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Managing bariatric patients in a children's hospital: radiologic considerations and limitations

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Abstract As the increasing prevalence of pediatric obesity and its associated risks gain national attention, adolescent bariatric surgery is gradually gaining acceptance as a viable weight loss tool for some severely obese adolescents. Obese patients often exceed the capacity limits of most radiological devices used for imaging. Because the radiological evaluation often plays a crucial role in the management of these patients, it is important for pediatric surgeons and radiologists to be aware of the special challenges and alternative algorithms for radiological evaluation. This review outlines and illustrates these considerations and limitations. Herein the authors discuss these topics within the context of characteristic bariatric patient profiles and the Roux-en-Y gastric bypass procedure, currently the authors' standard operative approach.

As with adult obesity, pediatric obesity in the United States has reached epidemic proportions. Its prevalence has tripled over the last 3 decades and is currently estimated to be between 15.5% and 37% [1-3]. The health consequences of this condition are often severe, encompassing serious psychosocial problems and a wide spectrum of serious comorbid medical conditions that can manifest during childhood or in adulthood. Medical comorbidities include hyperlipidemia, glucose intolerance, diabetes mellitus type 2, nonalcoholic steatohepatitis, obstructive sleep apnea, hypertension, deep vein thrombosis, and pulmonary embolism [4,5]. In light of these risks, bariatric surgery in adolescents is gradually gaining acceptance as a viable weight loss tool in a select group of severely obese adolescents [6,7], and pediatric centers are increasingly establishing multidisciplinary teams to assess potential surgical candidates [8,9].

Unlike the adult bariatric surgical experience, more than half of our adolescent bariatric surgical patients exceed 350 lb at presentation. The risk of complications is highest during the first 3 months after gastric bypass surgery. Although they generally lose 50 to 75 lb over that time interval, because of their excess weight and size, they present a number of special radiological challenges to the pediatric surgeons and radiologists. This review discusses these chal-

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lenges within the overall context of characteristic bariatric patient profiles.

1. Surgery overview

Bariatric surgery alone is not definitive treatment of clinically severe (morbid) obesity. An overall strategy entails a behavioral approach to weight control for patients who have failed conventional weight loss programs and have comorbidities related to obesity. At our institution, potential surgical candidates undergo a thorough assessment by a multidisciplinary team [8,10]. This assessment identifies comorbid conditions and determines the patient's psychological readiness, ability to understand the lifelong implications of surgery, and willingness to comply with essential postoperative lifestyle changes. Once candidates have been carefully screened and selected [7], they undergo a laparoscopic Roux-en-Y gastric bypass (RYGBP) procedure. A small gastric pouch is created and anastomosed to the side of the roux limb of jejunum (Fig. 1). The roux limb can be placed either antecolic or retrocolic (through a window in the transverse mesocolon).

The timing of surgical intervention is controversial. Concern regarding the long-term effect of bariatric surgery on nutrition, growth, and development of the adolescent has led us to defer gastric bypass surgery until patients have attained equal to or more than 95% of their adult stature [7]. Parenthetically, obese children typically demonstrate accelerated onset of puberty and are likely to be taller and to have more advanced bone age than their nonoverweight counterparts.

2. Preoperative imaging

When there are concerns about whether an adolescent bariatric patient has achieved skeletal maturation, radiographic studies of the hand and wrist may be helpful. By measuring the degree of epiphyseal closure, radiologists can determine with reasonable accuracy what percent of adult stature an adolescent has achieved [11]. Candidates commonly undergo abdominal ultrasound to determine the presence of gallstones. If stones are found, a cholecystectomy may be considered either at the time of the bariatric procedure or postoperatively. This is an important consideration because after gastric bypass, assessment and management of choledocholithiasis by endoscopic retrograde cholangiopancreatography and papillotomy are nearly impossible. Obtaining quality ultrasound evaluations in obese patients can be a technical challenge, and we have found that a low-frequency probe, for maximum penetration, is the most useful.

3. Postoperative imaging

Abdominal complications after RYGBP have been well characterized [12], and radiological assessment can influence clinical decision making [13-15]. Findings that are important to the surgeon include signs of intestinal obstruction or leak at either the gastrojejunostomy or jejunojejunostomy, leak from the staple lines used to create the gastric pouch, abscess formation, and wound infection [16,17]. Signs of anastomotic leak include free intraperitoneal air, unexpected fluid collections, or extravasation of enteric contrast. Because of excess visceral adiposity in the bariatric surgery patients, the anticipated signs of peritonitis are often absent. Physical examination is unreliable in detecting peritonitis. Thus, radiological imaging provides valuable information to aid clinical decision making and help avoid risks of delayed or unnecessary reoperation.

Bowel obstructions can occur at the level of the gastrojejunostomy, roux limb which passes through the mesocolon, the jejunojejunostomy, or anywhere along the small bowel length because of internal hernias or adhesions. Radiographic assessment of the patient with obstructive

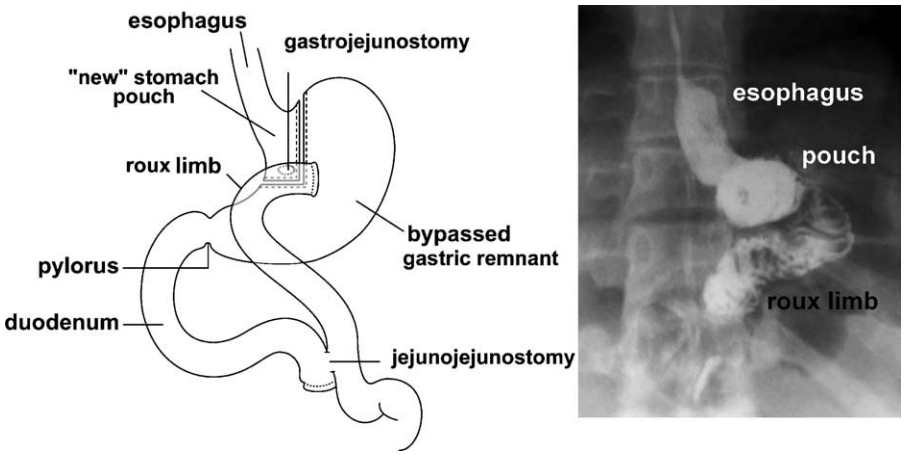

Fig. 1 Laparoscopic RYGBP. The small gastric pouch is created just beyond the gastroesophageal junction by dividing the stomach tissue with a surgical stapler. The radiograph shown to the right was obtained on postoperative day 1 with the patient in an upright position.