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Pelvic exenteration: Impact of age on surgical and oncologic outcomes☆,☆☆

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HIGHLIGHTS

- There was no difference in surgical complication rates based on age.
- No differences in survival after pelvic exenteration based on age.
- Advanced age alone should not be a contraindication to pelvic exenteration.

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ABSTRACT

Objective. To evaluate whether preoperative age impacts surgical outcomes, complication rates, and/or recurrence in women undergoing pelvic exenteration.

Methods. All women who underwent a pelvic exenteration for any gynecologic indication at our institution from 1993 to 2010 were included. Women were stratified into groups based on age in years (young: ≤50, middle: 51–64, and senior: ≥65). Baseline characteristics, surgical outcomes, early (<60 days) and late (≥60 days) postoperative complications, and recurrence/survival outcomes were ascertained. Fisher's exact test or Kruskal–Wallis test was performed. Kaplan–Meier survival curves were compared.

Results. 161 patients were included (58 young, 62 in the middle, and 41 senior). Women in the young group predominately had a diagnosis of cervical cancer (82.8%) while women in the senior group primarily had a diagnosis of vulvar or vaginal cancer (70.7%). Senior women were also more likely to have hypertension ($p < 0.0001$) and pulmonary disease ($p = 0.040$). Operative time was significantly shorter for women in the senior group (8.5 h) compared with the middle (9.5 h) and young group (10.1 h) ($p = 0.0089$). There were no significant differences in early or late complications when stratified by age. The overall survival did not differ between age groups ($p = 0.3760$).

Conclusion. Although hypertension and pulmonary disease were more frequent in the senior age group, duration of surgery, blood loss, length of hospital stay and complication rates did not increase with age. Advanced chronological age should not be considered a contraindication to a potentially curative surgical procedure.

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Introduction

Over the next four decades, the number of Americans aged 65 years and older is projected to more than double from 40.2 million in 2010 to 88.5 million by 2050 [1]. Thus, an increasing proportion of gynecologic cancer patients will be elderly with primary or recurrent cancer. In a select group of patients with a central recurrence, pelvic exenteration is often the only viable option for cure despite advances in radiation and chemotherapy. Historically, advanced age has been considered a relative contraindication to pelvic exenteration due to the complexity and significant morbidity of the procedure as well as an increase in chronic medical conditions that are found in older patients. Published data demonstrates that carefully selected elderly patients with gynecologic cancers may receive definitive treatment without significant associated morbidity or mortality [2,3]. Furthermore, studies have also demonstrated that other types of radical surgery, for example, ovarian cancer debulking can prolong overall survival in elderly patients (≥70 years) [4].

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As our population ages in the era of improved screening, new technology, diagnostic techniques, and novel surgical approaches, candidates for pelvic exenteration are also evolving. Studies examining the effect of age in patients undergoing exenterative surgery remain limited [3,5–8]. Previous literature mainly describes single institution experiences, reporting on clinical features associated with outcomes but none with age evaluated as a primary risk factor [6,7,9]. The purpose of this study is to determine if age at the time of pelvic exenteration has an independent impact on surgical complications or overall survival.

Methods

Following approval by The University of Texas MD Anderson Institutional Review Board, a retrospective review of all women who underwent a pelvic exenteration by the Department of Gynecologic Oncology & Reproductive Medicine for any indication from January 1993 to December 2010 was performed. Demographic data, operative reports, pathology reports and clinical outcomes were abstracted from medical records. Demographic data included ethnicity, body mass index, age, and cancer diagnosis. Related co-morbidity information including smoking history, hypertension, diabetes, and pulmonary disease were also collected. Pathologic data including histology, tumor size, lymph node status, and margin status were ascertained. Preoperative laboratory data including hemoglobin, platelet count, creatinine, and albumin were collected to determine if differences existed.

The patients were stratified into three age groups (young: ≤50 years, middle: 51–64 years, and senior: ≥65 years) based on previously published literature examining surgical outcomes stratified by age [10]. Comparisons between the groups were performed to determine if surgical outcomes, complication rates, and survival were different among the age groups. Post-operative complications were categorized as early (<60 days) or late (≥60 days) following exenteration. The sixty day cutoff was chosen based on previously published data and the long convalescence period for these patients [6]. Complications reported included wound separation, infections, urinary (ureteral injury, stricture, renal failure), gastrointestinal (bowel obstruction, colostomy complications), cardiovascular (myocardial infarction, deep vein thrombosis, pulmonary embolism), or need for re-operation. Follow-up data including recurrence, time to recurrence, site of recurrence, treatment at time of recurrence and survival status at the time of analysis were also gathered. Time to recurrence was defined as the time interval between exenteration and clinical or radiological diagnosis of disease recurrence. Overall survival was defined as time interval from exenteration to date of death or date of last follow-up.

Statistical tests of association were conducted by Fisher's exact test for categorical variables or Kruskal–Wallis test for continuous variables. For the analysis comparing complications by age, two tests were performed: (1) complications <60 days versus no complications and (2) complications ≥60 days versus no complications. Kaplan–Meier survival curves were compared using a log-rank test. We generated multivariate logistic regression and Cox proportional hazard models to adjust for confounding variables. We created two equations, one to compare patients 51–65 years old to patients ≤50 years old and another to compare >65 years old patients to ≤50 years old patients. In building these models we chose all complications that were statistically significantly associated with age ($p < 0.10$) using results from the univariate analysis. The full model was then modified using backward selection, keeping only those terms with $p < 0.05$. Stata (SE 12.1) program was used to perform all statistical analyses.

Results

A total of 161 pelvic exenterations were performed for the following indications: primary (17, 10.6%), recurrent (124, 77.0%), or persistent disease (20, 12.4%) of the cervix, vulva, vagina, or uterus. Among the entire group, total pelvic exenteration was performed most frequently (68.3%), followed by anterior exenteration alone (21.7%), then posterior exenteration alone (9.94%). In this analysis, three patients required a second exenterative procedure and were considered twice. One patient initially had an anterior exenteration for recurrent endometrial adenocarcinoma and underwent a posterior exenteration for recurrent disease three years later. The other two patients initially had posterior exenterations for recurrent vulvar carcinoma and developed disease recurrence requiring anterior exenteration at 10 and 21 months.

There were 58 patients (36.0%) younger than age 50 at the time of exenteration, 62 (39.0%) in the middle age cohort, and 41 (25.0%) in the senior age cohort. Patient demographics are summarized in Table 1. Body mass index did not differ significantly among the three age groups (28.6, 29.2, and 27.1 kg/m2 for young, middle, and senior respectively, $p = 0.5616$). The majority of women were white with senior women being predominantly white compared to middle and young groups ($p = 0.0308$). There were 86 (53.0%) women with cervical cancer, 38 (24.0%) with vaginal cancer, 21 (13.0%) with vulvar cancer, 15 (9.00%) with endometrial cancer, and one (0.010%) with a cancer classified as other (pelvic mucinous tumor of low malignant potential). Recurrent disease was the most common indication for surgery across all three age groups (84.5%, 79%, and 63.4%). Women in the senior cohort were more likely to undergo surgery for primary indications

Table 1
Demographics factors by age group.

	Young (n = 58)	Middle (n = 62)	Senior (n = 41)	p-Value
Mean age at diagnosis (years) range	40 (24.8–49.9)	57 (50.1–64.7)	71.7 (65.5–85.9)	
Mean age at exenteration (years) range	37.9 (21.3–49.6)	56.6 (50.5–63.7)	70.5 (65.5–78.7)	
Mean BMI	28.6 (15.2–50.3)	29.1 (15–50.8)	27.1 (15.2–37.9)	0.5616
Race				
White	39 (67.2%)	39 (62.9%)	36 (87.8%)	**0.0308**
Black	4 (6.9%)	6 (9.7%)	0	
Asian	2 (3.4%)	0	1 (2.4%)	
Hispanic	7 (11.9%)	14 (31.8%)	15 (25.9%)	
Other	13 (22.4%)	17 (27.4%)	4 (9.8%)	
Cancer diagnosis				
Cervix (n = 86)	48 (82.8%)	29 (46.8%)	9 (22%)	<**0.0001**
Vulva (n = 21)	6 (10.3%)	4 (6.5%)	11 (26.8%)	
Vagina (n = 38)	3 (5.2%)	17 (27.4%)	18 (43.9%)	
Uterus (n = 15)	1 (1.7%)	11 (17.7%)	3 (7.3%)	
Other (n = 1)	0	1 (1.6%)	0	

P < 0.10 is considered significant for all univariate analysis. P < 0.05 is considered significant for all multivariate analysis.

Table 2
Factors Affecting Surgery Performance Stratified by Age.

	Young (n = 58)	Middle (n = 62)	Senior (n = 41)	p-Value
BUN	10	12.3	14.4	<**0.0001**
Range	(1.6–2.0)	(5–21)	(3–27)	
Creatinine	0.8	0.8	0.9	**0.0004**
Range	(0.4–9)	(0.5–1.6)	(0.5–1.8)	
Pre-albumin	4	3.8	3.8	0.312
Range	(1.8–5.3)	(2–4.8)	(1.8–4.8)	
Smoking				
Never (n = 97)	34 (58.6%)	39 (65.9%)	24 (58.5%)	0.311
Current (n = 30)	15 (25.9%)	10 (16.1%)	5 (12.2%)	
History (n = 34)	9 (15.5%)	13 (21%)	12 (29.3%)	
Co-morbidities				
HTN	4 (6.9%)	16 (25.8%)	20 (48.8%)	<**0.0001**
DM	2 (3.4%)	10 (16.1%)	5 (12.2%)	0.058
Cardiac disease	1 (1.7%)	1 (1.6%)	12 (29.3%)	<**0.0001**
Pulmonary disease	0	3 (4.8%)	4 (10%)	**0.0404**

P < 0.10 is considered significant for all univariate analysis. P < 0.05 is considered significant for all multivariate analysis.

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