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Research Article

Perioperative Outcomes of Combined Gynecologic Oncology and Urogynecologic Surgeries

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ABSTRACT

Background: Many women diagnosed with a gynecologic malignancy may have coinciding urogynecologic complaints, such as pelvic organ prolapse (POP) and/or urinary incontinence, with approximately 35% reporting moderate to severe symptoms. Recent National Surgical Quality Improvement Program (NSQIP) database inquiries of gynecologic cancer cases found only 2.3-2.4% of women undergoing interventional surgery for gynecologic malignancy also had a procedure for pelvic organ prolapse urinary incontinence (POPUI), and those combination cases did not show significant increase in postoperative risks. The purpose of our study is to review our cases of gynecologic cancer that underwent concomitant urogynecologic procedures and compare their perioperative outcomes to gynecologic cancer cases without concomitant urogynecologic procedures.

Methods: A retrospective cohort study conducted at a teaching hospital included 29 gynecologic oncology patients who underwent robot-assisted total laparoscopic hysterectomy, bilateral salpingo-oophorectomy, and lymphadenectomy. Controls underwent standard staging procedure and were compared to women with concomitant pelvic floor dysfunction that underwent additional laparoscopic uterosacral ligament suspension for apical suspension and a sling for stress urinary incontinence (SUI). The primary outcome was operative time, defined as documented total operative time and robot console time. Secondary outcomes include delta hemoglobin, hospital length of stay, readmission rate, total pain medication, urinary retention and discharge with foley.

Results: The combined case group had longer total procedure time duration (301 minutes versus 210 minutes, p-value < 0.0001), with comparable mean console time (178 minutes versus 160 minutes; p = 0.1456). Blood loss estimated by mean percent difference of Hgb showed moderate conditional dependence on surgical case (22.2% cases versus 14.9% controls, p-value 0.04). Combined cases resulted in 76.9% of subjects discharged with a foley catheter compared to none in controls (p-value < 0.0001). Otherwise, there was no difference in the other perioperative outcomes between the two groups.

Conclusion: With appropriate counseling and clinical judgement, combined urogynecologic and gynecologic oncologic surgeries can be performed to improve a patient's quality of life (QOL) with minimal increase in perioperative morbidity.

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Background

Women with a diagnosis of a gynecologic malignancy require appropriate treatment, which may consist of surgical intervention, chemotherapy or radiation. Many women diagnosed with a gynecologic malignancy are of the perimenopausal age group and may have coinciding urogynecologic complaints, such as pelvic organ prolapse and/or urinary incontinence. However, as gynecologic malignancy may be seen as the more concerning pathology, symptoms of pelvic organ prolapse and/or urinary incontinence repair may be overlooked when concomitant surgical intervention for both may be addressed. A common statistic is that a woman has an 11.1% lifetime risk of surgery for either incontinence or POP by the age of 80. However, a recent study determined lifetime risk of either incontinence or prolapse surgery could be as high as 20% [1-3]. Of the suggested 25% of women in the United States with pelvic floor disorders, only 3.1% have a concomitant surgical procedure for repair of apical support at the time of hysterectomy [2, 4, 5].

Thus, these large studies suggest that pelvic floor disorders may not be adequately addressed in the female patient undergoing gynecologic surgery. In the gynecologic cancer population, even fewer studies have been conducted to evaluate procedures to treat malignancy and pelvic floor disorders. Survey studies have found that nearly half of patients presenting for their initial gynecologic oncology clinic visit reported urinary incontinence complaints (48.5%), 10.9% reported pelvic organ prolapse, and 34.9% of patients reported moderate to severe symptoms [6, 7]. Despite this high prevalence of POPUI in these cancer patients, studies have shown that they are also unlikely to be surgically corrected and may be further overlooked during planning surgical intervention for malignancy.

Several recent NSQIP (National Surgical Quality Improvement Program) database inquiries of 23,501-25,138 gynecologic cancer cases between 2010-2016 found only 2.3-2.4% of women undergoing interventional surgery for gynecologic malignancy also had a procedure for POPUI repair.

Furthermore, they found that these combination cases had a low but statistically significant increase in postoperative adverse events [8, 9]. Previous studies have reported the incidence of major postoperative complications for combination urogynecologic and gynecologic cancer surgery has been found to be at a rate of 8.2%, which is similar to the major postoperative complication incidence rate of 9.8% in patients undergoing surgery for gynecologic cancers only [8, 10].

Additionally, Davidson *et al.* demonstrated that combined urogynecologic and oncology cases did not pose a higher risk for major postoperative adverse effects when compared to oncology surgeries alone. However, they found an increased risk of postoperative urinary tract infection and voiding symptoms along with a 10% chance that the preoperative urogynecologic surgical plan may change intraoperatively [11]. The purpose of our study is to determine the safety of these combined procedures in our populations by reviewing our cases of gynecologic cancer that underwent concomitant urogynecologic procedures and comparing their perioperative outcomes to gynecologic cancer cases without concomitant urogynecologic procedures.

Methods

Approval to perform the study was obtained from the University at Buffalo institutional review board in order to access and obtain patient data from the Millard Fillmore Suburban Hospital in Williamsville, New York. A retrospective cohort study was designed and conducted at this teaching hospital that identified mutual patients from a faculty urogynecologist and several gynecologic oncologists case list between January 2016-June 2019, which included a total of 29 patients. The inclusion criteria for the study group included patients that underwent a robot-assisted hysterectomy with bilateral salpingo-oophorectomy and lymphadenectomy for presumed malignancy plus a concomitant procedure for pelvic organ prolapse or urinary incontinence. The control group included patients that underwent a robot-assisted hysterectomy with bilateral salpingo-oophorectomy and lymphadenectomy for presumed malignancy without any additional urogynecologic procedures.

The control group consisted of patients that were operated on in the same period by the same gynecologic oncologists. Urogynecologic procedures for POP or SUI in these cases were defined as uterosacral ligament suspension, Sling procedure and perineorrhaphy. After identifying this initial selection of patients, the data was reviewed from the electronic medical records of these patients. The patients' demographic information and perioperative variables were collected by specifically performing a manual retrospective chart review, each case was evaluated for demographic and perioperative variables as defined above. Primary outcome was operative time, specifically total procedure time and console time. Secondary outcomes were intraoperative and postoperative outcomes: estimated blood loss, length of hospital stay, postsurgical complications, discharge with Foley catheter, urinary retention, PACU time and pain medication utilization measured as morphine milligram equivalents (MME).

Results

A dataset compared two independent (unpaired) subject groups: one group (controls, N = 15) that underwent standard gynecologic oncology staging procedure consisting of robot-assisted total laparoscopic hysterectomy with bilateral salpingo-oophorectomy and pelvic lymph node dissection, to the subject group (cases, N =14) that underwent the same staging procedure with additional urogynecologic procedures, specifically uterosacral plication, mid-urethral sling placement and perineorrhaphy. Demographics of the groups were found to be similar across most variables (Table 1).

Table 1: Demographics.

	Age Mean (SD)	BMI (kg/m^2) Mean (SD)	Parity Median (IQR)	Smoking (%)	Prior Laparotomy (%)
Controls (n=15)	65.7 (6.93)	37.5 (9.17)	1 (2)	20	6.7
Cases (n=14)	70.8 (6.51)	34.3 (7.16)	1.5 (3)	21.4	7.1

Perioperative outcomes were considered and of these outcomes, three show a significant difference between cases and controls: total procedure time, home foley catheter, and change in Hgb. Mean total procedure time for cases was 301 minutes and 210 minutes for controls ($p < 0.0001$). This difference is expected when accounting for additional urogynecologic procedures performed in the cases group. However, mean console time (cases, 178 minutes; controls, 160 minutes; $p = 0.1456$) was found to be comparable between the two groups, which suggests that the main increase in the total procedure time is secondary to the non-robotic portion of the procedure, which is the sling and perineorrhaphy. The uterosacral plication is performed during the robotic portion (console time) and does not appear to increase the procedure time.

For combined cases, 76.9% of subjects were discharged with a foley catheter compared to 0.0% of controls. Comparison of Post Void Residual (PVR) outcomes was not possible due to lack of data or need to perform it in the control group. Analyzing the absolute change in Hgb, cases see a mean change of -2.34 compared to -1.71 of controls ($p = 0.0734$). Comparing mean percent difference of Hgb with postoperative reference shows cases at 22.2% and controls at 14.9% ($p = 0.037$), whereas using the pre- op value as reference (see Appendix I) results in a mean percent difference of -17.7% for cases and -12.6% for controls ($p = 0.0426$). Beyond the three aforementioned variables, cases and controls did not show significant differences in other outcomes such as Pain MME, Length of Stay, Creatinine Levels, and Re-admission or ER admission rates (Table 2).

Table 2: Perioperative outcomes.

	Total Operative Time (Min)	Total Console Time (Min)	PACU Narcotics (MME)	Floor Narcotics (MME)	Δ Hgb (g/dL)	Discharge with Catheter (%)	Length of Stay (days)	ED Visit in 1 Month (%)
Controls (n=15)	210	160	2.53	23.07	1.71	77	1.4	13.3
Cases (n=14)	301	178	3.14	34.54	2.34	0	2	14.3
p value	<0.05	0.15	0.62	0.15	0.426	<0.05	0.28	0.1

Discussion

As interventions for gynecologic malignancy are aimed at prolonging survival and increasing optimal quality of life, many surgical interventions can have a negative impact, potentially worsening pelvic floor dysfunctions. With endometrial malignancies being the most common and presenting with symptoms that result in intervention in early stages, initial treatment with hysterectomy, oophorectomy and possible lymphadenectomy is the modality of choice. When considering the high prevalence of pelvic floor disorders in this population, a multidisciplinary approach may be needed to offer the patient an improvement in quality of life.

Our study confirms the findings of other studies that the peri- and postoperative outcomes of the gynecologic cancer patients undergoing concomitant urogynecologic procedures are not substantially different and therefore there is low risk in combining procedures. Perioperative outcomes were considered, and of these outcomes, three show a significant difference between cases and controls: total procedure time, home foley catheter, and change in Hgb. An increased mean total procedure time for combined cases is to be expected due to the additional urogynecologic procedures. We recognize that the addition of a urogynecologic procedure to a cancer surgery, and especially a midurethral sling placement for treatment of stress urinary incontinence increases total operative time by approximately 50 minutes.

Furthermore, the inclusion of a sling procedure in combined cases resulted in a significant percentage requiring discharge with a urinary catheter for acute urinary retention, determined by performing a post void residual bladder scan prior to discharge. Despite the increase in operative time and need for discharge home with a few days of an in-dwelling catheter for transient acute urinary retention, we believe the positive impact on the quality of life these procedures have favors performing these combined procedures in the right patient. Given the safety of concomitant procedures to treat both the malignancy and the pelvic floor disorder, quality of life improvements resulting from correction of pelvic floor disorders need to be attained as well as intervention goals for gynecologic malignancy.

Many of these patients may never seek care for the pelvic floor disorder issue as it is non-life threatening, even though it may have a more significant impact on their quality of life. Many of these patients may experience a worsening postoperatively in their QOL if the pelvic floor disorders are not addressed at the time of the initial surgery. With removal of the uterus and disruption of any attachments that were present, many patients may experience worsening of their pelvic floor disorders postoperatively. When available, a collaboration between the cancer surgeon and a urogynecologist may provide the patient with the opportunity to treat both conditions simultaneously, thereby reducing the negative impact on the quality of life and avoiding putting the patient through another surgical procedure.

There may be certain situations where the primary cancer surgery is performed at a center where there is no opportunity for collaboration between gynecologic cancer surgeons and urogynecologists as in large cancer treatment centers. In that case, the patient should not be penalized for having their surgery in a center that doesn't have these subspecialists, ideally the Gynecologic oncologists should be able to treat the POPUI without need for any other specialist. Our anticipation is that once an oncologist incorporates this into their practice and combines their cancer operation with treatment of the POPUI, there should be no significant increase in perioperative morbidity or length of surgery. The pelvic floor disorders we are referring to in this article refer to pelvic organ prolapse and incontinence (POPUI) and can be treated with a uterosacral ligament suspension and anti-incontinence procedure, which can be addressed by a gynecologic oncologist with a minimal amount of further training needed.

I Prolapse

When considering an appropriate procedure for combination surgery, a thorough understanding of pelvic anatomy must be possessed by the surgeon. Gynecologic oncologists and Female Pelvic Medicine Reconstructive surgeons share this fundamental knowledge. Most prolapse can be treated by supporting the apex with a uterosacral plication, which is fairly easy to do by a gynecologic oncologist given their surgical training and comfort in the pelvis. Uterosacral ligament suspension (USL) is one such procedure that may be a viable method to repair vaginal vault prolapse. The fundamental concept of USL is to fixate the uterosacral ligaments to the vaginal apex to provide apical support following a hysterectomy. Apical support is key in pelvic organ prolapse repair and correlates with correction of anterior defects [12, 13]. The basic anatomy of the uterosacral ligament and the surrounding relevant structures must be respected in order to minimize postoperative complications. The uterosacral ligament has been described to be a total length of approximately 12-14 cm in the average patient, arising from the cervico-vaginal junction then curving posteriorly to reach the sacroiliac joint and can be divided into three sections: distal (cervical), intermediate, and proximal (sacral), with some cadaveric studies suggesting the intermediate section to be the safest area for surgical fixation [14]. The medial layer of the uterosacral ligament was noted to be composed of connective tissue, the middle layer was neural tissue and the most lateral found to be the vascular plane [14]. When performing dissection or suturing of the uterosacral ligament, consideration for adjacent structures must be considered.

Ureteral obstruction in vaginal USL varies from 1-11%, which can be minimized by suturing deep in the intermediate third of the uterosacral ligament or performing the procedure abdominally where the ureter can be more easily freed and visualized [15-18]. There has been shown to be minimal ureter obstruction with laparoscopic USL [19]. Nerve injuries can occur as the visceral fibers of the inferior hypogastric plexus in the S2-3 dermatome have been shown to be associated with USL and rarely require suture removal [20].

Although an abdominal sacrocolpopexy (ASC) may be the gold standard for apical prolapse repair with a high success rate, USL may be a safer alternative for the gynecologic oncologist in these cases for the following reasons: 1)USL does not involve use of mesh to suspend the vagina, this has its inherent risks of mesh extrusion into the vagina and infection, which are likely increased in the cancer patients due to removal of the cervix with exposure of the mesh to the vagina. In addition, this risk may be higher in patients who may receive chemotherapy and radiation postoperatively that may further cause delayed healing, 2)USL is easier to perform than the ASC, as the USL is a familiar structure to the gynecologic oncologist, as it is frequently transected or freed from tumor infiltration during cancer surgeries 3)USL is faster to perform than the dissection and suturing needed for an ASC.

The vaginal approach with a sacrospinous fixation is another option for apical prolapse but it also has its drawbacks that include more training needed for the gynecologic oncologist, the area of dissection and suturing is not very familiar to many gynecologic oncologists and converting to the vaginal approach further complicates an already lengthy abdominal procedure. Therefore, we recommend a USL as the treatment of choice for apical prolapse when there is concomitant cancer surgery.

II Incontinence

As described previously, with a gynecologic surgeon's unique understanding of pelvic anatomy, a combination surgery to repair prolapse may be easily performed with sutures suspending the vaginal apex to the uterosacral ligaments. However, treating stress incontinence with a mid-urethral sling which is the gold standard treatment for stress urinary incontinence, may be more challenging for a gynecologic oncologist. This can be due to many reasons: 1) a sling involves the use of a foreign material which carries its own set of risks, 2) a sling needs to be implanted in an area that the gynecologic oncologist is not frequently working, which is under the mid-urethra, or 3) there is a learning curve to place and tension the sling to get optimal results, which is continence without overtightening and resulting in retention.

These factors may dissuade the gynecologic oncologist from incorporating this procedure into their armamentarium to treat stress incontinence. A more feasible alternative to treat stress incontinence is the Burch procedure, which can be easily performed by the gynecologic oncologist. It involves entering the space of retzius, which is a space familiar to the gynecologic oncologist, and suturing the endopelvic fascia at the bladder neck to cooper's ligament. The learning curve is short and there is no foreign material or mesh to worry about. The efficacy in some studies is equal to the mid-urethral sling. Jelovsek *et al*. reported that a Burch has similar long-term efficacy as a mid-urethral sling.

In this study, 52% of patients receiving a mid-urethral sling and 43% of patients receiving laparoscopic Burch were reported to be completely dry 4-8 years after surgery [21]. In addition, the Colpopexy and Urinary Reduction Efforts (CARE) trial (a randomized trial that compared abdominal sacral colpopexy with and without Burch colposuspension), a Burch colposuspension was also shown to significantly reduce stress incontinence [22]. Thus, the patient with a gynecologic malignancy with SUI may benefit from Burch colposuspension when a traditional sling may not be feasible. For a quick primer on how to perform the USL and Burch procedure procedures please see our video at: Link [23].

Conclusion

Pelvic floor disorders are prevalent among peri- and post-menopausal women who are also an age group at higher risk of gynecologic malignancies. Many surgical interventions for gynecologic malignancies do not correct pelvic floor dysfunctions and may in fact result in worsening or POPUI symptoms. Though our study used mainly the USL as an apical support procedure and the mid-urethral sling as the incontinence procedure, most gynecologic oncologists' training and practice does not include placement of mid-urethral slings. A concomitant procedure using a Uterosacral ligament plication for apical correction and a Burch colposuspension as an alternative to a sling for stress urinary incontinence are well within the scope of the gynecologic oncologists and can result in significant improvements in QOL and patient satisfaction with their surgical treatment. With appropriate

counseling and clinical judgement, combined surgeries can be performed with minimal increase in risk of adverse outcome.

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