mortality in this series at any time.

Conclusions: The OAGB/MGB operation is a safe and effective option for childhood and adolescent patients with severe obesity. There is need for both long-term follow up, prospective, multicentre and larger series studies to confirm the findings in this study.

Keywords: Adolescent, Mini/one Anastomosis gastric bypass (MGB/OAGB), Severe obesity

INTRODUCTION

The prevalence of obesity among adolescents is rising in the recent decades specifically in developed countries around the world. Childhood obesity can lead to adulthood obesity, which reduces lifespan and decreases the quality of life. Nowadays, the incidence of obesity at all ages have been doubled in the developing countries including India. According to a report from urban South

India, 21.4 % of boys and 18.5% of girls aged 13-18 years were overweight or obese.² The prevalence of obesity among school children in India has been reported between 5.74% and 8.82%.^{3,4} Overweight childhood and adolescent have augmented risk of being overweight as adults. The various factors like genetics, behavior, and family environment play a role in childhood overweight. Childhood overweight increases the risk for certain medical and psychological conditions.⁵ Multiple

comorbid conditions are associated with obesity in this age group. Pediatricians are now facing childhood and adolescents with comorbidities previously only seen in adults, including Type 2 diabetes (T2D), obstructive sleep apnea (OSA), fatty liver disease, and hypertension (HTN).⁶ In addition, obese adolescents are likely to suffer from psychological morbidity, loss of self-esteem, and social exclusion which has the potential to scar them for life.⁷ This emphasizes the significance of this health issue and the need for both prevention and effective treatment measures of overweight and obesity in children and adolescents.

Obesity treatment comprises a multidisciplinary approach that intends to reduce weight, resolve comorbidities, and improve quality of life. Unfortunately, non-surgical weight management programs, including lifestyle changes, increase in physical activity, and dietary modifications, have produced poor results.9 Bariatric Metabolic Surgery (BMS) has been proven to be the most effective treatment in morbidly obese adults with significant and sustained weight loss and a high rate of comorbidity resolution. Laparoscopic sleeve gastrectomy (LSG) has become a very popular surgical procedure and is increasingly being done as a stand-alone bariatric operation in adults. It has been shown to produce excellent excess weight loss in the short and mid-term comparable with Roux-Y-gastric bypass (RYGB) and superior to gastric banding with a low incidence of major complications and death.¹⁰

However, there are still concerns about safety, effectiveness, the possibility of long-term complications, and adverse effects on growth and maturation. There is only limited evidence regarding the safety and effectiveness of in morbidly obese adolescent. No studies have been published on Mini/One Anastomosis Gastric Bypass (MGB/OAGB) outcome in adolescents' patients. Therefore, the aim of this study was to review our experience to assess the outcomes, safety, efficacy, and complications of OAGB/MGB in childhood morbidly obese subjects.

METHODS

This is a retrospective, descriptive study of prospectively collected data over seven years. Twenty adolescents between the ages of 6 and 18 years underwent OAGB/MGB using a standard technique by a single surgeon with follow-up of at least 2 years. All patients were assessed by a multidisciplinary team consisting of a pediatrician, a dietician, a psychiatrist, an endocrinologist, a health educator, and a surgeon.

Data collection

The preoperative patient profile of age, sex, BMI and comorbidities and short to medium term outcome of complications, weight loss and resolution of comorbidities were reviewed and analyzed. Patients were

discharged from the hospital 3 to 4 days postoperatively. Regular and intensive follow-ups were carried out at 1 month and 6 months postoperatively, and then annually. Follow-up was ensured through regular clinic visits.

One anastomosis gastric bypass (OAGB/MGB)

The pouch of the OAGB/MGB was created by making a window in the lesser omentum 1-2cm below the crow's foot. A gold reload size 6 cm endo-stapler was used to transect the stomach horizontally and partially leaving at least 2-3cm of stomach not transected on the greater curvature. A tubular pouch about 2.5-3cm wide and 9-18cm long was formed over a size 36 Fr. bougie tube by continuing the transection towards the diaphragm and coming out at a point about 1-1.5cm lateral to the gastroesophageal junction. The ligament of Treitz was identified. A 150cm jejunal limb was measured from the ligament of Treitz. An ante colic loop gastro-jejunal anastomosis 3-4cm wide was formed at the 150cm jejunal site. This was usually done with a linear stapler with a hand sewn gastro-enterostomy. Staple line hemostasis was achieved with clips.

Dietary protocol and evaluation of nutritional deficiencies

Nutritional education was provided to the patients postoperatively. For the first 2 days, only sips of water were allowed. If tolerated, a diet of clear low-fat, lowcarbohydrate fluids (1.5-2 L/day) with protein supplements were initiated for the following 2 weeks. In addition, an exercise regimen of walking was advised. For the period of 2weeks to the first month, puréed food consisting of low-fat, high-protein contents were given, and water intake was encouraged at 2 L/day. Finally, after the first post-operative month, a normal reducing diet of small frequent meals was advised, focusing on proteins, with physical activity as tolerated. Multivitamin supplements were prescribed throughout this time along with calcium and vitamin D tablets. Nutritional metrics including circulating levels of iron, protein, albumin, vitamin B12, calcium, vitamin D3, and hemoglobin A1c (HbA1c) were recorded and compared with baseline values.

Evaluating resolution of obesity-related co-morbidities

Data on preoperative body weight and the weight at yearly intervals after surgery were collected. Resolution of all co-morbidities was determined at each follow-up visit. For dyslipidemia, a level of <130 mg/dL for low-density lipoprotein (LDL), >35 mg/dL for high-density lipoprotein (HDL), and <150 mg/dL for triglycerides off all lipid-lowering medications – was defined as reaching a value within the normal adolescent range and was thus considered as remission. Hypertension resolution was defined as normal blood pressure (systolic <140 mm Hg and diastolic <80 mm Hg), without the use of antihypertensive medications. Musculoskeletal pain and

OSA improvement and/or remission were reported clinically based on changes in symptoms recorded at follow-up.

Statistical analysis

Statistical analysis was performed using IBM-SPSS software version 20. All categorical variables were summarized as frequencies, and continuous variables as mean±standard deviation (SD) or median and interquartile range.

RESULTS

A total of 20 adolescent patients underwent OAGB/MGB. Nine (45.0 %) were females and 11 (55.0%) were males. The median age was 15 years (range 6-18 years). The initial average weight and BMI was 112.13±26.52Kgs and 40.86±8.17 kg/m2 respectively (Table 1).

Table 1: Baseline chrematistics of 20 childhood and adolescent patients.

	Adolescent (n= 20)
Female: Male (%)	9(45.0 %): 11(55.0%)
High (cm, mean±SD)	136.0±0.08
Weight (Kgs, mean±SD)	112.13±26.57
BMI (Kg/m2, mean±SD)	40.46±8.17

The follow-up percentage at 1st year was 13(65%) and 2nd years was 8(40%); the median operative time was 32.5 min (range 25.0–66.0), and the average hospital stay was 3.2 ± 0.83 days.

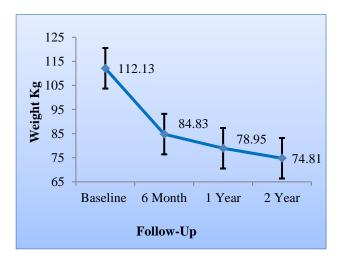


Figure 1: Change in weight-loss outcome during the follow-up intervals.

Postoperative average weight loss was 28kgs, 33kgs and 37.2kgs in 6 months, 1st year and 2nd years respectively (Figure 1). After surgery %EBWL was 63% at 6 months, 75% and 80% in 1 and 2 years (Figure 2). No statistical

significance was observed in terms of difference in %EBWL between males and females.

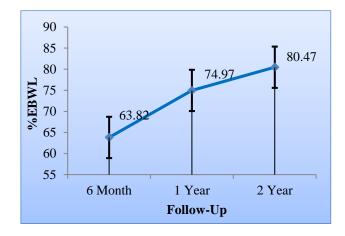


Figure 2: %EBWL out come in MGB/OAGB.

Co-morbidities were present in four patients preoperatively. None of our subject was diabetic, one patient was asthmatic, one had hypertension, sleep apnea was seen in one and one was hypothyroid. Complete resolution of HTN, and OSA was seen at 2 years and others loss to follow-up (Table 2).

Table 2: Co-morbidity prevalence and post-operative resolution.

Co-morbidity	Number	% Remission
Hypertension	1	100%
Sleep apnoea	1	100%
Asthma	1	-
Thyroid	1	-
Type 2 diabetes	No	-
Cardiovascular	No	-
Joint Pain	No	-
Back Pain	No	-

Nutrient deficiencies were present in some of the patients and there were no reports of any intra-operative or short-term operative complications. Overall post-operative complication rate was 5.0 % (two cases) of which one had gastroesophageal reflux and the other had protein caloric malnutrition. There was no mortality in this series at any time.

DISCUSSION

Morbid obesity occurrence is rapidly increasing in both, adolescents and adults worldwide. Furthermore, obesity is strongly associated with multiple comorbidities that raise mortality. Bariatric surgery in adults is now widely accepted as a safe and effective treatment for morbid obese subjects after unsuccessful conservative therapy. In adolescents, considering the low response to clinical treatments and the lowered life expectancy of severely, bariatric surgery seems to be the new hope for the obesity

epidemic. Still, there are quiet concerns about safety, effectiveness, the possibility of long-term complications, and adverse effects on growth and maturation. In this study, we assess the outcomes, safety, efficacy, and complications before and after OAGB/MGB during a period of at least 2 years in childhood morbidly obese subjects. There is very limited data available for OAGB on adolescent patients. Worldwide LSG/RYGB is been done for childhood obesity that made comparison of surgical technique difficult, although findings of present study show equivalent results with LSG/RYBG techniques.

In our group of 20 adolescents, we observed a mean weight loss of 33 kgs (average excess body weight loss of 75% EBWL) at 1 year. After 2 years, the average weight loss was 37.2kgs (80% EWL). This is similar after LSG; reported by Nadler and cols. who evaluated 33 patients with an average EWL of $40 \pm 19\%$ after 1 year. 11 On the other hand, our values were lower than those reported by Alqahtani and cols., who studied a group of 108 patients with a mean EWL of 64% at 2 years and Boza and cols., who studied 54 patients and recorded a mean EWL of 96.2% after 1 year. 12,13

In this study, we showed that OAGB/MGB is not only effective in terms of weight loss. OAGB/MGB also strongly improved coexisting comorbidities. This effect was more pronounced in adolescent obese compared with adult patients and was confirmed for every comorbidity. Resolution rate (complete resolution or improvement) at 1 and 2 years was 100% for hypertension and sleep apnea. The positive impact of bariatric surgery on comorbidities should be taken into consideration when timing of surgery is being discussed. In morbidly obese adolescent with coexisting comorbidities and no response to non-surgical therapy, surgery should be offered early in life before these conditions become irreversible. 14-16

In present study, overall post-operative complication rate was 5.0 % (two cases). These included one cases of gastroesophageal reflux disorder, and two cases of protein caloric malnutrition were identified. There was no mortality in this series at any time. Very little evidence exists regarding reflux following bariatric surgical procedures in the adolescent population. In a retrospective multicenter review, 21.3% of the 61 adolescent patients developed reflux that responded favorably to proton pump inhibitor treatment. 16 These results illustrate that symptomatic gastro-esophageal reflux also represents a relevant late complication in adolescent that had undergone OAGB/MGB. In these patients, a lifelong follow-up and consequent treatment is necessary to avoid any progression to Barrett's esophagus and esophageal adenocarcinoma.

There are some limitations to present study that should be acknowledged. First, the data size is very small. Secondly, low follow-up rate at 1 and 2 years in all groups were less than 65% and less than 40% respectively. This

may have strongly influenced the results regarding weight loss and resolution of comorbidities and questions our ability to generalize our findings. Additionally, midand long-term complications after OAGB/MGB is less frequent compared with LSG, RYGB and LAGB which may also impact the patient's adherence to follow-up instructions. Furthermore, it has been reported that the adolescent population has an important risk of impaired follow-up due to the increased mobility. ¹⁶

CONCLUSION

BMS before adulthood can result in substantial weight loss and resolution of co-morbidities and thus improve overall quality of life. The OAGB/MGB operation is an option for childhood and adolescent patients with severe obesity and can be safely performed. There is need for both long-term follow up, prospective, multicenter and larger series studies to confirm the findings in this study. Follow-up into adulthood will also be highly desirable and informative.

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