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Original article

Prospective evaluation of urinary incontinence in severely obese adolescents presenting for weight loss surgery

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Abstract

Background: Obesity has been associated with daytime urinary incontinence (UI), likely due to increased intra-abdominal pressure.

Objectives: To assess incontinence symptoms in severely obese adolescents before and 3 years after bariatric surgery.

Setting: Tertiary care pediatric hospitals in the United States.

Methods: The Teen-Longitudinal Assessment of Bariatric Surgery is a prospective, multicenter study designed to evaluate efficacy and safety of bariatric surgery in adolescents. Patients <19 years of age undergoing bariatric surgery at 5 centers between 2007 and 2012 were enrolled. Trained study staff collected baseline and postoperative anthropometric and clinical data. Presence and severity of UI were determined by standardized interview.

Results: A total of 242 patients (76% female) were evaluated at baseline. The mean age was 17.1 years at baseline, and 72% were of white race. The preoperative median body mass index was 50.5 kg/m^2. At baseline, 18% of females and 7% of males reported UI. Prediction analysis at baseline indicated that females, white race, and increasing body mass index had greater odds for UI. UI prevalence in females and males decreased to 7% and 0%, respectively, at 6 months after surgery ($P < .01$) and remained stable out to 36 months postoperatively. Furthermore, older patients were less likely to achieve 3-year UI remission or improvement.

Conclusions: In adolescents undergoing bariatric surgery, UI was more common in females than in males. Incontinence status significantly improved by 6 months and was durable to 3 years after surgery, suggesting that bariatric surgery favorably affects anatomic or physiologic mechanisms of bladder control in both males and females. (Surg Obes Relat Dis 2017;▮:00–00.)

Keywords: Incontinence; Obesity; Weight loss surgery

Obesity has long been associated with multiple adverse health outcomes, including diabetes and cardiovascular disease. Its increasing prevalence in the United States and throughout the world has been well documented [1,2].

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Daytime urinary incontinence (UI) is well known to be associated with obesity and can be a significant source of distress for patients. Childhood obesity is becoming more of a public health concern, and population studies showing rates of UI in obese children have recently been reported [3,4]. Bariatric surgery in adults has been well established as a safe and effective method of establishing significant and durable weight loss. It is generally considered to be a newer treatment modality in the pediatric population; however, favorable data have been emerging from several recent and ongoing studies [5–7]. Previous investigations in the bariatric literature have reported a substantially reduced UI rate 3 years after weight loss surgery in adults [8]. To date, there are limited data available that characterize UI in adolescents undergoing surgically induced weight loss. The purpose of the present study was to assess baseline and 3-year UI symptoms in severely obese adolescents undergoing bariatric surgery to determine changes in prevalence and potential predictor variables for change.

Materials and Methods

After obtaining institutional review board approval from all participating Teen-Longitudinal Assessment of Bariatric Surgery (LABS) clinical centers, a prospective cohort study was performed to assess health benefits and risks in severely obese adolescents undergoing weight loss surgery. Data were collected at 5 pediatric institutions participating in the Teen-LABS (U01 DK072493; Principal investigator: Thomas Inge, M.D.), a National Institute of Diabetes and Digestive and Kidney Diseases–funded consortium.

Details of participant recruitment have been previously reported [5,9]. After enrollment, a general medical history and physical was performed in the clinic. Blood and urine were collected for metabolic analyses and to assess renal function. Baseline anthropometric and clinical data were collected by trained study staff and have been previously reported for the entire study cohort [5]. Prevalence and severity of UI were determined by a standardized interview questionnaire. Daytime UI was defined as involuntary urinary leakage occurring at least once weekly. Remission was defined as no incontinence, and improvement was defined as UI occurring less frequently than at baseline (less than once weekly). Further questions were asked to delineate urge versus stress UI. No renal imaging or urodynamic studies were performed for research purposes.

Study patients underwent a Roux-en-Y gastric bypass, vertical sleeve gastrectomy, or laparoscopic adjustable gastric banding. The surgical details for these procedures have been well described in the bariatric literature. Postoperative research visits were performed at scheduled intervals and included a follow-up questionnaire performed by the same trained study personnel at 6, 12, 24, and 36 months. Baseline and postoperative data from all 5 clinical centers were collected and maintained by a central Data Coordinating Center at Cincinnati Children's Hospital Medical Center.

Standard descriptive statistics were calculated to summarize participant characteristics. Frequencies and percentages were reported for categorical measures. Means and standard deviations or medians and interquartile ranges were calculated for continuous variables. Logistic regression was used to evaluate predictors of baseline UI. Model-based remission and incidence estimates and 95% confidence intervals were calculated using generalized linear mixed-modeling. Independent variables evaluated included sex, age at surgery, race, diabetes, body mass index (BMI), pannus grade, and 2-way interactions with all variables and sex. The final adjusted model included all variables for which $P \leq .10$. These included sex, diabetes, and gender × diabetes interaction.

To evaluate predictors of 3-year remission and/or improvement of UI, risk ratios and 95% confidence intervals were calculated using modified Poisson regression models with robust error estimates. Due to the small number of male participants with UI at baseline (n = 4), modeled remission, improvement, and incidence analyses were restricted to females. Independent variables evaluated in the models included age at surgery, race, percent weight loss, presence of depression, and surgical procedure. Race was not included in the remission and improvement models due to lack of variation (only 1 nonwhite subject with baseline UI).

Baseline analyses included all patients who had incontinence data. For the remission/improvement analyses, male and laparoscopic adjustable gastric banding patients were not included due to very small numbers. At the 3-year study visit, 21% of the UI outcomes values were missing. Multivariate imputation by fully conditional specification was performed to address these missing data. A total of 25 imputed data sets were created for use in multivariable modeling analyses. All reported P values were 2-sided and considered statistically significant at $<.05$. Statistical analysis was performed using SAS version 9.3 (SAS Institute, Cary, NC).

Results

A total of 242 patients (76% female) were evaluated at baseline (Table 1). Of the study participants, 161 underwent Roux-en-Y gastric bypass, 67 had vertical sleeve gastrectomy, and 14 had laparoscopic adjustable gastric banding. Through the 3-year postoperative time point, 99% of patients remained as active study participants and 88% of postoperative visits were completed. The mean age at baseline was 17.1 years, and most (72%) patients were of white race. The preoperative median BMI was 50.5 kg/m^2. Type 2 diabetes was present in 14% (n = 33) of participants at baseline. A pannus grade of 3 or more (panniculus reaches the upper thigh or further) was observed in 23% of