Vaginal Dehiscence and Evisceration After Robotic-assisted Radical Cystectomy: A Case Series and Review of the Literature

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OBJECTIVE
To describe a rare complication in 5 women who had vaginal prolapse, dehiscence, and/or evisceration after having undergone robotic-assisted radical cystectomy with creation of ileal conduit urinary diversion. Radical cystectomy is the standard of care in the extirpative treatment for muscle invasive urothelial carcinoma. Anterior exenteration in the female patient requires removal of the anterior vaginal wall, urethra, uterus, and adnexa which results in significant changes to the pelvic floor.

METHODS
Retrospective identification of all women having undergone robotic-assisted radical cystectomy for urothelial carcinoma who ultimately represented with vaginal prolapse, dehiscence, and/or evisceration between January 2012 and April 2019. We identified patient characteristics detailing their presentation. A review of the available literature highlighted the lack of available information in this uncommon cohort.

RESULTS
Five women with vaginal dehiscence and/or evisceration who had previously undergone robotic-assisted radical cystectomy, anterior vaginectomy with urethrectomy, pelvic lymph node dissection, and creation of ileal conduit by 4 surgeons were identified. Mean interval time to initial presentation of prolapse or dehiscence was 44.4 weeks (range 11-120). In the 2 patients that eviscerated prior to repair, this occurred at 5 and 25 weeks after initial outpatient consultation. All reconstructive efforts were approached transvaginally. Two patients underwent 2 or more repairs. Management options included expectant management, pessary, and immediate vs delayed transvaginal surgical repair.

CONCLUSION
Our case series describes the unique and potentially devastating complication of vaginal dehiscence and bowel evisceration in women with history of robotic-assisted radical cystectomy. UROLOGY 134: 90–96, 2019. © 2019 Elsevier Inc.

Prior studies have demonstrated similar outcomes of female robotic anterior exenteration compared to male patients undergoing robotic radical cystoprostatectomy. Since radical cystectomy in women typically involves removal of the bladder, urethra, and anterior vaginal wall along with uterus and adnexa, there are resultant changes in pelvic support that can predispose these patients to develop vaginal prolapse. Unique to these women, undergoing partial vaginectomy can lead to uncommon but grave sequelae in regards to prolapse, namely dehiscence and organ evisceration. Vaginal dehiscence is the separation of the vaginal epithelium at the previous vaginectomy closure. Dehiscence of the vaginal wall allows herniation of the peritoneal cavity into the vaginal canal. Further progression can occur with evisceration of abdominal contents through the vagina. These complications present significant challenges for repair to the reconstructive pelvic surgeon.
We describe our experience with 5 women found to have vaginal failure after robotic-assisted radical cystectomy with ileal conduit urinary diversion. In this manuscript we define vaginal failure as prolapse, dehiscence, and/or evisceration.

**CASES**

Five women with history of robotic-assisted radical cystectomy and ileal conduit urinary diversion for urothelial carcinoma presented with vaginal prolapse, dehiscence, and/or evisceration. Cases were reviewed from our health system database which included data from January 2012 to April 2019. Patient summaries are listed in Table 1. All patients had anterior vaginectomy with urethrectomy closed in a single layer with running absorbable suture (except Patient 1 where this information was not available). Average patient age at time of robotic-assisted radical cystectomy was 69.6 (range 55-79) years with an average body mass index of 26.16 (range 21.2-33.7). Average interval time from robotic extirpative cystectomy to initial prolapse symptoms was 31 weeks (range 11-120). Two patients had multiple repairs and were also the women that had biologic graft augmentation with final repair. Parastomal and/or ventral hernias were also noted in 60% (3/5) of patients. Only 1 patient had systemic therapy for urothelial carcinoma. Two women had prior smoking history and none were active smokers. None were on steroids or had malnutrition. All women had their final reparative surgery at our institution by a single surgeon.

**Case 1**

This 55-year-old woman underwent robotic-assisted radical cystectomy with ileal conduit for high grade urothelial carcinoma. She had a hysterectomy performed 18 years prior for a nonprolapse related benign condition. She noted onset of vaginal bulge 16 weeks after cystectomy. Physical examination documented Stage IV vaginal prolapse with denuded anterior vaginal wall. The patient underwent an examination under anesthesia at 7.5 weeks after her initial prolapse presentation. This demonstrated a complete dehiscence of the anterior vaginal wall. Her initial repair was at an outside hospital and was described as a colpocleisis however surgical dictation described an enterocele reduction with native tissue repair of the vaginal dehiscence. At 6 weeks postoperatively, she was noted to have recurrent anterior vaginal wall prolapse with absence of overlying epithelium, consistent with recurrent vaginal wall dehiscence. She then underwent a second repair with excision of enterocele sac, approximation of the vaginal wall to the posterior pubic bone with a biological graft (dermal acellular graft) as an augment, along with a perineorrhaphy. One year later she represented with recurrent symptomatic bulge and was noted to have recurrent dehiscence on examination. She underwent a third repair effort consisting of a transvaginal Moschcowitz-style obliteration of the cul-de-sac with

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>BMI</th>
<th>Path Stage</th>
<th>Initial Vaginal Closure Technique</th>
<th>Time to Prolapse (wk)</th>
<th>Time to 1st Repair (wk after Prolapse Symptoms)</th>
<th>Time to Evisceration + Repair (wk after Prolapse Symptoms)</th>
<th>Tobacco (Pack-y)</th>
<th>Other Surgical Repair</th>
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<tr>
<td>1</td>
<td>55</td>
<td>33.7</td>
<td>pT1N0</td>
<td>clamshell closure</td>
<td>16</td>
<td>7.5</td>
<td>-</td>
<td>0</td>
<td>TV x4, Graft</td>
</tr>
<tr>
<td>2</td>
<td>68</td>
<td>22.6</td>
<td>pT1N0</td>
<td>V-Loc suture, side-to-side</td>
<td>56</td>
<td>20</td>
<td>-</td>
<td>0</td>
<td>Parastomal + ventral hernia</td>
</tr>
<tr>
<td>3</td>
<td>73</td>
<td>24.4</td>
<td>pTisN0</td>
<td>Microcystic</td>
<td>14</td>
<td>5</td>
<td>Concomitant Intravesical BCG</td>
<td>0</td>
<td>TV x3, Graft</td>
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<tr>
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<td>73</td>
<td>28.9</td>
<td>pT1N0</td>
<td>V-Loc suture</td>
<td>120</td>
<td>25</td>
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<td>0</td>
<td>TV x2, Graft</td>
</tr>
<tr>
<td>5</td>
<td>79</td>
<td>21.2</td>
<td>pT4aN0</td>
<td>V-Loc suture, microcystic</td>
<td>11</td>
<td>31</td>
<td>Concomitant Neoadjuvant pembrolizumab 6 cycles</td>
<td>0</td>
<td>TV x2, Graft</td>
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**Table 1. Case summaries of patients**

Mean 69.6 26.2 - - 31 - - - - - - 2.2
approximation of the posterior vaginal wall to posterior pubic bone as well as extended perineorrhaphy to reduce size of genital hiatus. She did well until 6 months postoperatively when she was noted to have a small peritoneal window through an area of dehiscence (Fig. 1A). She underwent a completion perineorrhaphy to completely close the genital hiatus. Recently, she is doing well with no recurrent prolapse at 5-year follow-up (Fig. 1B).

Case 2

A 68-year-old woman underwent robotic-assisted radical cystectomy with ileal conduit for urothelial carcinoma. She had previously undergone hysterectomy for abnormal uterine bleeding approximately 20 years prior. She noted onset of a vaginal bulge just over 1 year (56 weeks) after cystectomy. Physical examination confirmed anterior vaginal wall prolapse. The initial attempt for correction was a transvaginal reconstruction for an enterocele prolapsing through the area of the prior urethrectomy. The hernia sac was closed with absorbable suture.

The patient did well for approximately 6 months before noting recurrent vaginal bulge. Physical examination noted Stage II prolapse of the anterior wall and vault. She did not tolerate vaginal pessary due to discomfort and her prolapse symptoms became more bothersome. On repeat examination, she was noted to have developed an erosion of the prolapsing tissue near the right apex with discharge. Given the concern of impending vaginal evisceration, she was taken to the operating room for what was described as a partial vaginectomy. Six weeks after surgery she noted recurrent bulge and was found to have apical prolapse on examination. Vaginal wall ulceration at the right apex was again noted and she had another pessary trial that was ultimately not successful (Fig. 1C).

Given that prior native tissue repairs had failed, transvaginal repair was performed by approximating the posterior vaginal wall to the pubic symphysis and inferior rami utilizing a biological graft augmentation for reinforcement (ACell MatriStem Urinary Bladder Matrix). A Capio SLIM Suture Capturing Device was used to place sutures radially on remnant pararectal fascia posteriorly and anteriorly on the inferoposterior aspect of pubic bone. Additionally, an extended perineorrhaphy was performed to narrow the genital hiatus. Her postoperative course was complicated by readmission on postoperative day 3 for heavy vaginal bleeding that was managed with temporary vaginal/perineal packing, however no transfusion was required. At her most recent follow-up at 21 months...

Figure 1. (A) Woman 1 after 3 prior repairs showing recurrent prolapse and small area of dehiscence on speculum examination. (B) Woman 1 after her fourth and final repair to completely close the genital hiatus. (C) Woman 2 found to have apical prolapse with vaginal wall ulceration concerning for impending vaginal evisceration. (D) Woman 2 showing no recurrent vaginal failure at 21 months after her third repair utilizing a biological graft with extended perineorrhaphy. (Color version available online.)
(from most recent repair), patient was doing well with no recurrent prolapse (Fig. 1D).

**Case 3**
A 73-year-old patient underwent robotic-assisted radical cystectomy, concomitant hysterectomy, and creation of ileal conduit in 2014 for BCG refractory carcinoma in situ. The patient noted onset of vaginal bulge symptoms 14 weeks later and initial attempts with pessary management were unsuccessful. She was noted to have anterior vaginal wall prolapse on examination with vaginal wall dehiscence with a large window of peritoneal thickening. Vaginal serous discharge was endorsed. While awaiting a mutually convenient surgery date, 5 weeks after her initial prolapse evaluation, the patient eviscerated through the vagina wall defect after a coughing episode (Fig. 2A). This resulted in prompt emergent surgery to reduce bowel and secure the anterior vaginal wall to the posterior aspect of pubic bone (Fig. 2B). During her repair, a Capio SLIM Suture Capturing Device was utilized to place several rows of polydioxanone suture on inferoposterior aspect of pubic bone. Postoperative follow-up to 11 months demonstrated no recurrent prolapse.

**Case 4**
This is a 73-year-old female with a history gross hematuria found to have invasive high-grade microcystic variant urothelial carcinoma. She underwent robotic-assisted radical cystectomy with extended pelvic lymph node dissection, total hysterectomy with bilateral salpingo-oophorectomy, anterior vaginectomy with total urethrectomy, and creation of ileal conduit. About 2 years after cystectomy (28 months), patient had complaints of vaginal bulge with significant drainage. Physical examination noted vaginal eversion with a defect in the vaginal wall revealing a window of thickened peritoneum consistent with vaginal dehiscence (Fig. 2C). Patient adamantly declined surgical intervention at that time to travel internationally. Twenty-five weeks after her prolapse evaluation, the patient eviscerated vaginally. She had an emergent transvaginal reduction of prolapsed bowel, repair of the vaginal cuff dehiscence, colpocleisis, levatorplasty, and perineorrhaphy at an outside hospital.

**Figure 2.** (A) Woman 3 with bowel evisceration through a vaginal wall defect after a coughing episode. (B) Woman 3 showing the vaginal wall defect after bowel was reduced intraoperatively. A Capio SLIM Suture Capturing Device was utilized to place several rows of suture on posterior aspect of pubic bone with absorbable suture. (C) Woman 4 with vaginal eversion and a defect in the vaginal wall that was leaking peritoneal fluid. The dehisced vaginal epithelium had been replaced by thickened peritoneum consistent with an enterocele. (D) Woman 5 demonstrated vaginal dehiscence with concern for impending evisceration 11 weeks after her radical cystectomy. (Color version available online.)
Four months later she represented to our institution with recurrence of her vaginal dehiscence. Examination noted thickened peritoneum and vaginal skin herniating to 2-3 cm beyond the vaginal opening. She underwent completion colpocleisis with biologic augment (AlloDerm) and extended perineorrhaphy. She was seen in follow-up at 3 weeks postoperatively and continues to heal.

Case 5
This is a 79-year-old female with history of high-grade muscle invasive urothelial carcinoma. Cystoscopy demonstrated a large bladder tumor, which was found to be locally invasive on cross-sectional imaging. The patient underwent 6 cycles of neoadjuvant immunotherapy with pembrolizumab. She had extirpative surgery consisting of robotic-assisted radical cystectomy and total urethrectomy, radical hysterectomy and bilateral oophorectomy, bilateral extended pelvic lymph node dissection, and creation of ileal conduit urinary diversion. The patient recovered from surgery and was continued on pembrolizumab for adjuvant therapy given her advanced pathologic stage (pT4aN0).

Eleven weeks after her cystectomy, the patient presented to the emergency room with vaginal discharge and vaginal bulge. Physical examination demonstrated vaginal dehiscence and a window of thickened peritoneal tissue with concern for potential of evisceration (Fig. 2D). She was admitted and packed vaginally. Ultimately, the patient underwent enterocoele repair, colpocleisis, and a perineorrhaphy. She continued adjuvant immunotherapy and has been followed through the oncology service. The patient is now 8 months postrepair with no vaginal prolapse recurrence.

DISCUSSION
Laparoscopic approaches have been increasingly utilized in abdominal and pelvic surgeries with benefits of decreased morbidity, decreased blood loss, and shorter hospitalizations.8 Robotic-assisted radical cystectomy is now common in the treatment of urothelial carcinoma of the bladder, however, the population of patients undergoing this procedure is predominantly male.2,3 There are gender differences in the surgical approach as radical cystectomy in women includes exenteration of the anterior pelvic organs, including uterus, fallopian tubes, ovaries, and full thickness anterior vaginal wall with the entire urethra.9

We report on 5 women that underwent robotic-assisted radical cystectomy for urothelial carcinoma who later presented with vaginal failure. Tobacco history, systemic chemotherapy, increased body mass index, and pelvic radiation did not appear to be clear unifying associated factors. These exposures are all documented risk factors in wound and tissue healing.10,11

All 5 patients presented initially with vaginal prolapse symptoms including vaginal bulge, pelvic pressure, and serous vaginal discharge. Examinations were all consistent with prolapse with discrete areas of vaginal dehiscence with a window of thickened peritoneal lining. Dichotomizing the patient presentations, it appears that some had early presentations (<20 weeks) and some with delayed presentations (>52 weeks). Three of our patients had early presentation (Cases 1, 3, 5) with a mean of 13.6 weeks. The 2 patients with delayed presentation had symptoms over a year after cystectomy. Early and late presentations may have different etiologies including devascularization of vaginectomy closure in early presentations vs failure of pelvic support over time in delayed presentations. Larger prospective studies are needed to gain insight into the difference between early/late vaginal failures and to elucidate risk factors including patient variables and surgical techniques and allow us to calculate the incidence rate. We found very little literature related to this complication and would therefore expect the prevalence to be low.

Patients 3 and 4 proceeded to bowel evisceration prior to definitive reconstruction. Once these patients had evisceration, at 5 and 35 weeks after initial presentation respectively, they were emergently taken for reduction and vaginal reconstruction. Both were managed vaginally without abdominal exploration.

Three of the women (Cases 1, 3, 4) had other postsurgical complications including parastomal and ventral hernias. A recent study following 383 patients after robotic-assisted radical cystectomy with ileal conduit documented a 20% rate of parastomal hernia development.11 In our series, 60% of the women developed parastomal hernia. There may be an associated unifying risk factor that that results in weakness of both abdominal fascia and pelvic organ support. Future review may elucidate the fundamental risk factors related to both.

Following the extirpative portion of the surgery, the vaginal remnant consists of the posterior and lateral walls with an opening at the introitus (Fig. 3). Two basic techniques exist to close the vaginorrhaphy; (1) clam shell (ie, side to side) and (2) causal to cephalad (ie, north to south).9 Technical considerations related to the maintenance of insufflation during vaginectomy may lead to an attenuated suture line. Laparoscopic suturing technique, knots, mode of suture, and suture materials are suggested as possible explanations for the increased risk of vaginal cuff dehiscence after laparoscopic hysterectomies.12

The absence of endopelvic fascia can result in dehiscence of the vaginal epithelium allowing herniation through the apex or anterior wall of the vagina with only a thin layer of peritoneum covering the abdominal contents. This can result in abrupt evisceration requiring emergent surgical intervention. The absence of usual fascial layers can lead to recurrence with attempts at native tissue repairs.13

We forward that there are 2 fundamental challenges of postextirpative anatomy. First is the en bloc absence of bladder and the associated anterior vaginal wall. The defect in the anterior portion of the vaginal tube allows the peritoneum and abdominal contents to be in direct contact with this point of weakness.14,15 Second, there is
little to no reliable anatomic fixation points to reestablish the fibromuscular wall and vaginal tube integrity. The paravaginal support is not helpful as it lies far too lateral. The reliable vaginal support structures typically used in vaginal prolapse repair, the pubocervical endopelvic fascia, is diminished. Apical support structures, such as the uterosacral ligament, sacrospinous ligament, and levator muscular fasia, are also insufficient as these structures are too apical or posterior. Another possible technique utilizes the pectineal ligament (Cooper's ligament) which is used in colposuspension for the treatment of incontinence during a Burch procedure. The symphysis pubis can also be considered. The periostrum is familiar to the reconstructive surgeon as an analogous point of attachment during the Marshall-Marchetti-Krantz procedure. In our approach we utilized both of these structures to anchor biologic graft augments to address the open vaginal hiatus.

Treatment options for vaginal support failure in this setting include transvaginal or transabdominal repair. Transvaginal repairs can be reconstructive or obliteratorive in nature, with or without use of an augment. For final surgical technique, all of our patients all underwent transvaginal obliteratorive repairs.

A transvaginal technique we have developed to manage vaginal dehiscence and evisceration emphasizes an obliteratorive approach and utilizes a Capio SLIM Suture Capturing Device to approximate the distal remnant posterior vaginal wall to the periostium of the pubic symphysis and inferior rami. This is in combination with a vaginectomy of remaining vagina to further buttress the repair. We believe that this provides better and more durable support than repair utilizing surrounding soft tissue. Extended perineorrhaphy to reduce the genital hiatus has been essential in our experience to reduce vulnerability for recurrence. Due to paucity of native tissue and failed prior repairs, 3 patients had biological grafts to augment the repair and provide a barrier between the vagina and the peritoneal cavity.

There is scant literature available regarding vaginal prolapse, dehiscence, and/or evisceration in the women that have undergone robotic radical cystectomy. Stav et al in 2009 reported on a series of 5 patients treated for vaginal prolapse after open radical cystectomy with ileal conduit. The average time for presentation was 10.6 months and all had transvaginal repairs. Synthetic mesh was used in 2 of the patients. The mesh products used in those patients are not currently available in the United States (Perigee, Vypro II). Chopra et al in 2016 reported a 75-year-old patient who developed small bowel obstruction from prolapse 45 days after undergoing robotic-assisted radical cystectomy with ileal conduit. She was managed with immediate exploratory laparotomy with resection of a segment of small bowel found to be herniating through the apex of the vagina.

Chhabra and Hedge in 2013 reported on a 51-year-old postmenopausal patient who developed prolapse 3 months after open radical cystectomy with ileal conduit. This patient had evisceration of small bowel through the vagina requiring bowel resection. In this patient, prolene mesh was used to repair the pelvic floor and the vagina was closed transvaginaally. Recovery was noted to be unremarkable at 1 month postoperatively.

Graefe et al in 2013 described a technique for management of anterior/apical prolapse after radical cystectomy using a synthetic mesh implant. In their 2 cases, there was no mesh exposure, prolapse recurrence, or chronic pain issues noted. Follow-up length postoperatively in that series was 4 months in 1 patient and 16 months in the other. The commercial mesh product used in that study has now been taken off the market.

Prophylactically addressing potential vaginal prolapse at the time of extirpative surgery is an emerging issue. The role of performing vault suspension techniques at time of radical cystectomy to prevent prolapse has been sparingly described in the literature. This is not part of the classic description of anterior pelvic exenteration for urothelial carcinoma but can be considered in a case by case manner. Given the current Food and Drug Administration prohibition of transvaginal mesh implants are not viable options and biological graft can be considered. Obliteratorive techniques may ultimately be necessary to achieve durable relief and prevent recurrence of prolapse but require careful patient counseling regarding future vaginal coital function. Considering the rarity of vaginal failure in RARC, prophylactic procedures during time of extirpative surgery need to be carefully deliberated.

CONCLUSION
This is the largest case series to date documenting vaginal failure including prolapse, dehiscence, and evisceration as
a complication in female patients with history of robotic-assisted radical cystectomy and creation of ileal conduit. Anterior pelvic exenteration dramatically alters pelvic organ support in women. Care during initial extirpative surgery is critical to avoid devascularization of the vaginectomy and robust closure techniques are encouraged. Patients with prolapse symptoms should be evaluated and surgical intervention should be strongly encouraged as progression to evisceration of abdominal contents can result. Successful surgical management of this uncommon complication should include strong consideration toward colpocleisis, extended perineoplasty, and use of biologic graft given the changes to surrounding vaginal tissues and support.

References