

# Formal sacrocolpopexy reduces hypercontinence rates in female neobladder formation

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**Aims:** Continent urinary diversion is preferred by some patients and orthotopic urinary diversion (OUD) has become the procedure of choice for most men following cystectomy for invasive bladder cancer. OUD in women, however, is less common, likely due to a high rate of hypercontinence (HC), potentially from lax support of pelvic structures similar to pelvic organ prolapse. As such, we evaluated if abdominal sacrocolpopexy (ASC) at the time of OUD in women led to decreased rates of HC.

**Methods:** A retrospective review of all female patients receiving OUD by a single surgeon and ASC was performed. ASC was performed after RC was complete prior to the urethro-enteric anastomosis. Peritoneal flap was created to the vaginal apex. The distal leaf was then sutured to the proximal anterior vaginal wall and apex and the proximal end sutured to the anterior longitudinal ligament. HC was defined as the need to perform intermittent catheterization (IC) due to incomplete emptying of the neobladder.

**Results:** Nine women underwent cystectomy with OUD and concurrent ASC during the specified time period. Average patient age was 54 years (27-69). Mean followup was 61.6 months (5-123 months). None of those who underwent ASC had HC or incontinence post-operatively. No mesh-related complications were noted in this cohort. Pelvic abscess was noted in one patient who underwent ASC with rectus fascia.

**Conclusions:** ASC at the time of radical cystectomy and OUD is safe and effective. It appears to be associated with decreased rates of HC and is associated with minimal additional morbidity to the patient.

**KEYWORDS**

bladder, hypercontinence, urinary diversion

## 1 | INTRODUCTION

Orthotopic urinary diversion has become more popular in recent years for patients undergoing cystectomy as it permits the patient to remain as close as possible to a natural voiding state. However, the use of neobladders in females has been less than expected.<sup>1</sup> Initially, orthotopic

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Work performed at Memorial Sloan Kettering Cancer Center. All authors participated in data collection, writing and revising as well as approval of final manuscript.

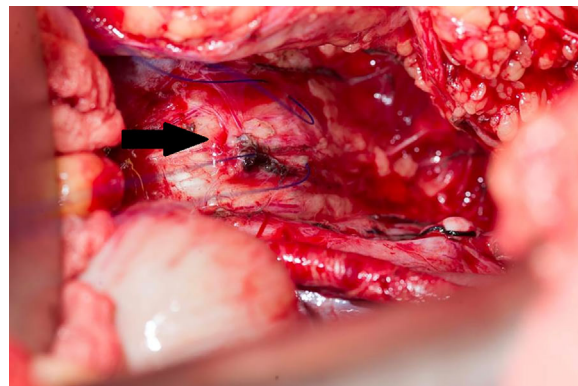
neobladder was not performed in women due to two concerns: lack of adequate oncologic control and incontinence. Further research indicates that the entire urethra does not need to be removed to achieve an adequate margin.<sup>2,3</sup> In terms of urinary control, instead of incontinence, hypercontinence occurs more frequently, up to approximately 50% of women in some series.<sup>4</sup> Multiple theories have been proposed regarding the etiology of hypercontinence. Although much progress has been made in the area of urinary reconstruction and diversion, there is limited information in the literature on reducing postoperative hypercontinence rates in these women, primarily relegated to case reports or small case series.<sup>5,6</sup> Laxity of the pelvic musculature resulting in a state similar to that present in women with pelvic organ prolapse is one of the many reasons postulated for HC. Abdominal sacrocolpopexy (ASC) is a well-known and efficacious treatment for prolapse. We hypothesized that by performing a formal ASC at the time of female neobladder creation, we could decrease the rates of HC.

## 2 | MATERIALS AND METHODS

After obtaining IRB approval we performed a retrospective chart review of all women who underwent radical cystectomy and received an orthotopic neobladder with concurrent ASC at Memorial Sloan Kettering Cancer Center. Pre-, peri-, post-operative characteristics, including age, body mass index (BMI), neoadjuvant chemotherapy, presence of omentum, pre- and post-operative continence, post-operative post void residuals, prior abdominal surgery, and pathology were recorded.

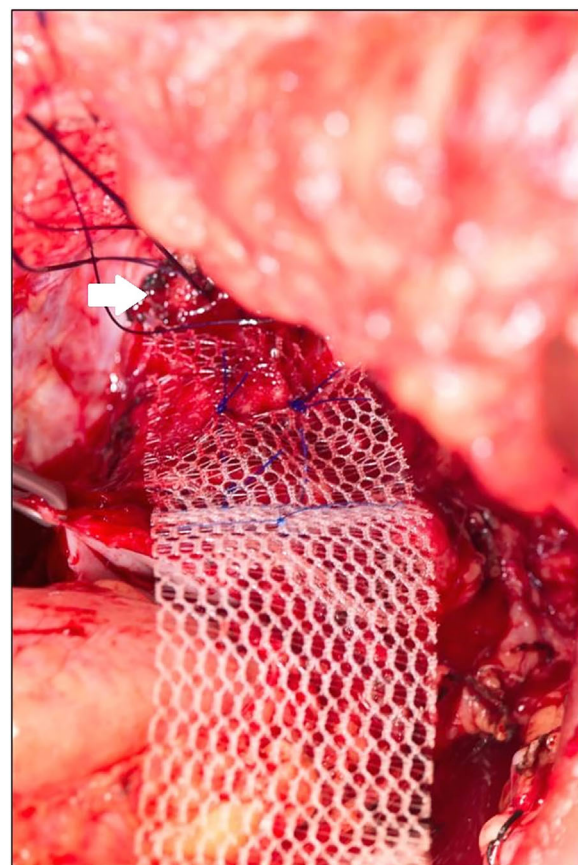
### 2.1 | Operative Technique

Cystectomy and pelvic lymph node dissection is carried out in the standard fashion. The anterior vagina is either spared during the cystectomy or if a strip of anterior vagina is left with the specimen, the anterior vagina is sutured longitudinally into a tube. An ileal neobladder is fashioned but not connected to the urethra, the rest of the small bowel is placed back in contiguity, and interrupted anastomotic urethral sutures placed and tagged. The sacral promontory is next identified and anterior longitudinal ligaments located. The peritoneal reflection is dissected off of the sigmoid colon from the level of the sacrum to the posterior vagina to create a peritoneal flap-this flap needs to be large enough to ensure that all mesh can be adequately covered with peritoneum and that none of the mesh is exposed to small intestine. Two 2-0 Prolene sutures are used to attach the tail of the mesh to the anterior spinous ligament (Figure 1). Using a vaginal probe to identify the apex of the

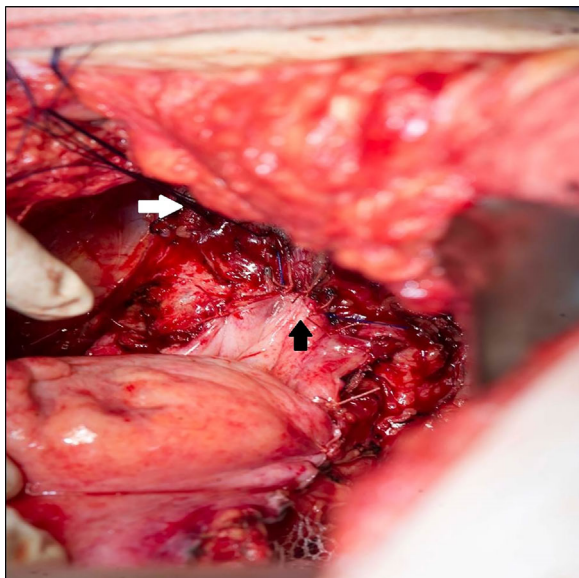


**FIGURE 1** Prolene sutures are placed through anterior longitudinal ligament. Black arrow shows sacrum

vagina, the anterior leaf of a Y-shaped piece of mesh or a 2 cm wide strip of rectus fascia is attached to the anterior vaginal remnant approximately 1 cm away from the apex using three interrupted permanent 2-0 Prolene sutures (Figure 2). The posterior portion of the mesh is trimmed and attached using one to two interrupted permanent 2-0 Prolene sutures. The previously created peritoneal flap is



**FIGURE 2** Y-mesh is stitched to the vaginal cuff. White arrow indicates preplaced urethral anastomotic sutures

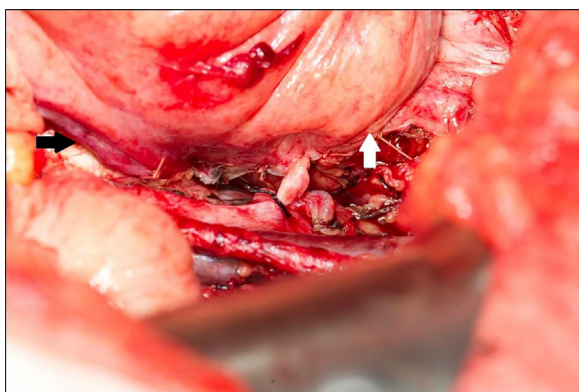


**FIGURE 3** Peritoneum (black arrow) overlying the mesh sewn to vaginal cuff. Urethral anastomotic stitches indicated by white arrow

then used to completely cover the mesh and vaginal remnant by suturing its free edge to the lateral vaginal and deep pelvic tissue using 2-0 Vicryl interrupted sutures (Figures 3 and 4). Finally, the neobladder-urethral anastomosis is completed and the abdomen closed in the standard fashion.

### 3 | RESULTS

Nine women were identified as having undergone radical cystectomy with orthotopic neobladder with concurrent ASC. Six of these women had an ASC with large-pore polypropylene mesh and three had a rectus fascia sacrocolpopexy. Table 1 identifies the patient character-



**FIGURE 4** Peritoneum is closed over the mesh from the vaginal cuff to the sacrum. Black arrow indicates sacrum, white arrow peritoneum

**TABLE 1** Characteristics of our cohort

	<i>n</i> = 9
Age, yrs	58
BMI	26.8
Histology	
Urothelial carcinoma	9
Micropapillary	1 (11%)
Sarcomatoid features	1 (11%)
Clear cell differentiation	1 (11%)
Omentum	27 (55%)
Neoadjuvant chemotherapy	4 (44.4%)
Preoperative incontinence	1 (11.1%)
Prior abdominal surgery	9 (100%)
Pathology T stage	
PT0	4 (44.4%)
PTA, PTIS, PT1	4 (44.4%)
PT2	1 (11.1%)

istics. All underwent cystectomy for urothelial carcinoma. Median age at the time of cystectomy was 58 years, ranging between 27 and 69 years old. Average body mass index (BMI) was 25.8 (14.7-38.3). Median operative time was 425 min with the ASC portion adding a median 43 minutes. The patients were followed for a median of 59.1 months (5-129 months). No mesh erosions were noted. Immediate major post-operative complications included two patients with pulmonary emboli and deep venous thrombosis. Three (33%) superficial wound infections were reported. One patient had a pelvic abscess after rectus fascial sacrocolpopexy. No patients were hypercontinent during the study period. The median post-operative post-void urine was zero. Two patients had nighttime incontinence, but no patient had daytime incontinence. One patient developed stones in her neobladder and required cystolithotripsy without any further sequela. Importantly, no patients in the synthetic arm had a mesh infection. No deaths were noted in this cohort during the study period.

### 4 | DISCUSSION

Orthotopic neobladder was initially preferred by men for the ability to resume a normal method of voiding, without ostomy appliances and the need for pouch catheterization.<sup>7,8</sup> Despite studies by Stenzl et al<sup>9</sup> and Stein et al<sup>2</sup> proving the oncologic safety of female neobladder, it remains underutilized.<sup>1,3</sup> Although few people are performing continent diversions, multiple studies have also shown that even on multivariate analysis women are less likely to receive continent urinary diversion.<sup>1,10</sup>



Hypercontinence following neobladder formation has provided some concern and may be one of the reasons behind these low numbers. Studies have demonstrated rates of hypercontinence between 16% and 70%.<sup>4,11</sup> The exact cause of hypercontinence remains unknown. Kaufman et al<sup>12</sup> was unable to determine any correlation between development of hypercontinence and a series of other variables in 50 patients. Multiple theories have been proposed regarding the physiology behind hypercontinence; however, these vary from study to study. Anatomic aspects such as an acute neocystourethral angle and preservation of the pubourethral ligaments are among two most commonly suggested. A study by Ali-el-Dein also showed sagging of the posterior bladder wall and an acute pouch-urethral angle as seen on videourodynamics. This resolved with reduction pouchoplasty and suturing of the neobladder to the anterior abdominal wall. This technique was later modified by placing omentum posterior to the neobladder and suspension of the vaginal stump to the round ligaments.<sup>4,5</sup> A series from the University of Southern California reported their series with placement of Marlex mesh to perform sacrocolpopexy at the time of cystectomy to prevent hypercontinence. Twenty-seven of eighty-one (33%) patients in their series required intermittent catheterization and an additional 20 were incontinent requiring more than two pads per day.<sup>13</sup> In the current study, we used large-pore polypropylene mesh as this is the standard mesh used in ASC for the treatment of high grade pelvic organ prolapse.<sup>14</sup> Rectus fascia was used if the patient was immunocompromised.

Given the high rate of hypercontinence in women undergoing neobladder creation, multiple methods have been attempted to reduce the rate of hypercontinence in these patients. Stein et al<sup>13</sup> created omental flaps that were secured to the levator ani primarily to reduce fistula formation. In their series, 27 of 61 (44%) were hypercontinent. Ghoneim's cohort placed omentum posteriorly, which also resolved hypercontinence in all subjects.<sup>5</sup> Finley et al<sup>15</sup> also noted prolapse of the neobladder pouch to be associated with prolonged retention post operatively. Although the number of patients is limited, transvaginal repair of neocystoceles has been shown to improve hypercontinence rates, both with and without mesh.<sup>15</sup>

A previous case report using mesh sacrocolpopexy with coverage by posterior peritoneum had also been published with no hypercontinence as well.<sup>16</sup> Previously they described a thick flap of peritoneal and extraperitoneal tissue secured to the vaginal cuff and levator ani to prevent posterior prolapse, which they felt was the primary etiology of hypercontinence.<sup>17</sup> The mesh from the sacrocolpopexy would minimize the posterior descent of the bladder with voiding and the peritoneal covering prevents potential mesh erosion into adjacent bowel.

## 5 | CONCLUSION

While our case series is small, we do show excellent outcomes, but larger numbers are needed to confirm our findings that formal ASC is a safe and effective way to prevent hypercontinence following orthotopic neobladder in women with minimal additional morbidity and operative time in patients.

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