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Original article

Bariatric surgery improves urinary incontinence in morbidly obese individuals

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Abstract

Background: Urinary incontinence is common in obese individuals. We report on the prevalence of urinary incontinence in patients undergoing bariatric surgery and the effect of surgically induced weight loss on urinary incontinence.

Methods: The prospectively collected data from 201 consecutive candidates for bariatric surgery were evaluated. The patients were surveyed using a questionnaire regarding the duration of incontinence, stress/urge incontinence symptoms, and incontinence severity before and after undergoing bariatric surgery. Severity was quantified using a validated index developed Data are presented as the mean ± standard deviation.

Results: Of 201 patients, 65 (32%) reported urinary incontinence. Of the 65 patients, 44 women and 1 man (age 49 ± 11 years, body mass index 48 ± 7 kg/m^2) underwent Roux-en-Y gastric bypass (n = 42) or laparoscopic-assisted gastric banding (n = 3). Of the 38 patients who reported mild (2%), moderate (48%), and severe (50%) urinary incontinence preoperatively who had complete follow-up at ≥6 months postoperatively, 19 (50%) had demonstrated resolution of urinary incontinence and 19 had reported residual slight-moderate (37%) or severe (13%) urinary incontinence. The overall severity score improved from 5.4 ± 2.3 to 2.3 ± 2.8 postoperatively ($P < .001$); the percentage of excess body weight loss was 61% ± 19%. The patients reported subjective improvement within 4 months postoperatively or after a 50-lb weight loss.

Conclusion: Urinary incontinence is prevalent in bariatric surgery patients. Surgically induced weight loss results in improvement or resolution of urinary incontinence in 82% of patients. The findings from this large cohort warrant additional investigation with urodynamic studies. (Surg Obes Relat Dis 2007;3:586–591.)

Keywords: Obesity; Weight loss; Gastric bypass; Laparoscopic-assisted gastric banding; Resolution of co-morbidities

More than 50% of American women are overweight (body mass index [BMI] 25–30 kg/m^2) or obese (BMI ≥30 kg/ m^2) [1]. Additionally, >13 million Americans, including 25% of women of reproductive age and ≤50% of postmenopausal women, are affected by urinary incontinence [2–4]. Obesity has been identified as a significant independent risk factor for urinary incontinence in older women [5] and has been identified as the largest attributable risk factor for daily urinary incontinence [6]. Moreover, obesity is an independent risk factor for stress and mixed urinary incontinence. It has been estimated that each 5-unit increase in BMI is associated with a 60–100% increased risk of daily urinary incontinence [5–7]. Although weight reduction has been shown to have a beneficial effect of reducing the frequency and severity, urinary incontinence has not been included among other co-morbidities as a

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prerequisite for bariatric surgery in patients with clinically severe obesity according to the 1991 National Institutes of Health consensus conference statement [8]. To our knowledge, prospective studies quantifying the severity of urinary incontinence preoperatively and evaluating the effect of surgically induced weight loss on urinary incontinence are lacking. We sought to evaluate the effect of weight loss on urinary incontinence and its severity in patients undergoing bariatric surgery using an index developed by Sandvik et al. [9].

Methods

This study was conducted with approval of the institutional review board of the University of South Florida and in compliance with Health Insurance Portability and Accountability Act regulations.

Patient population

The prospectively collected data from all patients who underwent bariatric surgery for clinically significant obesity from April 2004 to June 2006 were analyzed. During this period, we screened 201 consecutive prospective bariatric patients with a validated questionnaire before surgery at the initial preoperative visit and after weight loss surgery (Fig. 1). These patients did not receive any surgical or behavioral treatment specifically targeting urinary incontinence during the study period.

Urinary incontinence evaluation

According to the International Incontinence Society Standardization of Terminology Reports [10], stress incontinence is defined as the involuntary loss of urine on exer-

Over the past 12 months, have you had urine loss beyond your control?
☐ Yes ☐ No

How long ago did your urine loss start?
_____years or_____months or_____days

Have you ever sought medical treatment for loss of urine beyond your control?
☐ Yes ☐ No

Have you ever had surgery to correct urinary incontinence?
☐ Yes ☐ No

Did you feel the surgery was effective at controlling urinary incontinence?
☐ Yes ☐ No

When does the urine loss usually occur?
☐ Day time only
☐ Night time only
☐ Both day time and night time

Questions for Urinary Incontinence Severity

1. Do you use anything for protection against leaked urine?
   ☐ Yes ☐ No
2. On average, how many of each of these do you use for protection? (check all that apply and write the number used)
   ☐ Sanitary napkins
   ___ each day or ___ each week
   ☐ Pads like those placed on furniture (e.g., blue pads)
   ___ each day or ___ each week
   ☐ Adult wetness control garments (e.g., Attends, Depends)
   ___ each day or ___ each week
   ☐ Toilet paper or facial tissues
   ___ each day or ___ each week
   ☐ Something else (please list)
3. While awake, when you are having urine loss problems, how much urine would you say you lose without control EACH TIME?
   ☐ A few drops to less than ½ teaspoon
   ☐ ½ teaspoon to less than 2 tablespoons
   ☐ 2 tablespoons to ½ cup
   ☐ ½ cup or more

Questions for Urge Incontinence

1. Some people receive very little warning and suddenly find that they are losing, or about to lose, urine beyond their control. How often does this happen to you?
2. If you can't find a toilet or find a toilet that is occupied and you have an urge to urinate, how often do you end up losing urine and wetting yourself?
3. Do you lose urine when you suddenly have the feeling that your bladder is full?
4. Does washing your hands cause you to lose urine?
5. Does cold weather cause you to lose urine?
6. Does drinking cold beverages cause you to lose urine?

Questions for Stress Incontinence

1. Does coughing gently cause you to lose urine?
2. Does coughing hard cause you to lose urine?
3. Does sneezing cause you to lose urine?
4. Does lifting things cause you to lose urine?
5. Does bending over cause you to lose urine?
6. Does laughing cause you to lose urine?
7. Does walking briskly cause you to lose urine?
8. Does straining, if you are constipated, cause you to lose urine?
9. Does getting up from a sitting to a standing position cause you to lose urine?

Responses for the above questions are
☐ Often
☐ Sometimes
☐ Rarely
☐ Never

Fig. 1. Validated urinary incontinence questionnaire used to screen 201 consecutive prospective bariatric patients before and after weight loss surgery.

tion, effort, sneezing, or coughing. Urge incontinence is defined as involuntary urinary loss accompanied, or immediately preceded, by urgency. Mixed urinary incontinence is involuntary urinary loss associated with urgency and concurrent urinary loss with exertion, effort, sneezing, or coughing.

All patients were surveyed about the duration, type, and history of medical or operative treatment for urinary incontinence. To assess the symptoms, we incorporated the severity index developed by Sandvik et al. [9] as follows: (1) how often do you experience urine leakage? (0, never; 1, less than once a month; 2, one or several times a month; 3, one or several times a week; 4, every day and/or night); and (2) how much urine do you lose each time? (1, drops or little or 2, more).

The severity index was calculated by multiplying the reported frequency (4 levels) by the amount of leakage (2 levels); the resulting index value (1–8) was categorized as none, slight, moderate, or severe incontinence according to index scores of 0, 1–2, 3–4, or 6–8, respectively. Specific to our study, we measured the number of protection garments used for urinary incontinence as a proxy for the frequency of urinary incontinence episodes; the severity index was the product of the scores for the number of protection garments used and the amount of urine loss each time.

Follow-up

The patients were administered the questionnaires after the bariatric procedure by telephone interview and/or during the postoperative office visits at 3-month intervals during the first year and every 6 months thereafter.

Statistical analysis

Unless otherwise noted, all quantitative data are expressed as the median, with the range in parentheses, or the mean ± standard deviation. The mean values of the parametric continuous data were calculated using the 2-tailed paired *t* test. $P < .05$ was considered significant.

Results

Of the 201 patients, 65 (32%) reported urinary incontinence. Of the 65 patients, 20 were awaiting surgery or had been denied surgery for various reasons. Therefore, we analyzed the data from 45 patients with urinary incontinence who had undergone bariatric surgery during the study period.

All but 1 of the 45 patients were women. Their mean age was 49 ± 11 years, and the mean BMI was 48 ± 7 kg/mg^2. Most patients (93%) underwent Roux-en-Y gastric bypass, including 1 revisional Roux-en-Y gastric bypass and 1 conversion of vertical banded gastroplasty to Roux-en-Y gastric bypass. Three patients (7%) underwent laparoscopic-assisted gastric banding. The median duration of hospital stay was 3 days (range 1–48). The median follow-up of 12 months (range 6–23) was complete for 38 patients (84%) of the 45 patients (5 patients lost to follow-up and 2 deaths). During this period, the median percentage of excess body weight lost was 64% (range 19–91%).

A total of 14 complications occurred in 10 patients (1–4 complications/patient), for an overall complication rate (patient with at least 1 complication) of 22%. One patient each died of sepsis and of bleeding. Three patients underwent reoperation postoperatively: 2 patients had bowel obstruction (1 internal hernia and 1 adhesive small bowel obstruction) and 1 required repositioning of an adjustable gastric band port.

Most patients (60%) had reported mixed urinary incontinence; the remaining patients had reported stress (35%) and urge (5%) urinary incontinence. Additional obesity-related comorbidities included hypertension (71%), mechanical arthropathy (69%), gastroesophageal reflux disease (56%), hypercholesterolemia (51%), diabetes mellitus (40%), obstructive sleep apnea (40%), and depression (36%).

The median duration of symptoms of urinary incontinence was 5 years (range 1–15); 64% of patients used an average of 2 pads/d (range 1–10) of protective clothing for incontinence (i.e., sanitary napkins, adult undergarments). Also, 24% and 9% of patients had sought medical or operative treatment, respectively, for urinary incontinence before undergoing bariatric surgery.

Preoperatively, the patients reported slight (4%), moderate (47%), or severe (49%) urinary incontinence. Postoperatively, 50% of the patients had resolution of urinary incontinence, and 18% had slight, 18% had moderate, and 13% had severe symptoms (Fig. 2). Significant improvement or resolution was reported after a mean duration of 4 months or a 50-lb weight loss. Most patients (95%) reported subjective improvement or resolution of urinary incontinence postoperatively; incontinence was unresolved in 5% patients.

The mean severity index score improved from 5.4 ± 2.3 to 2.3 ± 2.8 postoperatively ($P < .001$). Of those patients with incontinence that persisted despite weight loss, 13 (32%) reported improvement, 5 (13%) reported no change,

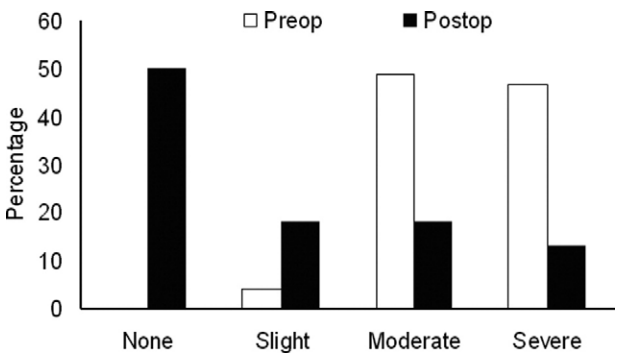

Fig. 2. Improvement in severity index of urinary incontinence in 38 patients with complete follow-up of ≥6 months after bariatric surgery.

and 2 (5%) reported scores indicating worsening of incontinence. Of those patients reporting no change or worsening of symptoms, 4 had stress and 3 had mixed urinary incontinence (predominant component of stress) preoperatively. The patients with persistent urinary incontinence did not differ significantly from those reporting improvement/resolution of symptoms with respect to age, preoperative/postoperative BMI, preoperative severity, percentage of excess body weight lost, or duration of follow-up.

Discussion

Urinary incontinence in morbidly obese individuals affects nearly 17 million Americans, at an estimated cost of $19.5 billion dollars [11]. This widespread prevalence is underestimated in the clinical setting, because patients often fail to report minor degrees of incontinence. In our study, we found urinary incontinence in one third of bariatric patients, most of whom reported moderate to severe symptoms (96%). Our findings are similar to those reported from smaller cohorts (28–67%) [12–14].

We report the largest cohort of patients with prospectively collected data demonstrating the incidence of, and improvement in, urinary incontinence after surgically induced weight loss, as documented by an established index of severity. In the only other study to include a comparable population size, severity was not quantified and a validated questionnaire was not used [14].

The severity index developed by Sandvik et al. [9] is an easy, reliable, and sensitive measure of urinary incontinence severity and has been validated in previous studies [15]. Using this index, we found that 82% of our study patients experienced resolution or improvement of urinary incontinence after surgically induced weight loss; this finding was corroborated by the subjectively reported improvement of symptoms (95%). These findings correlate well with previously reported rates of 75–100% after bariatric procedures in smaller cohorts of adults [14,16–19] and adolescents [20,21]. Nevertheless, 13% of patients in our study reported improved or resolved incontinence by subjective measures, although no change was found for the corresponding postoperative severity index score. The disparity between the subjective versus calculated improvement or resolution of urinary incontinence can be attributed to the documented sensitivity (74%) of this severity index as reported in published studies [22].

We did not find a statistically significant correlation for age, preoperative/postoperative BMI, percentage of excess body weight lost, preoperative severity, or duration of follow-up between patients with improved urinary incontinence and those with persistent urinary incontinence after weight loss surgery. Patients with persistent urinary incontinence constituted a small subset of our cohort, which might indicate other underlying causes for their urinary incontinence separate from, or in addition to, the increased intra-abdominal pressure from obesity. Urodynamic studies might be helpful to identify the causative factors and subsequent treatment options.

Bariatric surgery has been shown to produce durable and sustainable weight loss, improvement in quality of life, and improvement or resolution of co-morbidities. Obesity plays an important role in the etiology of stress urinary incontinence by increasing the intra-abdominal pressure [17]; it follows that surgically induced weight loss decreases intra-abdominal pressure and would alleviate the symptoms of urinary incontinence [12,19]. Using urodynamic studies, Bump et al. [17] indicated that weight loss improves stress urinary incontinence by reducing increased abdominal pressure with physical activity, thereby improving transmission of mechanical stress to the urethra and decreasing axial mobility of the urethra.

Operative treatment for stress urinary incontinence is common, especially in white women. The number of corrective procedures nearly doubled during the past decade to 135,000 in 1998, with an overall 18% complication rate [23]. According to a recent Cochrane review, Burch open colposuspension is the most effective operative treatment for stress incontinence and is associated with a 1-year continence rate of 85–90% [24]. These rates compare well with our results of improved urinary incontinence after weight loss surgery, with the added benefit of amelioration of other co-morbidities such as diabetes, hypertension, and obstructive sleep apnea.

This study had several limitations. The small sample size of the study group might have overestimated the morbidity rates relative to our larger cohort (>1200 patients) for whom the overall mortality and morbidity rates were 1–2% and 10%, respectively. Second, we might have underestimated the severity of urinary incontinence by substituting the frequency of incontinence episodes with the number of protection garments used. Third, the data could have been influenced by patient recall bias regarding the time elapsed and amount of weight loss when reporting the postoperative severity of urinary incontinence. Finally, urodynamic studies were not undertaken as a part of this study and could prove to be important in patients who did not have complete resolution of their symptoms.

Conclusion

The findings of our study have indicated that bariatric surgery results in marked improvement in urinary incontinence in most patients and could obviate the need for operative treatment of urinary incontinence in obese patients. Additional studies are warranted to elucidate the role of urodynamic studies for patients with persisting or worsening urinary incontinence after weight loss surgery and the potential role of urologic surgery.

Disclosures

The authors have no commercial associations that might be a conflict of interest in relation to this article.

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Editorial comment

This is an interesting study that complements that of Deitel et al. [1] from 1988 and Bump et al. [2] from 1992. Although this is a common co-morbidity of severe obesity, very few studies have been done regarding the mechanism and effects of surgically induced weight loss on urinary incontinence.

Surgical treatment for their urinary incontinence had failed in 9% of the patients before bariatric surgery. This is an important issue because, if surgical incontinence procedures fail in severely obese patients and the incontinence can be effectively treated with surgically induced weight loss, the latter would be the preferable primary treatment modality. This needs to be emphasized to both obstetricians and urologists. Furthermore, a procedure for urinary incontinence fails to treat the severely obese patient's many other co-morbidities.

The cause of this, as well as many other complications of severe obesity (e.g., pseudotumor cerebri, venous stasis disease, gastroesophageal reflux disease), is probably related to increased intra-abdominal pressure with central obesity [2–5]. It has been my impression that urinary incontinence and other intra-abdominal pressure–related comorbidities often resolve within 1 or 2 months after surgically induced weight loss. In future studies, it would be interesting to measure the urinary bladder pressure in incontinent patients before their surgery and monthly thereafter until their symptoms resolve. The improvement in these problems can be pictured as a result of letting a little air out of a tight balloon (i.e., the abdomen with decreased omental, retroperitoneal, and subcutaneous fat) and determining how quickly the balloon becomes flaccid, a word image of La Place's law.