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LOWER URINARY TRACT SYMPTOMS & VOIDING DYSFUNCTION (J SANDHU, SECTION EDITOR)

Management of Pelvic Organ Prolapse After Radical Cystectomy

Dominic Lee[1] · Philippe Zimmern[2]

Abstract

Purpose of Review This article explores the anatomy, management options, and outcomes of pelvic organ prolapse with a female cystectomy patient.

Recent Findings There is a lack of data on surgical management outcomes for prolapse following radical cystectomy. However, most case series from tertiary referral centers show reasonable results irrespective of route of repair. As expected, the surgical planes and the reorientation of the bowel loop for urinary diversion makes any pelvic reconstruction a potential hazard and requires a high level of expertise and counseling to the patient in regard to the management of expectations.

Summary Pelvic organ prolapse following radical cystectomy is uncommon but presents a significant challenge to the reconstructive surgeon.

Keywords Radical cystectomy · Prolapse · Sacro-colpopexy · Complications

Introduction

Bladder cancer is the fifth most common urological cancer and although the ratio of male to female is 4:1, women have more aggressive disease requiring radical management [1]. A radical cystectomy (RC) in the female is often performed as part of an anterior exenteration with concurrent removal of the bladder and uterus (if present). The urinary diversion performed subsequently is governed by the oncological status of cancer and patient characteristics. The desired diversion chosen for reconstruction is usually a bowel segment (ileal/colonic) conduit. However, if the condition is favorable, a continent urinary diversion such as an orthotopic neobladder (ONB) formation may be performed. A recent study by Stein et al. suggests that 70% of women are suitable for ONB [2]. Both of these scenarios presents significant challenges to the reconstructive surgeon when a pelvic organ prolapse (POP) develops later on. This article aims to discuss the diagnostic workup, management, surgical technique, and outcomes of intervention.

Prevalence

Literature on the prevalence of pelvic organ prolapse is rather scarce following radical cystectomy and is likely underreported. Most of the reports are limited to case reports and small case series. However, a large series of radical cystectomy/ONB by Badawy et al. in 78 women, reported an incidence of ONB vaginal prolapse in 6% of women over a mean follow-up of 62 months [3]. In most of the reported case series, apical prolapse dominates the clinical presentation, which suggests considerable disruption to the pelvic organ support structures at the time or following surgery. The cause and effect of hyper-continence relating to the subsequent development of POP is controversial but the constant Valsalva efforts at voiding can lead to weakening of the pelvic floor with descent of the ONB causing direct urethral kinking at the neobladder-urethra anastomosis or a neo-cystocele with prolapse through the anterior vaginal wall [4].

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✉ Philippe Zimmern
Philippe.Zimmern@utsouthwestern.edu

Dominic Lee
domi_2020@yahoo.com.au

[1] Department of Urology, St. George Hospital, Gray Street, Kogarah, NSW 2217, Australia

[2] Department of Urology, UT Southwestern Medical Center at Dallas, 5323 Harry Hines Blvd, JA5- 130 C, Dallas, TX 75390-9110, USA

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Intraoperative Management Allowing Preservation of Oncologic Principles

The surgical technique varies depending on the desired urinary diversion chosen following radical cystectomy without endangering oncological outcomes. A uterine and vaginal sparing technique can be utilized in the context of younger women desiring future fertility and to aid in POP prevention with preservation of pelvic support structures [3].

Ileal Conduit

If the ileal conduit is the chosen diversion technique, the anterior vaginal plate is often excised en bloc with the bladder specimen in addition to a urethrectomy. The residual posterior vaginal wall is often mobilized laterally and posteriorly to allow for it to be folded caudad. This ultimately shortens and narrows the vaginal compartment, which makes subsequent attempt at a transvaginal repair difficult. At this point, it is worthwhile to preserve the round ligaments and plicate them medially to the vaginal stump in order to stabilize and reinforce the apex of the vaginal to prevent subsequent development of vaginal prolapse.

Orthotopic Neobladder

When a neobladder is considered the vesico-vaginal plane is carefully dissected. A nerve sparing approach can be attempted. A modified uterine sparing technique reported by Badawy et al. detailed careful dissection of the lateral vaginal walls, bladder neck, and proximal urethra retaining most of the pudendal nerve plexus fibers to preserve the sphincter mechanism. The dorsomedial pedicle is transected close to the bladder wall and proximal urethra, avoiding any dissection caudal to the level of urethral incision to preserve maximal urethral length. The specimen is detached ≈ 0.5 cm below the bladder neck and the pubo-urethral suspensory ligaments of the remnant urethra is left intact. The endopelvic fascia must be kept intact and dissection distal to bladder neck minimized to prevent injury to the rhabdosphincter region. In addition, a posterior support to the ONB is created with an omental flap placed in the junction between the neobladder and the urethra. Furthermore, this flap is sutured circumferentially to the pelvic fascia and to the vaginal wall just below the ventral urethral margin. The ONB is fixed anteriorly to the pubis or to the Cooper ligament and laterally to the endopelvic fascia to prevent prolapse [3].

It is important that aside from oncological considerations that pre-existing POP be fully assessed. The presence of POP contributes to hyper-continence and can lead to post-surgical pelvic floor disorders [5]. This has been one of the many deterrent factors in offering ONB surgery at the time of RC for women. In order to prevent prolapse and hyper-continence a prophylactic sacro-colpopexy has been reported by Sterns et al. with concurrent ASC at the time of RC. The operative technique entails a standard RC and pelvic lymph node dissection. The ONB is fashioned but not anastomosed. The urethral sutures are preplaced. The anterior vagina is spared or if partially resected, it is closed longitudinally into a tubular configuration. The sacral promontory is identified, and the anterior longitudinal ligament is dissected clear. The sacrocolpopexy can be performed with either rectus fascia (if the patient is immunocompromised) or with synthetic mesh. When mesh is used, it is attached to the vaginal cuff 1 cm distal to the closure line and the peritoneal lining closed over the mesh. The neobladder-urethral anastomosis is completed. In their series of 9 patients, 6 women had ASC with mesh and 3 had rectus fascia and at a median follow-up of 59.1 months, no prolapse, mesh erosion, or hyper-continence was reported [6].

Management

The majority of patients present with a vaginal bulge (enterocele/neo-cystocele) (Fig. 1). Very rarely, a complete evisceration from the vaginal stump can be encountered. In patients with an ONB, the presentation with voiding dysfunction with hyper-continence can also be a feature. Hyper-continence is the state of urinary retention and the incidence varies from 16 to 70% in women with neobladder surgery [7]. The sequelae of hyper-continence include overflow incontinence, overdistension of neobladder, potential upper tract deterioration, and stone formation. It is one of the pervading reasons deterring women from having ONB surgery. There are multiple hypotheses relating to its development including an overly capacious reservoir, sphincter dyssynergia, the presence of prolapse causing urethral kinking, or ischemic urethral stricture disease.

The management of prolapse following radical cystectomy is a challenging undertaking. There is a significant paucity of data on treatment and outcomes apart from a few selected small case series. Conservative management (Including

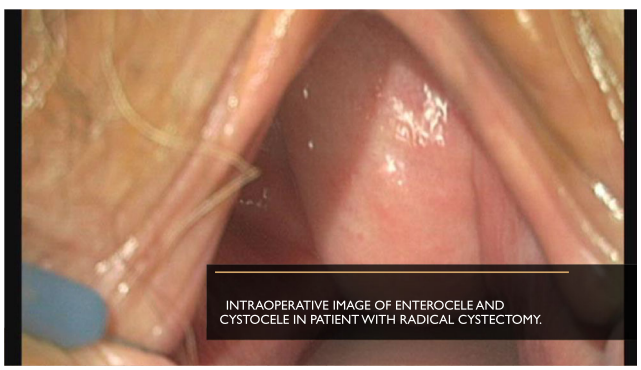

Fig. 1 Intraoperative image of enterocele and cystocele in patient with radical cystectomy

pessary) can be trialed but on failure/ or intolerance, surgical repair can be considered. The options include non-reconstructive techniques such as colpocleisis or a formal repair (transvaginal or transabdominal) depending on patient variables such as ease of vaginal access, comorbidities and desire for sexual function. Given the complexity, detailed counseling, and optimal disclosure is imperative.

Investigations

Apart from a thorough clinical history and pelvic examination detailing the vaginal compartments affected and an assessment of the tissue quality and vaginal caliber, it is useful to consider imaging. A magnetic resonance imaging with defecography (MRI) has been used to assess the pelvic floor anatomy, degree of prolapse in all compartments and also to evaluate for possible local or distant recurrence of cancer. The technique is detailed by Zimmern et al. [8]. Multi-channel Urodynamics with fluoroscopy maybe required if voiding dysfunction is evident in cases with ONB presenting with POP [7].

Treatment

Conservative Management

Depending on the caliber of the vagina and/or the sexual activity of the individual, a vaginal pessary can be trialed for prolapse reduction. However, pessary retainment is dependent on the integrity of pelvic floor musculature, which may be damaged at the time of the RC and the length of the vaginal vault. In addition, caution must be exercised in patients with enterocele as the vaginal epithelium is often significantly thinned and pessary use can potentially cause ulceration and subsequent bowel evisceration.

Surgical Management

Non-reconstructive Surgery

In a willing and non-sexually active patient, colpocleisis can be performed, which can resolve the prolapse. However, the status of continence must be assessed adequately as it will not be feasible to consider any sling surgery for anti-incontinence management following closure of the vagina. Furthermore, careful consideration needs to be given to dissection of the anterior vaginal wall in the context of ONB as a fistula can occur with an anterior vaginal wall injury [9, 10]. Stav et al. have reported on a small series of 5 patients with prolapse undergoing transvaginal surgery following RC and IC, of which 2 were treated with colpocleisis. Of the 2 cases, both were surgically challenging due to the attenuated tissues and one had recurrence pending further surgery [11].

Reconstructive Surgery

It is imperative that no evidence of local recurrence of bladder cancer is present before any attempt at reconstruction is considered. Furthermore, the utilization of mesh becomes a focus and there is no consensus of opinion on its use. Suffice to say that mesh use is dictated by the severity of the prolapse, the quality of local tissue, the form of diversion performed, i.e., an IC vs ONB and the experience of the surgeon.

Transvaginal Repair

The complexities of a hostile abdomen with adhesions and access to the pelvis makes transvaginal repair an attractive option. However, as is often the case with complicated cases, the use of transvaginal mesh to augment the repair comes into question. Stav et al. reported the use of transvaginal mesh in 2 of the 5 POP repairs. One patient subsequently developed a colo-vaginal fistula requiring a laparotomy with a loop transverse colostomy and transvaginal mesh excision [11]. One case reported the use of a prophylactic sacrospinous mesh fixation at the time of laparoscopic cystectomy and ONB without subsequent prolapse recurrence or mesh complications [12]. Graefe et al. report a technique to reduce the enterocoele with fixation of the hernia sac to the retropubic space. Thereafter, an anterior mesh kit was utilized to perform and antero-apical repair in two cases. There was no reported prolapse recurrence at 4 and 16 months [13].

Abdominal Sacro-Colpopexy

An abdominal approach is challenging given the presence of adhesions, the interference of the diversion and the

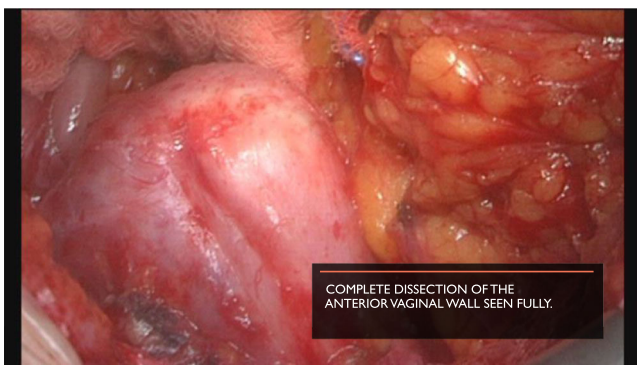

Fig. 2 Complete dissection of the anterior vaginal wall seen fully

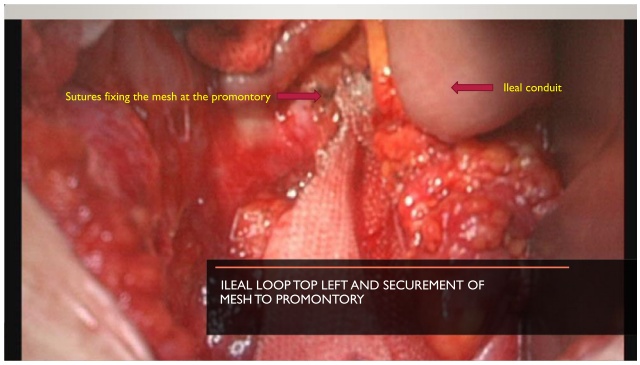

Fig. 3 Ileal loop top left and securement of mesh to promontory

foreshortened vagina. The use of autologous fascia graft and synthetic mesh has been reported at the time of sacrocolpopexy [6]. In most cases, it requires a modification of the standard technique to carry out a strong and durable repair (Fig. 2). Zimmern et al. reported their technique by attaching mesh distally to Cooper's ligament bilaterally, the shortened anterior vaginal wall, the vaginal apex, and then onto the sacral promontory proximally. A midline laparotomy is performed and an extensive adhesiolysis is undertaken, especially laterally in the pelvis at the site of the previous lymphadenectomy where loops of bowels can be adherent. A general surgeon is often required at this stage. Caution is advised when navigating the sacral promontory due to the close proximity of the ureters entering the base of the ileal conduit (Fig. 3). The mesh will have to be customized according to the dimensions of the defect and an "Eiffel Tower" shape mesh may be required intraoperatively for its broad-based extension arms that provided secure anchoring to Cooper's ligaments and allowed for selective tailoring and adjustment to the vaginal post-cystectomy anatomical changes. Retroperitonealization of the mesh can be challenging and may require an omental wrap around the mesh or over the mesh. Of the two patients reported in the series using this technique, there was no mesh erosion and one patient had a small anterior recurrence at 11 months requiring a transvaginal colporrhaphy [8] (Fig. 4).

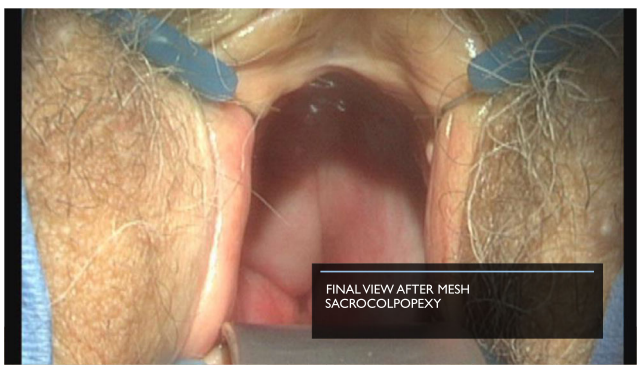

Fig. 4 Final view after mesh sacro-colpopexy

Conclusion

The surgical repair POP in women following RC and urinary diversion/reconstruction is fraught with challenges. High level of surgical skill is required, and it is best managed in a tertiary referral center. The outcomes are often mixed and there is no consensus on the preferable route of repair and the surgeries are dependent on the ability of the pelvic surgeon. More understanding and preservation and/or repair of the supportive pelvic structures is required at the time of RC to prevent prolapse. Concurrent prolapse repair at the time of RC can be attempted to prevent future events. Ultimately, more research is required in this field to understand the interplay of pelvic support preservation at the time of oncological clearance.

Compliance with Ethical Standards

Conflict of Interest Dominic Lee and Philippe Zimmern each declare no potential conflicts of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

References

1. Thorstenson A, Hagberg O, Ljungberg B, Liedberg F, Jancke G, Holmäng S, et al. Gender-related differences in urothelial carcinoma of the bladder: a population-based study from the Swedish National Registry of Urinary Bladder Cancer. Scand J Urol. 2016;50:292–7.
2. Stein J, Esrig D, Freeman J, et al. Prospective pathologic analysis of female cystectomy specimens: risk factors for orthotopic diversion in women. J Urol. 1998;51:951–5.
3. Badawy A, Abolyosr A, Mohamed E, et al. Orthotopic diversion after cystectomy in women: a single Centre experience with a 10 year follow-up. Arab J Urol. 2011;9:267–71 **This provides a surgical commentary on orthotopic neobladder and uterine preservation technique**.
4. Finley D, Lee U, McDonough D, et al. Urinary retention after orthotopic neobladder substitution in females. J Urol. 2011;186:1364–9 **This provides a detailed on mechanism of hypercontinence following orthotopic enobladder**.
5. Littlejohn N, Cohn JA, Kowalik CG, Kaufman MR, Dmochowski RR, Reynolds WS. Treatment of pelvic floor disorders following neobladder. Curr Urol Rep. 2017;18(1):5. https://doi.org/10.1007/s11934-017-0652-4 **This review presents the most current information on the treatment of pelvic floor disorders after orthotopic bladder substitution**.
6. Stearns G, Donahue T, Fathollahi A, Dalbagni G, Sandhu J. Formal sacrocolpopexy reduces hypercontinence rates in female neobladder formation. Neurourol Urodyn. 2018;37(7):2281–5 **This case series documents the use of current ASC at the time of RC and ONB**.
7. Gross T, Meierhans S, Meissner C, et al. Orthotopic Ileal bladder substitution in women: factors influencing urinary incontinence and hypercontinence. Eur Urol. 2015;68:664–71.
8. Zimmern PE, Wang CN. Abdominal sacrocolpopexy for repair of pelvic organ prolapse after radical cystectomy. Female Pelvic Med

Reconstr Surg. 2019;25(3):218–22 **This article documents the use of transabdominal ASC technique**.

9. Gelber K, Bohrer J, Kim CO, Minaglia S. Vaginal repair of neobladder-vaginal fistula: a case report and review of the literature. Int Urogynecol J. 2013;24(1):175–8.
10. Carmel ME, Goldman HB, Moore CK, Rackley RR, Vasavada SP. Transvaginal neobladder vaginal fistula repair after radical cystectomy with orthotopic urinary diversion in women. Neurourol Urodyn. 2016;35(1):90–4.
11. Stav K, Dwyer PL, Rosamilia A, Lim YN, Alcalay M. Transvaginal pelvic organ prolapse repair of anterior enterocele following cystectomy in females. Int Urogynecol J Pelvic Floor Dysfunct. 2009;20(4):411–5 **This article documents the use of transvaginal repair of prolapse following radical cystectomy**.
12. Törzsök P, Bauer S, Forstner R, Sievert KD, Janetschek G, Zimmermann R. Laparoscopic radical cystectomy and ileal neobladder for muscle invasive bladder cancer in combination with one stage prophylactic laparoscopic Sacrospinal fixation to avoid future pelvic organ prolapse. J Endourol Case Rep. 2016;2(1):59–61.
13. Graefe F, Beilecke K, Tunn R. Vaginal vault prolapse following cystectomy: transvaginal reconstruction by mesh interposition. Int Urogynecol J. 2013;24(8):1407–9.