



## NATIONAL SURVEY FOR BARIATRIC PROCEDURES IN PEDIATRIC PATIENTS: LONG TIME FOLLOW-UP

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Follow-up	%EWL 6m	%EWL 3yrs	BMI 5 yrs	P value
AGB	12.1±9.3%	43.1±10.3%	33.4 ± 3.2 kg/m <sup>2</sup> (pre-op 43.6 ± 5.9 kg/m <sup>2</sup> )	<0.05
SG	15.2±12.6%	56.2±13.6%	32.4 ± 3.4 kg/m <sup>2</sup> (pre-op 46.3 ± 7.9 kg/m <sup>2</sup> )	<0.05
IB	12.2±7%	68.2±14.7%	33.5 ± 5.4 kg/m <sup>2</sup> (pre-op 42.7 ± 5.7 kg/m <sup>2</sup> )	<0.05
MT	18.6±16.6%	78.6±19.8%	-	<0.05

### BACKGROUND-INTRODUCTION-AIMS

Obesity is a chronic disease, as are its complications; the World Health Organization in 1998 warned that obesity had reached the rank of a pandemic and that its prevalence was increasing alarmingly, especially in child population. Outcomes for obesity treatment is expressed as excess of weight loss (EWL) during a continuous follow-up; The therapy could be surgical and non surgical but it has been reported that the most aggressive nonsurgical weight loss therapy had provided at best 10-15% of excess weight loss in less than 30% of the patients and it is associated with a high rate of recidivism.

Through a systemic analyses of consecutive patients, the aim of this study was to analyse clinical outcomes of adolescent treated for obesity.

### MATERIALS AND METHODS

The clinical and surgical data of adolescents treated for obesity were analyzed using the Italian register of the Italian Society of Obesity Surgery and metabolic disorders (S.I.C.O.B.) to select the study population.

This retrospective cohort study included all consecutive patients (aged 13-18 years) who had received bariatric procedures between 2000 and 2010. A minimum follow up of 3 years (for 80% of patients) was considered as the first inclusion criteria. In general, inclusion criteria for bariatric procedures included body mass index (BMI)  $\geq 40$  Kg/m<sup>2</sup> or BMI  $\geq 35$  Kg/m<sup>2</sup> with obesity-associated comorbidities according to the international guidelines. [1-5]

Exclusions criteria were as follows: patients lost to follow-up and patients who had received other bariatric procedures, dependency on alcohol or drugs; subjects with severe learning or cognitive disabilities or emotionally unstable.

Demographic and weight data, operative data, hospital stay, morbidity, mortality and procedure-related complications were recorded and compared. Morbidity was defined as 'early', with onset within 30 days from surgery, or 'late', with onset after the first 30 post-operative days. Procedure-related complications included bleeding, slippage, leakage and stricture formation, ulceration. Other complications considered were: gastritis (irritated stomach tissue), gastroesophageal reflux (regurgitation), heartburn, gas bloat, dysphagia (difficulty swallowing), dehydration.

Statistical analysis was performed using the student t-test, chi-square and **Fischer exact tests**. The analysis was conducted with the Statistical Package for Social Sciences (SPSS) software version 15 for Windows SPSS Inc, Chicago, USA.

### RESULTS

#### •Demographic data

The study population included 55 males and 118 females. Median age at operation was 15.9 ± 1.4 years (range: 13-18 years) (females 16.07 ± 1.4 yrs and males 15.5 ± 1.5 yrs) (p>0.05). Mean BMI before surgery was 44.8 ± 7.7 kg/m<sup>2</sup> (females 44.6 ± 8.7 kg/m<sup>2</sup> and males 45.5 ± 3.5 kg/m<sup>2</sup>) (p>0.05). Mean Excess Weight was 62.8 ± 23.8 Kg in females and 70.9 ± 9.3 kg in males (p>0.05). 65% of patients were from the south of Italy, 30% from the north and 5% from central Italy (p<0.05). 43% of patients had comorbidities, such as hypertension (4 patients), arthropathy (4 patients), obstructive sleep apnea (4 patients), dyspnea (5 patients), dyslipidemia (15 patients), depression with psychiatric disorders (binge eating, sweet eating, nibbling sneakers) (12 patients), cholelithiasis (4 patients), steatosis (28 patients) and diabetes mellitus (6 patients). There were no significant differences between distribution of comorbidities and procedure used to treat obesity.

The mean follow-up time was 62.6 months. The number of patients with post-operative follow-up at 3 months, 6 months, 1 year and 2 years was 173/173 (100%), 173/173 (100%), 162/173(93.6%) and 158/173 (91.3%) respectively. There were 142 patients (82%) who completed a 3-year follow-up, 65 patients (35%) who completed a 5-year follow-up and 2 patients who completed follow-up at 10 years. The number of patients with multiple comorbid conditions at 2 years was small, with a mean number of comorbidities per patient falling from 2.1 before surgery to 0.7 at 2-year follow-up.

With respect to mean pre-operative BMI, there was a significant decrease in mean BMI for each procedure; BMI at 5 years for the AGB group was 33.4 ± 3.2 kg/m<sup>2</sup> (pre-op 43.6 ± 5.9 kg/m<sup>2</sup>), 32.4 ± 3.4 kg/m<sup>2</sup> for the SG group (pre-op 46.3 ± 7.9 kg/m<sup>2</sup>) and 33.5 ± 5.4 kg/m<sup>2</sup> for the IB group (42.7 ± 5.7 kg/m<sup>2</sup>). The %EWL at 3 years was 43.1±10.3% for AGB, 56.2±13.6% for SG, 68.2±14.7% for IB and 78.6±19.8% for malabsorptive techniques respectively. (p<0.05). There were no cases of nonresponders (%EWL< 30%) at 2 years. (P<0.05)

One of the most interesting findings was that at 6 months after procedures there were not statistical differences in BMI reduction and %EWL between the study groups, but this changed at 1 year: a comparison between the procedures (excluding the malabsorptive techniques) showed that SG achieved significantly higher BMI reduction and %EWL than AGB and IB (p<0.05). At 5 years, %EWL was more significant than %EWL at 1 and 2 years. (p<0.05)

### DISCUSSION

For comorbidities, there was a statically significant improvement in 35% of patients within the first year after procedures, rising to 78% of patients within 5 years. (p<0.05)

SG showed the best improvement rate compared to AGB and IB; for malabsorptive techniques the results were not comparable due to the reduced number of cases considered.

The most recently available meta-analysis provides good initial evidence in support of surgical intervention also in adolescents. This meta-analysis reported a complication rate comparable to that of adults, indicating that these procedures are safe also in the pediatric age (complication rates of 22%–33% for RYGB, 4.3% for SG, and 10%–48% for AGB)

Recent evidence has demonstrated that SG is a viable option also in adolescents, with short weight outcomes similar to RYGB but with lower risk of long-term nutritional deficiencies, although there are no data available for long-term weight loss outcome. Our study reports interesting findings, comparing different procedures with long-term follow-up. The study population is one of the few pediatric populations ever reported in medical literature with a satisfactory distribution per procedure. Data from our database and study results showed that SG seems to be a promising technique in terms of weight loss, safety, low complication rate and resolution of comorbidities.

Although a National surgical register should be encouraged for the whole country, the data included should be as correct and complete as possible; however, this represents a limit of this study. As for surgical complications, only a limited number of Centers recorded the data regarding complications and, for this reason, it was not possible to report and compare them

There is emerging literature about bariatric surgery in adolescents, but data remain limited. Based on current evidence, bariatric surgery also in adolescents offers weight loss and improvements in terms of patient's health, as it is reported for adults.

Bariatric surgery seems to be an effective method for weight loss in adolescents. Considering the different techniques available in this field, in adolescent patients the Authors advocate the use of those techniques preserving an intact gastrointestinal tract. As reported in recent literature as well as in this study, the use of Sleeve Gastrectomy is safe and useful to achieve high and stable %EWL. Other less invasive techniques, such as AGB or intragastric balloon insertion, offer satisfactory results and could be used as an alternative to SG or in those patients who require immediately reversible procedures.