BARIATRIC SURGERY FOR MORBIDLY OBESE ADOLESCENTS: A REVIEW
TO HELP NURSE PRACTITIONERS COUNSEL PATIENTS

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BARIATRIC SURGERY FOR MORBIDLY OBESE ADOLESCENTS: A REVIEW TO HELP NURSE PRACTITIONERS COUNSEL PATIENTS

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the manuscript of ANNETTE BYRD find it satisfactory and recommend that it be accepted.

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Morbid obesity in adolescents has increased in recent years despite growing awareness of this problem. Obese adolescents have increased risk for cardiac disease, diabetes, depression, obstructive sleep apnea, liver disease, and joint disorders. Typical non-surgical treatments often fail for morbidly obese adolescents. Due to the recent popularity and success of bariatric surgery in adults, many families are asking nurse practitioners to advise them about its safety for adolescents. The purpose of this article is to provide nurse practitioners with the basic knowledge and information needed to assist them in counseling adolescents and their families to make an informed decision about possible referral for consideration of bariatric surgery.
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Introduction

An estimated 2 million adolescents ages 12-18 years, in the United States have morbid obesity defined as greater than the 99th percentile of the body mass index (BMI) (Ippisch & Inge, 2008). Adolescents with morbid obesity often have other health problems such as type 2 diabetes, hypertension, cardiac disease, depression, liver disease, sleep apnea, and joint disease. The earlier these co-morbidities develop the greater the degree of damage done to the body. While some damage appears to be reversible, other damage can progressively lead to more life-threatening conditions (Ippisch & Inge, 2008). Adolescent morbid obesity has been shown by research to continue into adulthood especially if the adolescent has at least one parent who is obese (Paoletti, 2007).

Several interventions exist for the treatment of obesity in adolescents including counseling, diet, exercise, and pharmacological treatments. Despite these interventions, the rate of obesity in adolescents continues to increase (Hyman, Kooi & Ficklen, 2008). When these interventions fail to produce significant weight loss results, practitioners and patients start looking for other options. Bariatric surgery is increasingly being considered as an option for adolescents.

Much controversy exists regarding performing bariatric surgery on adolescents. Evidence from studies of adults undergoing bariatric surgery has shown good results with weight loss, reversal of type-2 diabetes, and hypertension (Inge, 2009). No studies, however, evaluate the long-term effects of bariatric surgery on adolescents. A summary of bariatric procedures with risks and benefits will be detailed.
Overview of Morbid Obesity in Adolescents

Obesity rates in adolescents have increased in the last 20 years. Contributing factors include increased caloric intake, genetics, environmental influences, and lack of exercise. Morbid obesity in adolescents is more difficult to define than in adults due to periods of rapid growth and development. The American Academy of Pediatrics formed an expert committee to help define obesity in adolescents using BMI measurements. The committee suggested that >95th percentile of a normal BMI be defined as obesity (Barlow, 2007). BMI of >40kg/m² and > 99th percentile can be defined as morbidly obese. Approximately 4% of children ages 5-17 are in this category (Xanthakos & Inge, 2008). Morbid obesity leads to increased cost of healthcare due to the co-morbidities (Barlow, 2007).

Morbidly obese adolescents often have multiple inter-related co-morbidities. Morbidly obese adolescents often develop decreased insulin sensitivity. Type-2 diabetes in obese adolescents has increased ten-fold in the last 20 years. Increased adipose tissue releases more free fatty acids to the liver where they form triglycerides. Hypertriglyceridemia associated with obesity may have a genetic or dietary cause. Sleep apnea can lead to increased pulmonary hypertension and right sided heart failure in later adulthood. Research on adults has shown that many of these co-morbidities improve or almost completely resolve with bariatric surgery (Baker, Olsen & Sorensen, 2007; Ippisch & Inge, 2008).
Non-surgical Obesity Interventions

Prior to discussing whether bariatric surgery should be considered for an adolescent with morbid obesity, weight loss counseling should occur. This includes recommending lifestyle interventions and possible use of weight loss medications. Bariatric surgery is generally not recommended until these first two options are considered (Calamaro & Waite, 2009).

Lifestyle Interventions

In the last 20 years diet and exercise habits have changed in the United States with more consumption of fast food and less time spent exercising and in outdoor play. Adolescents need support to have successful weight loss, which requires changing diet and exercise (Mechanick, et al., 2008). The first step in the process of any type of weight loss effort is counseling with a nurse practitioner or other qualified health care professional. Counseling can occur during individual encounters, with the family, or in a group (Briscoe & Berry, 2009; Calamaro & Waite, 2009).

Counseling should include strategies for successful lifestyle changes. The media influence on diet choices has lead to increased caloric intake in the diets of adolescents (Krishnamoorthy, Hart & Jelalian, 2006). Adolescents need to be taught basic nutrition and how to make choices of foods that are healthy and satisfying. Avoidance of caffeine products that stimulate appetite and high sugar soft drinks is recommended. Eating more fruits and vegetables is encouraged. Resources for teaching adolescents and family members about how to shop for nutritional foods and how to calculate the caloric needs of an adolescent can be found at
http://mypyramid.gov. This site is set up to educate families using the food pyramid as a visual tool for selection of a balanced diet. Another site that has numerous links to nutritional health studies and information is http://www.ific.org/nutrition/obesity/index.cfm by the International Food Information Council.

Television and computer screen time including video games should be limited to no more than 2 hours per day as a way to promote physical activity. Increasing physical activity to at least 60 minutes daily is necessary for healthy bones and growth. Activities can include housekeeping, walking, bike riding, swimming, or physical education classes at school. Activities that involve the whole family will be of greatest benefit. Adolescents who spend time with parents have a chance to learn new activities while increasing family bonding. Families could participate in weekly walks on weekends with healthy snacks and water to drink (Strong, 2005).

Prescription Medication

If diet and exercise do not produce the desired results after at least a year of effort, prescription medication may be considered. Two medications approved for use with adolescents are sibutramine and orlistat (Paoletti, 2007). Sibutramine is a schedule IV prescription approved for patients over 16 years of age and taken once daily. Cost is $140.00/month (Epocrates, 2009). Sibutramine works by blocking the reuptake of norepinephrine and serotonin, which increases feelings of satiety. Side effects can include increased blood pressure, tachycardia, or anxiety. Orlistat is available by prescription for children ages 12 and older and a 120mg dose can be
taken up to three times daily with meals that contain fat. Orlistat is also available over the counter under the brand name Alli in 60mg strength. A one-month prescription for orlistat costs $284 while the over-the-counter cost is as low as $70 (Epocrates, 2009; Costco, 2009). These medications in combination with diet and exercise may produce modest results in some adolescents (Paoletti, 2007). Orlistat works by blocking the absorption of fats. Primary side effects result in loose oily stools and flatulence (Epocrates, 2009).

Bariatric Surgery Overview

Bariatric surgery has been used with success in adults for many years. In 2000 there were approximately 36,700 bariatric surgeries performed in the United States; in 2007 an estimated 200,000 Americans had bariatric surgery. This increase is in part related to more surgeons becoming trained in this specialty. The increase in procedures may also be attributable to fewer postoperative complications such as leakage, bleeding, poor wound healing, and malnutrition. These have been reduced as more centers are certified in bariatric surgery and surgeons are specially trained (DeMaria, 2007).

Adult studies of bariatric surgery have shown great success with weight loss. It is estimated that most bariatric surgeries yield an average 30% weight loss. Research has shown that within as little as 6 weeks after surgery most patients with type-2 diabetes can discontinue insulin therapy. This is due to the loss of visceral fat, which is associated with increased insulin resistance. Other improvements in co-morbidities include a decrease in gastroesophageal reflux disease, resolution of
sleep apnea, improved joint mobility, lower blood pressure and overall decrease in mortality (Mechanick, et al., 2008).

Considerations for Bariatric Surgery in Adolescents

A survey was done in 2005 regarding surgeons' attitudes on adolescent bariatric surgery. A questionnaire was sent by electronic mail to members of the American Society for Bariatric Surgery. Only 3% of the respondents were board certified in pediatric surgery. Twenty-nine percent responded that they had done an adolescent bariatric surgery, were developing a program for adolescent bariatric surgeries with pediatric specialists, and were planning to do more adolescent bariatric surgeries in the next year. Many expressed concerns about having the appropriate team necessary to keep adolescents safe. There was discussion about needing a team of pediatric specialist to deal with complications that may arise. In summary this survey showed increased interest by surgeons in adolescent bariatric surgery but also demonstrated a need for research and study (Allen, Lawson, Garcia, & Inge, 2005).

A literature review for studies on adolescent bariatric surgery was completed using CINHAL, Medline, Up To Date, and a hand review of articles from an evidence based report commissioned by the Health Technology Assessment Program of the Washington State Health Care Authority. Fifteen studies have been done on Roux-en-Y gastric bypass (RYGB) and laparoscopic adjustable gastric banding (LAGB) surgery for adolescents. All but one of these studies was retrospective (Washington State Health Care Authority, 2007). These reports were a collaborative effort of surgeons in the Eastern United States called the Pediatric Bariatric Study Group,
which changes members as different physicians join the group (Lawson, et al., 2006). Researchers reviewed adolescent patient medical records from five different hospitals using a standardized data collection form (Lawson, et al., 2006; Inge, et al., 2004). One of the studies found that 78% of patients were female and the average age range was 15-19 years. When compared to adults, adolescents, on average had a shorter period of hospitalization with fewer complications. The researches attributed this to the fact that while adolescents present with co-morbidities similar to those experienced by adults, they are often less severe in nature (Tsai, Inge & Burd, 2007).

A prospective pilot study of the effects of pediatric bariatric surgery involved eleven morbidly obese adolescents who underwent gastric bypass surgery. Results of this study revealed remission of type-2 diabetes as evidenced by improved hemoglobin A1c levels over a one-year post-operative period. A five-year observational study currently in progress, the “Teen Longitudinal Assessment of Bariatric Surgery (Teen-LABS)” funded by the National Institutes of Health (NIH), involves 200 teens. The study compares teen data with data from 200 adults who had the same surgery (Inge, et al., 2009).

**Criteria for Adolescent Bariatric Surgery**

The National Institute for Health and Clinical Excellence (NICE) 2006 guidelines do not generally recommend bariatric surgery for adolescents. When surgery is indicated, criteria include a BMI > 35 with a co-morbidity, at least six months of documented non-surgical weight loss efforts, management by a pediatric specialist, physically fit for surgery, a commitment to long-term follow-up, and care is provided by a multidisciplinary team. Evaluation for the psychological, social, and
educational needs of both the patient and family are necessary (National Institute for Health and Clinical Excellence, 2006). Xanthakos and Inge (2008), researchers in the Pediatric Bariatric Study Group, propose three main criteria for surgery: BMI > 35kg/m² and severe co-morbidity, physical maturity, and history of efforts to lose weight. They also recommend pre-surgical screening that includes full history, psychological evaluation, and Tanner staging for physical maturity.

*Informed Consent*

Informed consent is a controversial ethical issue for adolescents being considered for bariatric surgery of any kind. Whether or not an adolescent has the cognitive ability to fully understand the surgery and commitment to lifetime changes is the main issue. Centers for excellence specializing in pediatric bariatric surgeries are required to offer education classes to the patient and family. There are no studies that evaluate how well an adolescent comprehends the material. Due to the age of the adolescents, both patient assent and parental consent are required prior to surgery (Ippisch & Inge, 2008).

*Bariatric Procedures for Adolescents*

Roux-en-Y gastric bypass (RYGB) is the surgery most commonly used for adolescents and has FDA approval (See Figure 1). RYGB has been used for adolescents since 1980 with short-term studies demonstrating safety and results. Average weight loss for adolescents after RYGB is 30% (Ippisch & Inge, 2008).

Laparoscopic adjustable gastric banding (LAGB) is not FDA approved for use in adolescents 17 years of age and younger due to insufficient research (See Figure
2). When used in adults, weight loss results tend to be about 5-10% less than with the gastric bypass. Research is in progress to evaluate the safety of LAGB in adolescents however there have been concerns raised about the study for a variety of reasons. One of the concerns with LAGB is the increased incidence of band slippage in adolescents. A current study being done at New York University Hospital in cooperation with Lap Band Brand is investigating methods to alleviate this issue (O'Brien, et al., 2006).

Complications of Bariatric Surgery for Adolescents

Bariatric surgery has the potential for a variety of complications. Careful monitoring of patients after surgery are essential. Complications can occur within hours to months after surgery. Common complications include pulmonary embolism, deep vein thrombosis, gastric leakage, bleeding, infection, poor wound healing, hernias, strictures, and anemia (Tyler-Evans & Meyer, 2009). Young women taking oral contraceptives are especially at risk for blood clots. Researchers suggest alternative contraception be considered such as levonorgestrel intrauterine systems or depot medroxyprogesterone acetate injections (Xanthakos & Inge, 2008).

Problems associated with laparoscopic adjustable gastric banding include band erosion, band slippage, and herniation of the esophagus above the band. If the band is too tight it can cause nausea and vomiting. Bands can also be too loose or a pouch can be overstretched by a large volume meal causing the band to slip from sutures and displace. Band erosion with penetration into the stomach wall occurs in 1-5% of
cases. Frequent follow up visits are needed with this procedure to assure patient safety (Allo & Bueno, 2007).

There is the potential for many additional complications among adolescents due to their developing bodies. Nutritional deficits have a great impact on quality of life. While every effort is made to monitor adolescents and nutritional counseling is mandatory, assuring use of necessary supplements is difficult. Vitamin B deficiency in adolescents can lead to neuropathic complications such as peripheral neuropathy and paraesthesias. One study indicates that a protocol for replacement therapies leads to fewer complications. Because adolescents are at higher risk for these nutritional complications, follow up visits often start at every two weeks then progress to monthly visits as the adolescent adjust to the changes (Ippisch & Inge, 2008; Hydock, 2005).

There is insufficient research to understand how bariatric surgery may affect pregnancy and lactation. Young women who are post-bariatric gastric bypass are considered high-risk pregnancies and may not have the nutritional stores to breast-feed an infant. No research has been published on pregnant women post-bariatric surgery to determine how much of a problem this will be. Considerable concern exists over basic management of young women who have had bariatric bypass surgery because of anemia, ongoing vitamin B deficiency problems, trouble with fat-soluble vitamins like A D E and K, and calcium absorption (Mechanick, et al., 2008; Ippisch & Inge, 2008). Pregnancy should not be attempted for at least 2 years after bariatric procedures (Xanthakos & Inge, 2008).

Role of the Nurse Practitioner
When prevention of obesity fails, nurse practitioners (NPs) can initiate counseling, assessment, and efforts to promote lifestyle changes as discussed above. As part of the assessment, differential diagnoses should include evaluation for hypothyroidism, pituitary disease, and Cushing syndrome to rule out physical causes. Referral to a specialist may be necessary if there are problems such as endocrine disorders (Barlow, 2007).

Counseling adolescents and families on bariatric surgeries often starts with the NP. Barriers to obesity counseling include lack of: time, confidence that patients are ready to lose weight, training on current education, and reimbursement (Briscoe & Berry, 2009). NPs need to decide when referral for bariatric surgery is appropriate for adolescents. Resources can be found at the web site for the American Society for Metabolic and Bariatric Surgery http://www.asbs.org and at bariatric surgery centers of excellence see http://www.surgicalreview.org/locate.aspx. Each center's web site includes information about office practice standards, education classes that are available, guides to assisting with insurance coverage, calculation of cost, and a basic outline of the process from referral to acceptance for surgery. The cost listed for bariatric surgery ranges from $18,000-$30,000.

Health Plan Coverage of Pediatric Surgery

Not all health plans will cover bariatric surgery for adolescents as it is sometimes considered an unproven technology. The Washington State Health Technology Clinical Committee makes coverage decisions for the state's health plans. In August of 2007, after consideration of an evidence report, the committee
made a coverage determination that bariatric surgery would not be covered for individuals less than 18 years of age (http://www.hta.hca.wa.gov/pbs.html).

In one study only four out of ten private insurance companies consider covering part of the cost for pediatric bariatric surgeries and those four companies had specific conditions under which surgery would be covered (Washington State Health Care Authority, 2007). Medicare and Medicaid services vary from state to state and vague language on state web sites makes it hard to determine if coverage is available.

As an example of private coverage, Regence Blue Cross/Blue Shield of Oregon has several individual and group plans available for its members. Bariatric surgery in general is not covered on any of the individual plans available for purchase but certain group plans such as those available through local unions cover bariatric surgery with a $3500 deductible. There is no language that restricts age of coverage for this service. Group plans require six months of documented weight loss efforts prior to referral. The next step for Regence after referral is to meet with their bariatric nurse coordinator and start the pre-surgery approval process (S. Mosier, personal communication, June 10, 2009).

Conclusion

Morbidly obese adolescents are looking for methods to help them lose weight. While there is no instant cure available, options do exist. NPs can help adolescents and families make informed decisions about which options are best for them. When lifestyle changes and medications do not produce needed results, bariatric surgery may be an option for some morbidly obese adolescents although it is generally not
recommended due to a lack of long-term studies. Short-term studies suggest there can be a reversal of co-morbidities in morbidly obese adolescents similar to reversals in adults who undergo surgery. Evidence based practice suggests that these potential health benefits of bariatric surgery emphasize the urgent need to focus on prevention and early treatment of obesity in adolescents.
Figure 1: Roux-en-Y Gastric Bypass

DeMaria, 2007

Figure 2: Laparoscopic adjustable Lap Band

DeMaria, 2007


