

Surgical Interventions in the Pediatric Population:

Selecting the Right Patient and the Right Procedure

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Case #1: A.B.

- 17 yr old male
 - 5' 11" tall
 - 243 lbs
 - Elevated cholesterol
 - “Heavy” since age 8 yrs
 - Has tried to lose weight by dieting
 - Plays basketball with friends

Case 2: C.D.

- 14 yr old female
 - 5' 2"
 - 256 lbs
 - Heavy since age 6 yr
 - Elevated insulin levels
 - Irregular periods
 - Ankle pain
 - Lost 15 lb on Weight Watchers x 2 but regained

Both Overweight, but only 1 is Obese

- 17 yr old male
 - 5' 11" tall
 - 243 lbs
 - Elevated cholesterol
 - "Heavy" since age 8 yrs
 - Has tried to lose weight by dieting
 - Plays basketball with friends
 - **BMI = 34**
- 14 yr old female
 - 5' 2"
 - 256 lbs
 - Heavy since age 6 yr
 - Elevated insulin levels
 - Irregular periods
 - Ankle pain
 - Lost 15 lb on Weight Watchers x 2 but regained
 - **BMI = 47**

Patient Profiles

what we can see and hear...

- 3 female : 1 male
- Obese (“heavy”) since elementary school
- Tried dieting (Weight Watchers, Atkins, self designed with transient success (but ultimate regain))
- Lower extremity joint pains
- Skin changes
- Depressed- low self esteem
- Want to be like the other kids

Patient Profiles

what we can't see and hear...

- Type II Diabetes/Glucose intolerance
- Hyperlipidemia
- Hypertension
- Sleep disturbances
- Hepatic steatosis
- Cholelithiasis
- Stress incontinence
- Menstrual abnormalities

What does it mean to be obese?

Social Implications:

- Unable to
 - go to movies
 - sit on bus or theater
 - use seat belt
 - fit through turnstile
 - play with children
 - maintain adequate hygiene
 - buy stylish clothes
 - avoid being the center of jokes
- Resulting behavior:
 - depression
 - low self esteem
 - self-conscious
 - uncomfortable in gyms
 - lack intimacy
 - do not participate

Who is a surgical candidate?

- Patients whose **BMI exceeds 40** are potential candidates for surgery if they strongly desire substantial weight loss, because obesity severely impairs the quality of their lives. They must clearly and realistically understand how their lives may change after operation.
- In certain instances less severely obese patients (with **BMI's between 35 and 40**) also may be considered for surgery. Included in this category are patients **with high-risk comorbid conditions** such as life-threatening cardiopulmonary problems (e.g., severe sleep apnea, Pickwickian syndrome, and obesity-related cardiomyopathy) or severe diabetes mellitus.
- Other possible indications for patients with **BMI's between 35 and 40 include obesity-induced physical problems interfering with lifestyle** (e.g., joint disease treatable but for the obesity, or body size problems precluding or severely interfering with employment, family function, and ambulation).
- **Children and adolescents have not been sufficiently studied to allow a recommendation for surgery for them even in the face of obesity associated with BMI over 40.**

What about obese adolescents?

- Adolescents Being Considered for Bariatric Surgery Should:
 - Have failed 6 months of organized attempts at weight management, as determined by their primary care provider
 - Have attained or nearly attained physiologic maturity
 - Be very severely obese (**BMI \geq 40**) with **serious obesity-related comorbidities** or have a **BMI of 50** with **less severe comorbidities**
 - Demonstrate commitment to comprehensive medical and psychologic evaluations both before and after surgery
 - Agree to avoid pregnancy for at least 1 year postoperatively
 - Be capable of and willing to adhere to nutritional guidelines postoperatively
 - Provide informed assent to surgical treatment
 - Demonstrate decisional capacity
 - Have a supportive family environment

(continued)

- Surgical management may be warranted for very severely obese adolescents who have serious obesity-related comorbid conditions and who have, in the opinion of their primary care providers, experienced failure of organized attempts to achieve sustained weight loss.
- Suggested criteria for surgical intervention cannot be applied rigidly to every patient but should be tailored to the individual patient's needs, on the basis of the patient's maturity level and the severity of comorbid conditions.
- A multidisciplinary team with expertise in adolescent weight management and bariatric surgery should carefully consider the indications, contraindications, risks, and benefits of bariatric surgery for individual patients.
- It is essential for patients and their families to realize that bariatric surgery is not a cure for obesity but instead is an effective **weight loss tool** when patients comply with recommended dietary and physical activity regimens.
- Patients and their families must fully understand the known risks and possible side effects of individual bariatric surgical procedures and should participate in decision-making.
- Adolescent bariatric surgery should be performed only at facilities capable of treating adolescents with complications of severe obesity, where detailed clinical data collection can occur.
- Highly trained and skilled bariatric surgeons must play an integral role within multidisciplinary adolescent bariatric teams, to ensure safe and effective application of bariatric surgical procedures for adolescents

Are these criteria too strict?

- the BMI threshold for bariatric surgery proposed by these “conservative” guidelines was not informed by a critical review of the bariatric surgery literature
- the higher BMI criterion for adolescent bariatric surgery exposes the adolescent to a higher degree of risk for operative complications and death
- the heavier the patient is at the time of bariatric surgery, the less the percent of weight lost, the lower the likelihood that conditions amenable to surgical weight loss will be ameliorated or resolve, and the greater the likelihood of weight regain

Garcia VF, DeMaria EJ. Adolescent bariatric surgery: treatment delayed, treatment denied, a crisis invited.

Obes Surg. 2006 Jan;16(1):1-4.

Not Everyone Agrees...

- (Bariatric surgery) is not indicated in children and adolescents, except in exceptional circumstances determined in units specialized in nutrition and pediatrics with an expert analysis of the psychological situation.

...but patients speak for themselves:

1. You feel better about yourself and are not depressed all the time
2. There are lots of big teenagers out there
3. If they choose to have it and enough information is given to them. 17-18 (years) is a better age
4. If you can't control yourself, why not? No harm. I am better for it.
5. Definitely! Should not matter what age. No one wants to be that way. Best thing.
6. People at that age are not immature. You are more aware of things when you are morbidly obese.
7. Not under 18 years. You may run into something that may help you. Be sure the person is ready.
8. If they feel there is no other solution.
9. I wouldn't get to 21 if I didn't have the surgery at 16 years.
10. Healthwise reasons; I was 14 years and weighed 340 lbs, which is not healthy!

Types of Procedures

- **Malabsorptive**
- **Restrictive**
- **Combination**
- **Novel**

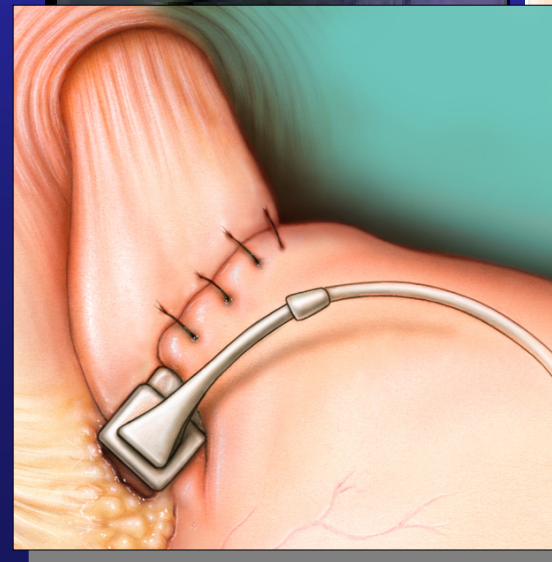
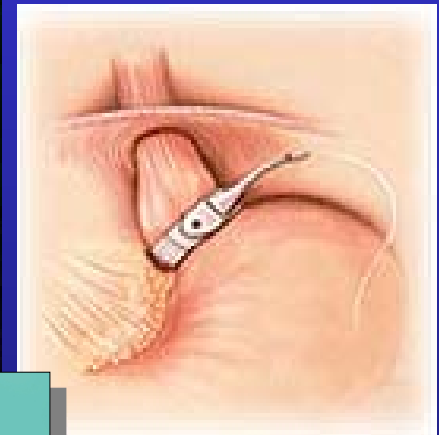
Roux-en-Y Gastric Bypass (LAGB)

- **Most common bariatric procedure in the US.**
- **Advantages**
 - **Greater wt loss (EWL 80% at 24 months and 75% at 30 mos)**
 - **Little weight gain**
 - **Causes avoidance of sweets and fats**
- **Disadvantages**
 - **Complication rate of 2-5%**
 - **Death rate 0.5-1**
 - **Poor absorption of vitamins and minerals**
 - **Difficult to reverse**
- **Failure rate (15%)**



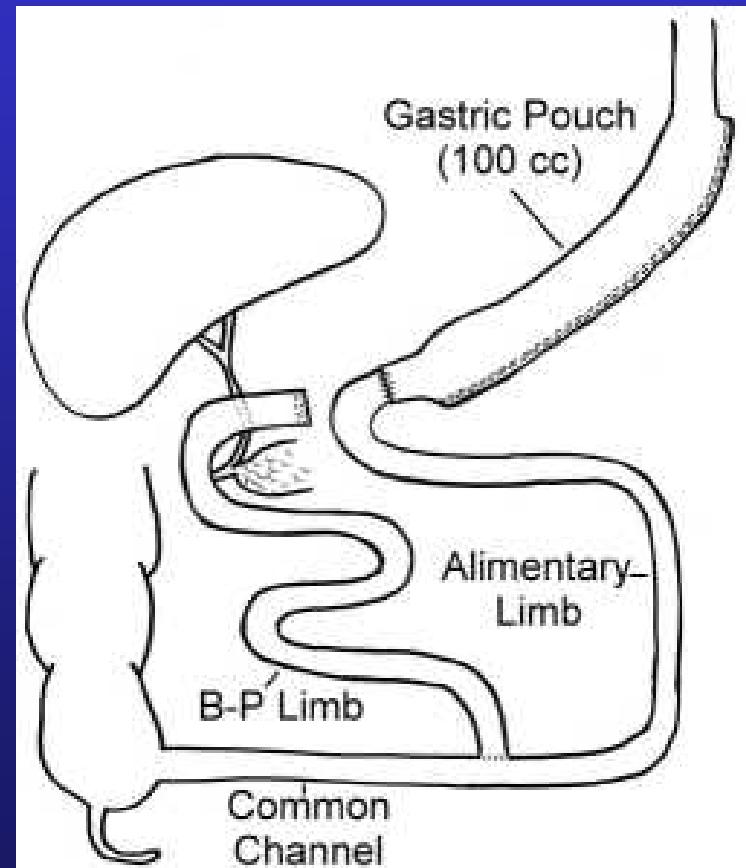
Laparoscopic Adjustable Silicone Gastric Banding (LAGB)

- Most commonly used bariatric procedure worldwide.
- Advantages
 - Less invasive
 - Band is adjustable to customize pouch according to patients needs (e.g., pregnancy)
 - Reversible
 - Complication rate <1%
 - Mortality rate <0.1%
- Disadvantages
 - Band Slippage
 - Gradual weight loss
- Failure rate~15%



Other Bariatric Operations

- Gastric sleeve resection
- Duodenal switch
- Gastric pacing
- Gastric balloon



LAGB vs LGBP

- 500 patients (age 17-63)
- BMI 36-60 (mean 43)
- No deaths
- Mean excess weight loss
 - 56% @ 1 yr
 - 65% @ 2 yrs
 - 64% @ 3yrs

“We believe that (LAGB) should not be regarded just as a first-step procedure but as a final therapy, even for superobese patients”

Problems analyzing literature...

- Han et al: Gastric Sleeve Resection 130 patients (age 16-62)
- Salinas et al: Silastic Ring Vertical Gastric Bypass 1588 patients (age 12-70)
- Rutledge & Walsh: Mini-Gastric Bypass 2410 patients (age 14-78)
- Parikh et al: Lap Bariatric Surgery in Super-Obese 332 patients (age 13-72)
- White et al: Gastric Bypass 342 patients (age 15-68)

Advantages of bariatric surgery in morbidly obese *adolescents* vs. adults

- **Avoid irreversible co-morbidities**
 - » Body image not fully developed
- **Generally healthier than adults**
- **Develop lifelong habits**
- **May have greater success**

Disadvantages of bariatric surgery in morbidly obese adolescents vs. adults

- **More likely to lose weight without surgery**
- **May not be as compliant**
- **Not yet reached full physical maturity**
- **Not able to give consent**
- **May be coerced**
- **Less data available**

Bariatric Surgery in Adolescence. Is this the Best Age to Operate?

- 19 patients, ages 13-19
- May 1990 – August 2001
- Avg BMI 49 kg/m² (range 38-67)
- Vertical Banded Gastroplasty-Roux en Y gastric bypass
- Mean BMI 5.5 years p/o 28 (23-45)
- 100% resolution of comorbidities

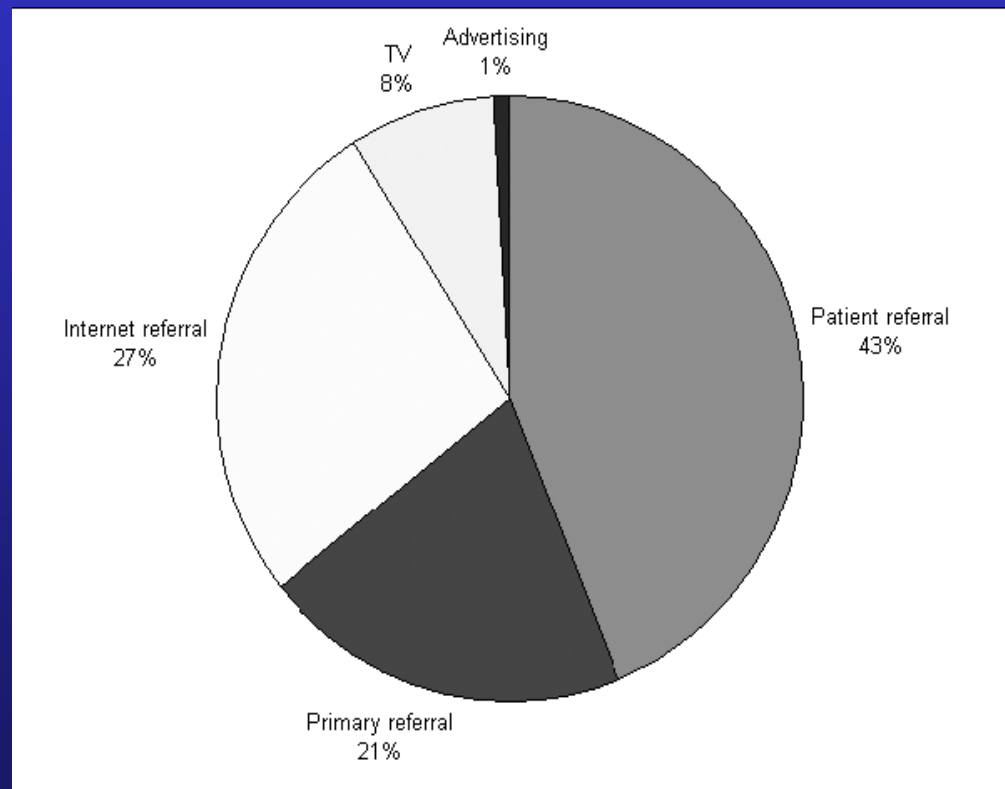
Bariatric Surgery for Severely Obese Adolescents

- 33 patients, 12.4-17.9 years
- Mean BMI 52 ± 11 kg/m² (38-91)
- HGP, VBGP, GBP
- Weight loss
 - N =28 61-77% EWL (BMI 29-31) 5-14yr p/o
 - 5 lost weight but regained at 5 years
- 2 late deaths (> 5yrs)
- Comorbid conditions--resolution
 - DM 2/2
 - HTN 9/11
 - SAS 6/6
 - GERD 3/5
 - PsC 3/3
 - PCOS 1/1
 - DJD 4/11

LAGB in morbidly obese adolescents

- **N = 17 patients**
- **Median age = 17 (12-19) yrs**
- **Median Preoperative weight = 127.9 (82.9-218.8)kg**
- **Median Preoperative BMI = 44.7 (31.6-70.5)kg/m²**
- **Median follow up = 25 (12-46) months**
- **Outcomes**
 - **Complications (Band slippage n=1, Port leakage n=1)**
 - **Median %EWL= 59.3%**
 - **patients achieving 50%EWL= 76.5%**

How do patients learn about bariatric surgery (US)



How do patients choose?

2 sites with strong patient preference for LAGB*

Australia

- LAGB
 - Least Invasive
- LGBP
 - “Dumping”
- BPD/DS
 - Sustained weight loss

United States

- LAGB
 - Surgical Safety
- LGBP
 - Lack of foreign body
 - Inability to cheat
- BPD/DS
 - Sustained weight loss

***Mostly adults**

Necessary Ingredients

- Multidisciplinary team
 - Nutritionist
 - Nurse Coordinator
 - Medical Specialist(s)
 - Psychologist/Psychiatrist
 - Exercise Specialist
 - Surgeon
 - Anesthesiologist
- and
 - Billing/Financial Expert(s)

Gastric Bypass for Morbidly Obese Adolescents

Authors	N	Age (yrs)	Mean Pre op BMI (kg/m ²)	Mean Pre op Wt (kg)	Follow up (yrs)	%EWL	comorbidities
Strauss, 2001	10	<17	52.4	148	1	66%	R
Capella, 2003	19	13-17	49	133	5.5 (1-10)	80% at 5 yrs 78% at 6 yrs	R
Schauer, 2000	4	17-19	55.1	158	2	87% at 2 yrs	R
MacGregor, 1994	34	11-19	47	131	6	66% at 6 yrs	R
Higa, 2000	10	16	54	----	2	53%	R
Total/Range	77	13-19	49.2	135.7	5.7	68.8%	R

Gastric Banding for Morbidly Obese Adolescents

Authors	N	Age (yrs)	Mean Pre op BMI (kg/m ²)	Deaths	Follow up (yrs)	Mean %EWL	comorbidities
Angrisani, 2005	58	15-19	46.1 (34.9-69.2)	0	1-7	45.6-55.6%	R
Dolan, 2003	17	12-19	44.7	0	2 (1-4)	59.3%	R
Nadler, 2006	41	13-17	47	0	2	51.5%	R

Which is the “right” operation?

Survey of European bariatric surgeons-
2004

39% offer laparoscopic bariatric surgery to
pediatric patients

- LAGB 76%
- LRYGBP 8 %
- L-BPD 8 %
- Other 4%

Advantages

- LRYGBP
 - Reliability
 - Experience
 - Durability
 - Rapid weight loss
 - Greater weight loss in many cases
- LAGB
 - Safety
 - Adjustability
 - Reversibility
 - Minimal risk of malnutrition
 - No supplements

Disadvantages

- LRYGBP

- Increased morbidity
- Increased mortality
- Longer hospitalization
- Nutritional supplements
- 15% failure
- Difficult to reverse

- LAGB

- Slower weight loss
- Vomiting
- Additional surgery 10%
- Frequent visits
- 15% failure
- Not readily available to adolescents in US (FDA)

Summary / Conclusions

- Severe obesity is increasing in adolescents
- Diets etc. fail for 80% but better than adults
- Surgery appears to be as effective for adolescents as for adults (more data is needed)
- Benefits likely outweigh the risks for most
 - BMI >40 or >35 with co-morbidities

Summary / Conclusions

- **Choice of operation should stress safety, reversibility, and absence of metabolic sequelae (LAGB)**
- **Multidisciplinary team required**
- **Team, Patient and Family should be committed to long term follow up**