



## Laparoscopic Sleeve Gastrectomy in a 2-Year-Old Morbidly Obese Child: A Case Report with Two Year Follow-Up

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### Abstract

Morbid obesity in infancy or early childhood is a challenging disease to manage. Here we present a case report of the successful management of a two-year-old morbidly obese bed-ridden girl child with sleep apnea who underwent Laparoscopic Sleeve Gastrectomy (LSG). Bariatric surgery in this age group comes with a lot of decision-making challenges, technical and ethical considerations, and literature is scant on pediatric bariatric surgery. We describe the case and associated challenges in detail in this report.

**Keywords:** Pediatric bariatric surgery; Childhood obesity; Sleeve gastrectomy; Obesity in infants

### Introduction

There is no consensus on a cut-off point for overweight or obesity in children and adolescents. The Centre for Disease Control and Prevention defined overweight as at or above the 95<sup>th</sup> percentile of Body Mass Index (BMI) for age and “at risk for overweight” as between 85<sup>th</sup> to 95<sup>th</sup> percentile of BMI for age [1].

The ecological model, as described by Davison et al. [1], suggests that child risk factors for obesity include dietary intake, physical activity, and sedentary behavior. The impact of such risk factors is moderated by factors such as age, gender. Family characteristics parenting style, parents’ lifestyles also play a role.

Genetic milieu is one of the important factors examined as a cause of obesity in children. Genetic susceptibility often needs to be coupled with contributing environmental and behavioral factors in order to affect weight. Several rare genetic syndromes can cause obesity in children [2]:

- Prader-Willi syndrome
- Pro-opiomelanocortin deficiency
- Leptin receptor deficiency
- Bardet-Biedl Syndrome (BBS)

Childhood obesity has been linked to numerous medical conditions [1]. These conditions include fatty liver disease, Obstructive Sleep Apnea (OSA), Type 2 diabetes, asthma, hepatic steatosis (fatty liver disease), cardiovascular disease, high cholesterol, cholelithiasis (gallstones), glucose intolerance and insulin resistance, skin conditions, menstrual abnormalities, impaired balance, and orthopedic problems.

In addition to being implicated in numerous medical concerns, childhood obesity affects children’s and adolescents’ social and emotional health.

Weight loss surgery for obese children and adolescents is a controversial topic. In decision making for bariatric surgery in childhood, multidisciplinary teams should agree on the specific needs and abilities of the given patient and should be considered on a case-by case basis.

We report successful management of a two year and three-month-old morbidly obese bed-ridden girl child with sleep apnea without any known cause of obesity who underwent laparoscopic sleeve gastrectomy. There is a limited literature available regarding guidelines, type of bariatric surgery and operative technique for this age group (<3 years). As to our best knowledge, there is only one published case report of Laparoscopic sleeve gastrectomy in the age group of less than 3 years

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wherein LSG was done in 2.5-year-old Saudi boy [3]. This makes the index case as the youngest reported case of Bariatric Surgery till date.

### Case Presentation

A 2-year-old girl child was referred to us from pediatric endocrinology department for bariatric surgery. She was born in March 2019, to non-obese parents by LSCS at 35 weeks of Gestational age. Birth weight was 2.7 kg. APGAR score at the time of birth was normal. Her brother six year elder to her was normal weight, achieved all milestones at appropriate age. She was exclusively breast feed till the age of 3 months when she started feeling hungry. To compensate the increase appetite, parents added top feed from the age of four months. Parent noticed abnormal gaining weight from 4 months of age. In view of abnormal weight gain at the age of four months with weight of 8 kg, parents consulted pediatrician who in turn referred them to pediatric endocrinologist. Intensive work up was done to find out the cause of obesity. Thyroid profile (to rule out hypothyroidism), serum cortisol/ACTH (increased levels causes insulin resistance and hepatic gluconeogenesis), serum insulin (to rule out insulin resistance), lipid profile, MRI brain (to rule out pituitary and hypothalamic mass) was done. All these investigations were normal except that serum leptin levels were raised.

Genetic study for monogenic (LEP, LEPR, POMC, MC4R, MC3R



Figure 1: Port position.



Figure 2: Gastrolysis.



Figure 3: Stapling of stomach.

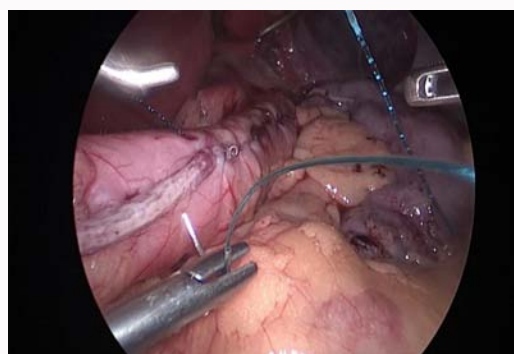


Figure 4: Oversewing of staple line.

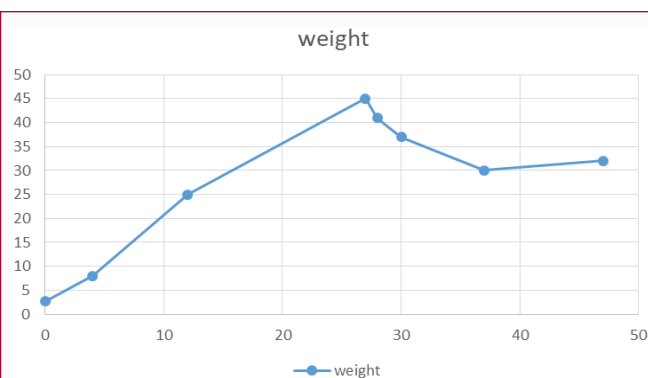


Figure 5: Progress of weight loss after Sleeve Gastrectomy.

etc..) and syndromic obesity panels genes (Prader-Willi, WAGR, BBS Syndrome etc..) were done, no abnormality was detected. Sleep study revealed severe OSA. There was severe delay in developmental milestones.

Her weight increased to 25 kg at the age of one year. Weight continued to increase at same pace and at the time of presentation to us, at the age of 2 years, her weight was 45 kg, height 104 cm and BMI was 41.6 kg/m<sup>2</sup>. She was bed-ridden, unable to sit by herself, was eating and drinking excessively and had severe OSA.

Child was evaluated by the multidisciplinary team consisting of pediatric endocrinologist, pediatricians, pediatric intensivist, bariatric surgeons and anesthetist. Child was re-evaluated to find out the cause of obesity. Serum insulin levels, serum cortisol/ACTH, MRI Brain and genetic analysis were repeated, they were again normal. Sleep study revealed severe OSA with significant desaturation during sleep.

She was put on CPAP after titration to optimize her. In view of life-threatening morbid obesity, after discussing with parents and taking their consent, decision of LSG was taken as a life saving measure.

Administration of general anesthesia in morbidly obese child with severe OSA was challenging as was getting a venous access. A video laryngoscope was used for intubation. Central and radial arterial lines were also inserted. Short acting anesthesia agents were used for induction and maintenance for anesthesia to avoid postoperative anesthesia complication including hypoxia.

Initial pneumoperitoneum was created using verses needle from Palmer's point. Supra-umbilical 5 mm camera port was inserted, 12 mm port for stapler was inserted in right mid clavicular line. Two 5 mm ports were inserted on left side along with a Nathanson's liver retractor (Figure 1). To start with, an intraoperative upper GI endoscopy was done with pediatric scope. Gastrolysis was performed 3 cm proximal to pylorus till angle of his (Figure 2). Gastric sleeve was made over 32 French bougie and stomach was stapled using Echelon™ flex powered gun using adult 45 mm first green and subsequent blue cartridges (Figure 3). Staple line was oversewn using barbed absorbable suture (Figure 4). There was minimal blood loss during the surgery.

Patient was extubated in OT itself, was shifted to pediatric ICU and was shifted toward after 48 h of surgery. Post-op period was uneventful. She was given clear liquid diet from post op day 1 and discharged on post-op day 3.

Patient was closely followed up in post-op period. Child lost around 10% of body weight within first one month of surgery and there was immediate relief in OSA. Snoring completely disappeared. Patient was put up on regular physiotherapy and continue to make improvement. On follow up, 3 month and one-year post-surgery weight was 37 and 30 kgs respectively (Figure 5). Within six months of surgery, she was able to stand with support, and showed significant progress in general wellbeing.

Now at the age of 4 years, 2 years after the surgery, her weight is 32 kg, height is 111 cm and BMI is 25.97 kg/m<sup>2</sup>. She is able to walk now and ride a tricycle. At present, her motor and cognitive milestones are appropriate as per her age. She has joined school and is able to lead a normal life.

## Discussion

Decision of doing bariatric surgery in this child age group was most important and challenging aspect in this case. After exhausting all the options for weight loss, child was referred to us by pediatric endocrinologist. Child was evaluated again with new team of pediatricians and endocrinologist. No etiology of morbid obesity was found. In view of life-threatening comorbidities, the possibility of bariatric surgery was discussed with parents as the only measure which could have helped the child. It was the decision with agreement of pediatricians, endocrinologists, anesthetists, intensivists, parents and surgical team.

As per ASMBS, in decision making for bariatric surgery in childhood, multidisciplinary teams should agree on the specific needs and abilities of the given patient and caregiver and these should be considered on a case-by case basis with the assistance of the hospital ethics committee where appropriate [4].

Stefan M. van Geelen et al. wrote, besides concerns over efficacy

and safety; influence on health, motivation, and the possibility of informed consent—play an important role in the disputes over bariatric surgery for childhood obesity [5].

As per Hofmann, the risks of bariatric surgery in children are considerable, and its long-term safety and efficacy in children remains largely unknown. Surgery should be reserved for only the most severe cases [6].

As per ASMBS, LSG has become the most used and most recommended operation in children and adolescents with severe obesity for several reasons, near-equivalent weight loss to the Roux-en-Y Gastric Bypass (RYGB) in adolescents, fewer reoperations, better iron absorption, and near-equivalent effect on comorbidities as RYGB in adolescents [4].

There were many technical challenges. Compared to big size of abdomen, morbidly obese toddler coelomic cavity volume is very small. It was a challenge to have ergonomically adequate space between ports. As toddler size laparoscopic instruments, stapler gun and cartridges are still not manufactured, using Size adult Endo GI stapler used for stapling the stomach were a constraint. It was ergonomically challenging and was difficult to maneuver them in a small abdomen. These age group children have a very low total blood volume and reserves, thus allowable blood loss is very low. The adult bougie could not be used, thus a pediatric endoscope was used to guide formation of sleeve. There was no previous operative bariatric surgery video available for this age group which made the preoperative planning difficult.

In this case, child did very well in follow up. Before surgery, she was bed ridden. Post-surgery underwent rigorous physiotherapy and within three month she was able to stand. At the time of surgery her BMI was 41.6 kg/m<sup>2</sup>. Currently at present at the age of 4 years, BMI is 25.97 kg/m<sup>2</sup>. As per current age she has achieved all cognitive and motor milestones.

She is being monitored for any nutritional deficiencies regularly and is being given supplements appropriate for her age and weight. Bone health is a concern in children after bariatric surgery, as is vitamin B1 and B12 deficiency. They should be supplemented well with B1, B6, B12, Folic Acid, Iron, Calcium and Vitamin D3. As per ASMBS, Children and Adolescents are more likely to stop taking nutritional supplements. Therefore, annual follow-up with vitamin level monitoring is strongly recommended. Efforts should be done to make sure that the child remembers to take supplements daily [4].

Her family is very satisfied and happy with her progress. As a caregiver, we were able to achieve desired result in a short period of time.

## Conclusion

Bariatric Surgery can be done as a lifesaving procedure in a morbidly obese toddler, with severe life-threatening comorbidities. LSG is safe and effective in this age group.

Decision making and medico legal/ethical consideration are very important aspects of pediatric bariatric surgery.

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