



Caso clínico

12-year old adolescent with super morbid obesity, treated with laparoscopic one anastomosis gastric bypass (LOAGB/BAGUA): A case report after 5-year follow-up

Miguel Ángel Carbajo¹, Raúl Vázquez-Pelcastre², Rodolfo Aparicio-Ponce², Enrique Luque de León³, José María Jiménez¹, Javier Ortiz-Solorzano¹ and Castro María José¹

¹Centre of Excellence for the Study and Treatment of Morbid Obesity and Metabolic Diseases, Valladolid. Spain. ²High Speciality Regional Hospital of Yucatan Peninsula. Mexico. ³Centre of Excellence for the Study and Treatment of Morbid Obesity and Metabolic Diseases, Mexico DF. Mexico.

Abstract

The prevalence of morbid obesity among adolescents has been on the increase in the recent decades specifically in developed countries around the world. In Europe, Spain has the highest prevalence of obese adolescents with more than 18% of the population of children and adolescents. There is evidence that the only effective and permanent treatment for morbid obesity and the comorbidities is surgical treatment, however there exists many controversies about which treatment is the best for obese adolescents. We report a case of a 12 year old patient with super obesity (58.5 kg/m² of BMI) and metabolic syndrome who underwent LOAGB/BAGUA and monitored during the last 5 year. The patient after five years follow-up maintains a 22.4 kg/m² of BMI. We consider that LOAGB/BAGUA could be an effective and safe procedure as a treatment of obesity and comorbidities as well, for adolescent patients.

(Nutr Hosp. 2015;31:2327-2332)

DOI:10.3305/nh.2015.31.5.8884

Key words: *Childhood Obesity. Adolescent Obesity. Super-Morbid Obesity. Laparoscopic One Anastomosis Gastric Bypass. BAGUA. Mini Gastric bypass. Metabolic Syndrome.*

ADOLESCENTE DE 12 AÑOS PORTADOR DE OBESIDAD SUPER-MÓRBIDA, TRATADO MEDIANTE BYPASS GÁSTRICO DE UNA ANASTOMOSIS (BAGUA) Y MONITORIZADO DURANTE CINCO AÑOS: CASO CLÍNICO

Resumen

La prevalencia de la obesidad mórbida en adolescentes se ha incrementado en las últimas décadas alrededor del mundo y países desarrollados. En Europa, España ocupa el primer lugar de obesidad en adolescentes, con más de un 18% de la población infantil y juvenil. Existe evidencia de que el único tratamiento efectivo y permanente para la resolución de la obesidad y sus comorbilidades es el tratamiento quirúrgico, aunque existen controversias sobre cual sería el procedimiento óptimo para los adolescentes. Reportamos el caso de un paciente de 12 años de edad con superobesidad y síndrome metabólico (IMC de 58.5 kg/m²) que se sometió a bypass gástrico tipo BAGUA y que se ha sido monitorizando durante los últimos 5 años, presentando un IMC actual de 22.4 kg/m². Consideramos que el método BAGUA se puede ofrecer como un procedimiento seguro y efectivo para la resolución de la obesidad y sus comorbilidades, incluso en la adolescencia.

(Nutr Hosp. 2015;31:2327-2332)

DOI:10.3305/nh.2015.31.5.8884

Palabras clave: *Obesidad infantil. Obesidad Adolescencia. Obesidad Super-mórbida. Bypass Gástrico de Una Anastomosis. BAGUA. Mini gastric bypass. Síndrome metabólico.*

Correspondence: Miguel Ángel Carbajo Caballero.
Centre of Excellence for the study and treatment of the morbid obesity and metabolic diseases
Edificio Columbus C/ Estación No 12, 1º dcha.
47004, Valladolid, España.
E-mail: doctorcarbajo@obesos.info

Recibido: 21-II-2015.

Aceptado: 21-III-2015.

Introduction

The prevalence of morbid obesity among adolescents continues to increase around the world^(1,2).

The World Health Organization (WHO), reported in 1998 that obesity was increasing in adults and in children populations also, becoming a pandemic. In the United States from 1998 to 2012, obesity in children between 6 and 11 years of age increased from 7% to 18% and adolescents between 12 and 19 years of age from 5% to 21%^(3,4).

In Spain, overweight children has the highest prevalence in Europe. Recent data obtained from the Spanish Growth Study in 2008 showed an increase of 10% in the rate of overweight in children, adolescents and young adults between 4 and 24 years of age in the last 20 years, an actual estimate is 20% in boys and male adolescents and 15% in female adolescents with overweight and obesity, using the Cole criteria in 2000⁽⁵⁾.

There is evidence that suggests that without proper treatment the obese children will continue to suffer from obesity when they become adults and the overweight adolescents have a probability of 70% of developing obesity in the future^(6,7). Adolescents represent less than 1% of the patients who undergo bariatric procedures⁽⁸⁾. Adults, as well as children and adolescents with morbid obesity develop metabolic syndrome associated with some of the common comorbidities such as diabetes mellitus type II, hypertension, SAOS, dyslipidemia and others cardiovascular risk factors^(9,10,11).

There is few scientific data available in adolescent population. The classical treatment for obese adolescent patients is medical, diet supervision, physical activity and pharmacological intervention⁽¹²⁾. However, the diet control and medical treatment have shown limited results⁽¹³⁾. There is evidence that bariatric surgery is an effective and reliable method for permanent weight loss and obesity treatment available at this time.

Despite the debates about which is the best treatment in adolescent patients and the age limits to perform this surgical bariatric procedure⁽¹⁾, at this moment it is recommended in patients above 40kg/m² of BMI with comorbidities such as hypertension, insuline resistance, etc. Also in 35kg/m² with severe comorbidities as diabetes type II, sleep apnea syndrome, and moderate to severe CPAP.

In the literature the most common bariatric surgical procedures done for adolescent patients are adjustable lap-band and roux en Y gastric bypass, however sleeve gastrectomy has become more popular in recent years but there is no evidence in long term follow up for this procedure^(17,18). LOAGB/BAGUA is the result of a modification of the mini gastric bypass⁽¹⁹⁾, and is demonstrated to be a safe, effective and long-lasting procedure for weight loss and the elimination of the comorbidities in the adult life^(14,20). In our experience with child-adolescent patients, this procedure showed

be an effective method for obesity management and especially whit comorbidities such as diabetes mellitus type II^(14,21).

Case report

We select a case of a patient with 12 years old male, extracted of a total of 28 (1.12%) child-adolescent (12-18 years old) of our database of the last 2500 patients underwent to LOAGB/BAGUA, during the period between 2002 to 2014.

The patient was 146 kg weight, 157 cm height, a BMI of 58.5 Kg/m² and 85 kg above of the ideal weight when was studied, and after included an monitored in the database of European Accreditation Council-Bariatric Surgery (EAC-BS)⁽²²⁾.

Despite being an adolescent the patient suffered from a metabolic syndrome with central obesity, high blood pressure, insulin resistance, artropathy, hypertriglyceridemia, hiatal hernia and severe hepatic steatosis.

The patient underwent various different medical treatments and diet modification without success. Then, the LOAGB/BAGUA procedure was proposed to the family and patient, who accepted and signed the consent form for the bariatric procedure.

He underwent the regular pre operative protocol which included blood tests, radiologic, ultrasonographic, electrocardiogram, acid-barium swallow, ureasa test, breath test and spirometry. Later the patient underwent pre operative respiratory therapy, physical activity and early deambulation and diet protocol specifically designed for the patient, with the goal to reduce 20% of the excess body weight before surgery to diminish the cardiovascular risk during and after surgery⁽²³⁾.

Technique description

We used 6 trocars for the procedure, one of 10 mm for the camera port, 2 of 12 mm for the stapler devices, and 3 trocars of 5 mm for hepatic retractor and intestinal segment control. An auxiliar robotic arm device was connected to the optic system (Lap Man, Medsys, Belgium) to maintain the camera work independently. (Figure 1).

The first step of the procedure was to identify the Treitz ligament, then we measured the totally length intestinal in order to choose the bypass loop. Then we worked in the stomach, releasing the Hiz angle with a section of the phreno esophagic ligament to visualize both pillars and to reduce the hiatal hernia.

We sectioned with ultrasonic scissors (Autosonix, Covidien, USA) the short blood vessels of the lesser curvature of the stomach at the level of the incisura angularis, and opened the cavity of the posterior face of the stomach. After, the stomach was stapled horizontal with a EndoGIA Reticulator tri-staple 45 mm, 3.5mm (Covidien, USA). An orogastric 36 french tube

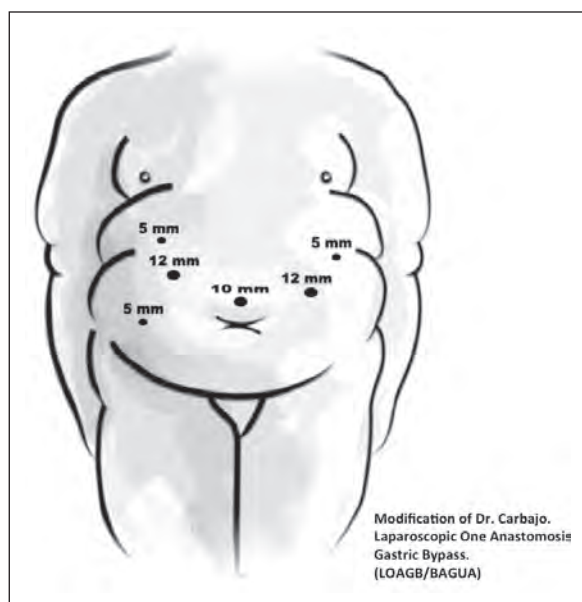


Fig. 1.

was passed for the gastric pouch calibration. The posterior face of the stomach was released from all the adhesions before the vertical stapled of the stomach to complete the gastric pouch in cefalic direction at the esophagogastric junction. This allowed to have a large, stretched and well vascularized gastric pouch.

The intestine was measured from the Treitz ligament to the cecal ileum valve, and mobilized in antecolic and antegastric position to start a running suture stomach-intestine. The biliopancreatic limb excluded was 350 cm, and the common limb the rest of 180 cm. The ileal loop was fixing 10 cm length to the staple line of the gastric pouch. An enterotomy and a gastrotomy was done with ultrasonic scissors 3 to 4 mm, introducing the 75% of the 30 mm, 3.5 mm stapler to

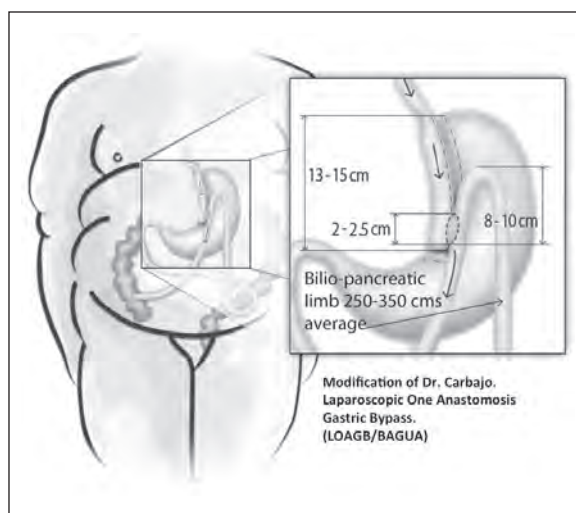


Fig. 2.

create an side to side ileo gastric anastomosis of 2.5 cm length. The anterior face of the anastomosis was closed stitches by separate stitches with polisorb No. 2-0 (Covidien, USA). The bilopancreatic loop was sutured in ascending position of the stomach excluded. Also the common loop was sutured to maintain an antireflux mechanism and releasing the tension from the anastomosis, pneumatic test was performed in the anastomosis (Figure 2).

Immediately postoperative stage

The patient had a liquid diet in the first week, then progressed to a blended semi-liquid diet in the second week. In the following three weeks, he consumed a semi-solid diet and at the sixth week started with a diet consisting of solids, all under careful surveillance

Table I

	<i>Inicial</i>	<i>6 months</i>	<i>12 months</i>	<i>18 months</i>	<i>24 months</i>	<i>5 years</i>
Weight	146 kg	72 kg	69 kg	69 kg	68 kg	65 kg
Height	157 cm	160 cm	162 cm	163 cm	165 cm	170 cm
Ideal weight	61 kg	62.6 kg	63.3 kg	63.6 kg	64.5 kg	67 kg
% Excess Weight Loss	%EWL 0	%EWL 89.1	%EWL 93.1	%EWL 93.4	%EWL 95.7	%EWL 102.5
Body mass index	58.5 Kg/m ²	28.2kg/m ²	26.2 kg/m ²	25.9 kg/m ²	24.9kg/m ²	22.4kg/m ²
% Excess BMI Lost	%EBMIL 0	%EBMIL 90.4	%EBMIL 96.4	%EBMIL 97.3	%EBMIL 100.2	%EBMIL 107.7
Waist index	111 cm	97 cm	87 cm	87 cm	83 cm	80
Hip index	108 cm	98 cm	90 cm	90 cm	96 cm	90
Food tolerance	good	excellent	excellent	good	excellent	excellent
vom	No	No	No	No	No	No
diarrhea	No	No	No	No	No	No
Gastroesophagic reflux	No	No	No	No	No	No

based on the nutritional protocol of our Center. The patient received a prescription for pantoprazol and sucralfato daily during the first month, and calcium phosphate during the first three months. Also a multivitamin and mineral complex for the following three years.

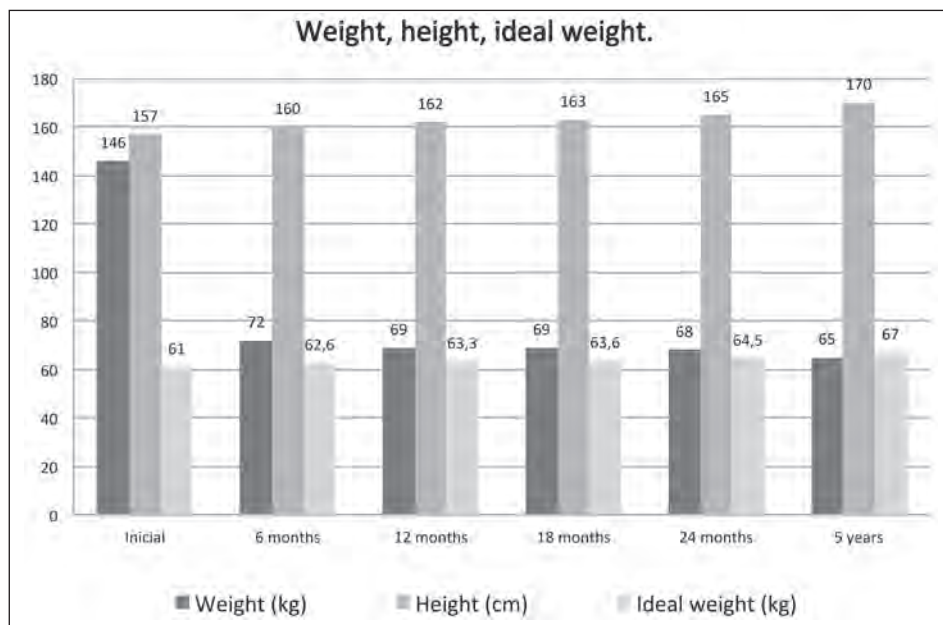
Results

Table I describe the data related to: weight, height, ideal weight, % Excess Weight Loss, BMI, % Excess

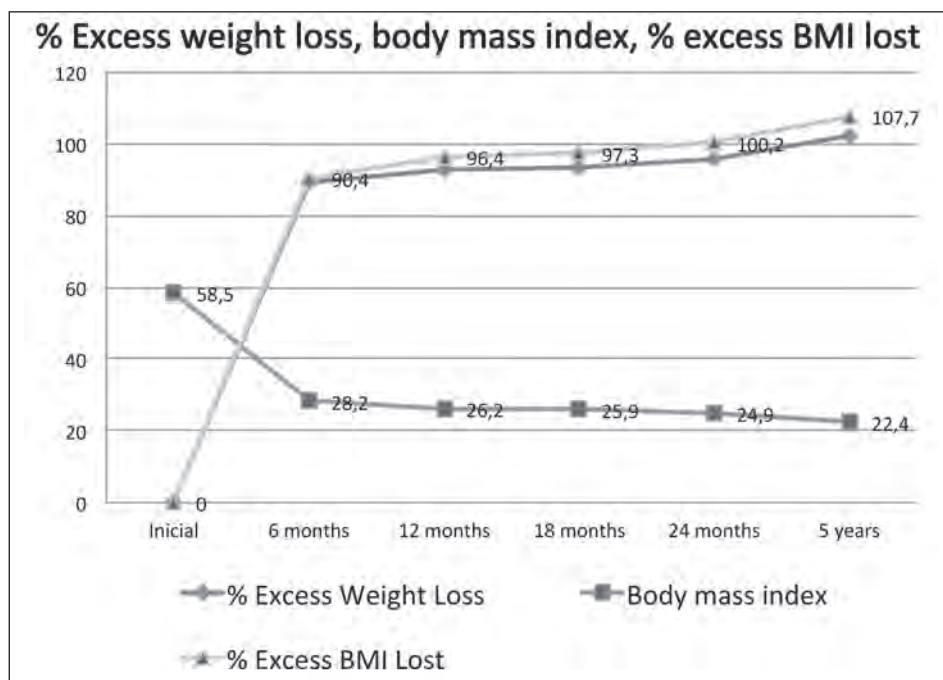
BMI Lost, waist index, hip index, diet tolerance, vomit, diarrhea, and gastroesofagic reflux, in 5 year follow up.

We compared the data related to: weight, height, ideal weight, in the 5 year follow up (Graphic 1), and we observed that the % Excess Weight Loss, Lost BMI, and % Excess of total weight loss was 90 % in the first six months after surgery (Graphic 2).

The insulin resistance improvement was produced immediately after the surgery, with the remission of comorbidities in early stage (Table II), without observing nutritional deficiencies during the 5 year follow up (Graphic 3).



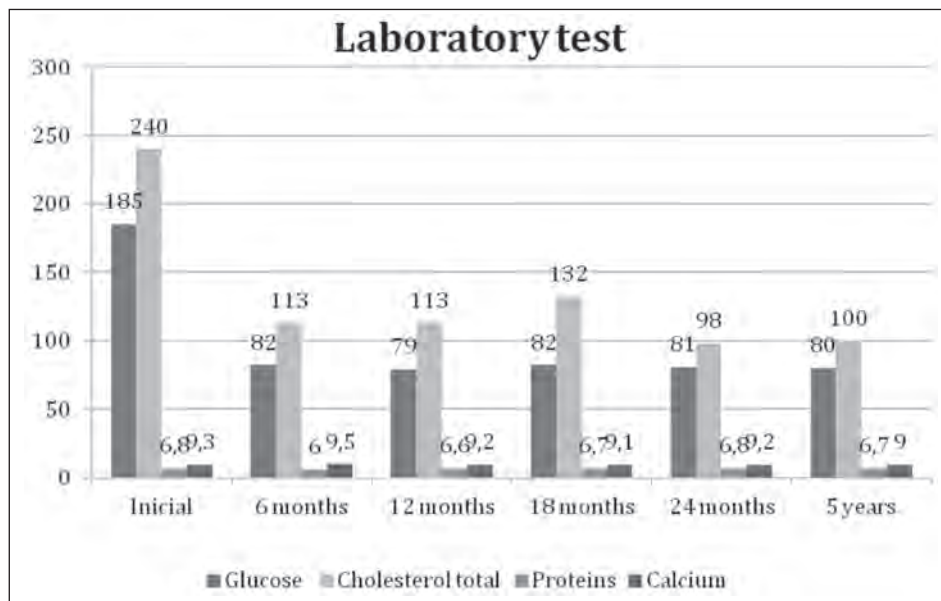
Graphic 1.



Graphic 2.

Table II
Laboratory test data table

	<i>Inicial</i>	<i>6 months</i>	<i>12 months</i>	<i>18 months</i>	<i>24 months</i>	<i>5 years</i>
Glucose	185 mg/dl	82 mg/dl	79 mg/dl	82 mg/dl	81 mg/dl	80 mg/dl
Uric acid	6.3 mg/dl	4.8 mg/dl	4.3 mg/dl	4.2 mg/dl	4.6 mg/dl	4.3 mg/dl
Cholesterol total	240 mg/dl	113 mg/dl	113 mg/dl	132 mg/dl	98 mg/dl	100 mg/dl
Fatty acid	110 mg/dl	70 mg/dl	55 mg/dl	49 mg/dl	56 mg/dl	65 mg/dl
Iron	69 ug/dl	66 ug/dl	56 ug/dl	57 ug/ dl	37 ug/dl	60 ug/dl
Ferritina	13 ng/dl	13.9 ng/dl	12.3 ng/dl	10.9 ng/dl	11 ng/dl	12 ng/dl
Proteins	6.8 g/dl	6.0 g/dl	6.6 g/dl	6.7 g/dl	6.8 g/dl	6.7 g/dl
Albumin	4.9 g/dl	5.1 g/dl	5.0 g/dl	4.7 g/dl	4.9 g/dl	4.5 g/dl
Folic Acid	5.9 ng/dl	6.0 ng/dl	6.2 ng/dl	4.2 ng/dl	4.9 ng/dl	5.1 ng/dl
Calcium	9.3 mg/dl	9.5 mg/dl	9.2 mg/dl	9.1 mg/dl	9.2 mg/dl	9.0 mg/dl



Graphic 3.



Fig. 3.—A): Before surgery. B): After LOGB/BAGUA, 5 years later.

The body mass index went down from 58.5 kg/m² to 22.4 kg/m², reducing the Excess BMI Lost more than 100% the initial IBM with a complete comorbidities resolution. Food intolerance, vitamins or mineral deficits, vomits or gastroesophageal reflux were not observed. An Endoscopic control at 5-years follow-up was performed and was considered normal.

Conclusions

LOAGB/BAGUA can be considered as safe and effective surgical option for a permanent obesity management and its comorbidities in adolescent population. Improving quality of life, health in general and psychosocial environment. However more studies are needed to check the results of this procedure.

Conflict of Interests

The authors declare that they have no conflict of interest.

References

1. David Nocca Marius Nedelcu et al. Laparoscopy sleeve gastrectomy for late adolescent population. *Obesity surgery* (2014) 24:861-865.
2. Kimm SY, Obarzanek E. Childhood obesity: A new pandemic of the new millennium. *Pediatrics* 2002;110:1003-7.
3. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States. *JAMA*. 2014; 311(8):806-814.
4. Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among U.S. children, adolescents, and adults, 1999-2002. *JAMA*. 2004;291(23): 2847-2850.
5. Carrascosa A, Fernandez JM, Fernandez C, Ferrández A, Lopez-Siguero JP, Sanchez E, et al., Grupo Colaborador Español. Estudio transversal español de crecimiento 2008. Parte II: valores de talla, peso e índice de masa corporal desde el nacimiento a la talla adulta. *An Pediatr (Barc)*. 2008;68: 552-69.
6. Inge TH. Baseline BMI is a strong predictor of nadir BMI after adolescent gastric bypass. *J Pediatr*. 2010;156:103-8.
7. U.S. Department of Health and Human Services. The surgeon general's call to action to prevent and decrease overweight and obesity. [Overweightinchildrenandadolescents:surgeongeneral.gov/topics/obesity/calltoaction/fact_adolescents.htm](http://www.hhs.gov/topics/obesity/calltoaction/fact_adolescents.htm)
8. Tsai WS, Inge TH, Burd RS. Bariatric surgery in adolescents: recent national trends in use and in-hospital outcome. *Arch Pediatr Adolesc Med*. 2007;161:217-21.
9. Dabelea D et al. Incidence of diabetes in youth in the United States. *JAMA*. 2007;297(24):2716-24.
10. DeFronzo RA, Ferrannini E. Insulin resistance. A multifaceted syndrome responsible for NIDDM, obesity, hipertensión, dyslipidemia and atherosclerotic cardiovascular disease. *Diabetes Care*. 1991;14(3):173-94.
11. Weiss R, Dziura J, Burgert TS, Tamborlane WV, Taksali SE, Yeckel CW, et al. Obesity and the metabolic syndrome in children and adolescents. *N Engl J Med* 2004;350:2362-74.
12. Inge TH et al. Bariatric surgery for severely overweight adolescents: concerns and recommendations. *Pediatrics*. 2004;114(1): 217-23.
13. Brownell KD, Rodin J. Medical, metabolic, and psychological effects of weight cycling. *Arch Intern Med*. 1994;154(12):1325-30.
14. Carbajo MA et al. One-anastomosis gastric bypass by laparoscopy: results of the first 209 patients. *Obes Surg*. 2005 Mar; 15(3):398-404
15. Hsia DS, Fallon SC, Brandt ML. Adolescent bariatric surgery. *Arch Pediatr Adolesc Med*. 2012;166:757-66.
16. Pratt JS, Lenders CM, Dionne EA, et al. Best practice updates for pediatric/adolescent weight loss surgery. *Obesity (Silver Spring)*. 2009;17:901-10.
17. Michalsky M, Reichard K, Inge T, et al. ASMBS pediatric committee best practice guidelines. *Surg Obes Relat Dis*. 2012; 8:1-7.
18. Pratt JS, Lenders CM, Dionne EA, et al. Best practice updates for pediatric/adolescent weight loss surgery. *Obesity (Silver Spring)*. 2009;17:901-10.
19. Robert Rutledge MD FACS. The Mini-Gastric Bypass: Experience with the First 1,274 Cases. *Obes Surg*. June 2001, Volume 11, pp 276-280.
20. Lee WJ, Lin YH. Single-anastomosis gastric bypass (SAGB): appraisal of clinical evidence. *Obes Surg*. 2014 Oct;24(10): 1749-56.
21. Carbajo MA, Jiménez JM, Castro MJ, Ortiz-Solórzano J, Arango A. Outcomes in weight loss, fasting blood glucose and glycosylated hemoglobin in a sample of 415 obese patients, included in the database of the european accreditation council for excellence centers for bariatric surgery with laparoscopic one anastomosis gastric bypass. *Nutr Hosp* 2014 Nov 1;30(n05):1032-1038
22. European Accreditation Council for Excellence Centers for Bariatric Surgery (EAC-BS). www.eac-bs.com.
23. Carbajo MA, Castro MJ, Kleinfinger S, Gómez-Arenas S, Ortiz-Solórzano J, Wellman R, García-Lanza C, Luque E. Effects of a balanced energy and high protein formula diet (Vegestart complet®) vs. low-calorie regular diet in morbid obese patients prior to bariatric surgery (laparoscopic single anastomosis gastric bypass): A prospective, double-blind randomized study. *Nutr Hosp* 2010; 25(6):939-948.