

# Current State of Laparoscopic Roux-en-Y Gastric Bypass as a Surgical Treatment Modality for Morbid Obesity in Adolescents

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Obesity in children has dramatically increased in number and is affecting health of many adolescents. Children with Body Mass Index >99<sup>th</sup> percentile tend to become obese adults with more health complications and a higher mortality rate than those who become obese in adulthood, therefore, obesity brings major concerns to medical providers and parents [1]. Even though bariatric surgery is not a permanent cure for obesity, it has been proven to improve obesity-related co-morbidities in children, who have failed multiple non-operative weight loss methods [2]. The use of bariatric surgery in older children is still not universally accepted, and data on this treatment modality is lacking. In order to investigate the current state of bariatric surgery in pre-adult population, we designed a meta-analytic study to evaluate the current state of laparoscopic roux-en-y gastric bypass (LRYGB) as treatment modality for morbidly obese adolescents.

Using PubMed, MEDLINE, and CHINAHL databases, a systematic review of most current and relevance articles from 2003 to 2012 was performed. A total 7 full articles were studied. Keywords used were adolescent, children, outcomes, and bariatric surgery. Improvement of obesity-related co-morbidities was emphasized in order to objectively evaluate the benefits of laparoscopic gastric bypass in morbidly obese adolescents.

A total six hundred and ninety two adolescents underwent laparoscopic Roux-en-Y gastric bypass (RYGB) were included in the study period. The average preoperative body mass index (BMI) was 52.9 kg/m<sup>2</sup>, with mean age of 17, 10 years old (range: 11 to 23). Postoperatively, significant weight loss was seen at 12 and 24 months, with average outcome BMI of 35.9 and 33.8 kg/m<sup>2</sup>, respectively (Table 1). At 12 months, systolic blood pressure (SBP) and diastolic blood pressure (DBP) decreased by 6.7% and 5.8%, respectively. Among chemical parameters, total cholesterol decreased by 15.7%. High density lipoprotein (HDL) exhibited a non-significant increase of 3.9%. Low density lipoprotein (LDL) and serum triglyceride levels markedly decreased by 15.1% and 38.9%, respectively.

Inge et al. [3] described that the prevalence of obesity among pediatric age groups in the United States has almost tripled in the past 30 years, with current conservative estimate indicates that 15.5% of children and adolescents are obese [3]. Our meta-analysis included 7 RYGB studies that described patient characteristics, postoperative outcomes, and complications. They have shown a significant weight reduction after LRYGB, with improvement in the systemic blood pressure and lipid panel. It is suggested that the timing of surgery is an important factor for success, as late referrals for bariatric surgery at higher BMI, potentially preclude reversal of obesity within the first postoperative year and may increase the risk of weight regain [3].

Regarding the obesity-related comorbidities, Teeple et al. [4] described that the rising trend of morbid obesity in children is associated with high incidence of obesity-related illnesses, such as

Authors	Patients (n)	Duration	Mean age (year)	BMI preop (kg/m <sup>2</sup> )	BMI postop (kg/m <sup>2</sup> )	
					12 mo	24 mo
Inge et al. [2]	61	2002-2007	17.2 (13-23)	60.2	37.7	NR
Nijhawan et al. [7]	25	10 years	16.9 (14-18)	45.7	NR	28.6
De La Cruz-Munoz et al. [8]	65	2001-2010	18.3 (16-19)	46.2	34.9	NR
Lawson et al. [9]	39	2001-2003	NR (13-21)	56.5	35.8	NR
Teeple et al. [4]	15	2004-2009	NR	58.8	37.6	34.9
Messiah et al. [6]	454	2004-2010	NR	50.7	33.62	NR
Xanthakos [10]	33	21 years	16 (NR)	52	NR	38

NR = Not Recorded

**Table 1:** Previously published studies on laparoscopic roux-en-y gastric bypass in morbidly obese adolescents.

hypertension, hyperlipidemia, obstructive sleep apnea, polycystic ovarian syndrome, hepatic steatosis, and cardiac dysfunction [4]. The overall postoperative complications rate after the LRYGB was 19.7%, which consisted of procedure-related/technical complications, systemic complications, and nutritional deficiencies. Anastomotic leak, bleeding, intestinal obstruction, surgical site infection, and venous thromboembolism represented the majority of procedure-related complications. Dehydration, iron deficiency anemia, vitamin B, and vitamin D deficiency were the most commonly seen nutritional problems after LRYGB. Other systemic complications such as postoperative pneumonia, and clostridium difficile infection were seen in low frequency. These complications can be minimized with meticulous surgical technique, vitamins and minerals supplementation program, routine postoperative follow-up, exercise program, and lifestyle modifications.

In conclusions, laparoscopic Roux-en-Y gastric bypass in morbidly obese adolescents is safe and feasible. Surgical weight loss method in children results in improvements of obesity-related comorbidities and excellent weight loss outcome [5,6].

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