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Patient, treatment and discharge factors associated with hospital readmission within 30 days after surgery for vulvar cancer

K.M. Dorney *, W.B. Growdon, J. Clemmer, J.A. Rauh-Hain, T.R. Hall, E. Diver, D. Boruta, M.G. del Carmen, A. Goodman, J.O. Schorge, N. Horowitz [1], R.M. Clark

Division of Gynecologic Oncology, Department of Obstetrics and Gynecology, Massachusetts General Hospital, Harvard Medical School, Boston, MA, United States

HIGHLIGHTS

- Discharge to a post acute care facility was associated with risk of readmission.
- Readmission after vulvar surgery leads to long hospitalization stay and reoperation.
- Readmission is a multifactorial event with some factors outside physician control.

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ABSTRACT

Objectives. The majority of hospital readmissions are unexpected and considered adverse events. The goal of this study was to examine the factors associated with unplanned readmission after surgery for vulvar cancer.

Methods. Patient demographic, treatment, and discharge factors were collected on 363 patients with squamous cell carcinoma in situ or invasive cancer who underwent vulvectomy at our institution between January 2001 and June 2014. Clinical variables were correlated using χ^2 test and Student's *t*-test as appropriate for univariate analysis. Multivariate analysis was then performed.

Results. Of 363 eligible patients, 35.6% had in situ disease and 64.5% had invasive disease. Radical vulvectomy was performed in 39.1% and 23.4% underwent lymph node assessment. Seventeen patients (4.7%) were readmitted within 30 days, with length of stay ranging 2 to 37 days and 35% of these patients required a re-operation. On univariate analyses comorbidities, radical vulvectomy, nodal assessment, initial length of stay, and discharge to a post acute care facility (PACF) were associated with hospital readmission. On multivariate analysis, only discharge to a PACF was significantly associated with readmission (OR 6.30, CI 1.12–35.53, $P = 0.04$). Of those who were readmitted within 30 days, 29.4% had been at a PACF whereas only 6.6% of the no readmission group had been discharged to PACF ($P = 0.003$).

Conclusions. Readmission affected 4.7% of our population, and was associated with lengthy hospitalization and reoperation. After controlling for patient comorbidities and surgical radicality, multivariate analysis suggested that discharge to a PACF was significantly associated with risk of readmission.

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1. Introduction

In 2009 the Affordable Care Act reported on healthcare spending and identified 30 day readmission rates as an area that needed improvement. Jenks et al. [1] examined over 11 million Medicare beneficiaries and discovered that 19.6% of all discharged patients in 2004 were re-hospitalized within 30 days with an estimated cost of $17.4 billion. A subgroup analysis focusing on discharge after surgical procedures showed a readmission rate of 15.6% in the first 30 days after discharge [1]. Although some of these readmissions may be planned or expected as part of the patient's treatment plan, most of them are unexpected and may result from inadequate discharge planning, poor care coordination between hospital and community clinicians, and lack of an effective longitudinal community-based care infrastructure. The current readmission rates in the United States lend support to the increasing concern that patients are more infirm after initial discharge, and subsequently require more diagnostic and therapeutic interventions, developing poorer quality of life and higher healthcare costs.

As readmissions are increasingly viewed as a metric for quality care, there is growing interest in elucidating the drivers for this occurrence

* Corresponding author at: Massachusetts General Hospital, 55 Fruit Street, Boston, MA 02114, United States.
E-mail address: kmdorney@partners.org (K.M. Dorney).
[1] Division of Gynecologic Oncology, Department of Obstetrics and Gynecology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, United States.

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[2–4]. The data specific to readmissions in gynecologic oncology patients are limited and have focused primarily on readmission after debulking for ovarian malignancy, with rates ranging from 11.5–16% [5–7]. Data on readmission after surgery for vulvar malignancy are scarce. Similar to patients with ovarian cancer, patients with vulvar malignancy often have multiple other comorbidities and undergo radical tumor resection. The goal of this study was to examine the patient demographic, treatment, and discharge factors associated with unplanned readmission after surgery for vulvar cancer.

2. Methods

After obtaining approval from the Massachusetts General Hospital/Partners Healthcare Institutional Review Board, we identified 479 patients that underwent vulvar surgery at our institution between January 2001 and June 2014. Inclusion into the study required the following: histology showing squamous cell carcinoma in situ or invasive cancer (including squamous cell, melanoma, basal cell, or more rare subtypes) and complete medical records with operative and postoperative care at our institution. Exclusion criteria included vulvectomy for benign indications and incomplete medical records. There were 363 patients who met criteria and were included in the study.

All operative reports and pathology reports were reviewed to abstract specific data regarding surgical procedures, demographics, treatment, and outcome parameters. Abstracted data included the following: age at time of surgery, number of major comorbidities, histology, previous radiation therapy, prior vulvar surgery and adjuvant therapy. In regards to treatment, surgical radicality, concomitant nodal dissection and extent of nodal assessment (unilateral vs bilateral vs sentinel node dissection), and length of index stay were collected. To evaluate peri-operative and post-operative complications we used the American Board of Obstetrics and Gynecology reportable events including: estimated blood loss (EBL) >2 L, transfusion >4 units, unplanned intensive care unit admission, readmission within 30 days, re-operation within 30 days, presence of vascular injury, and postoperative infection. The authors did not collect data on surgical site infections that did not require admission to the hospital but rather focused on the significant wound complications that required inpatient admission. Finally, we examined discharge planning factors including discharge to post acute care facilities (PACF: rehabilitation facility or skilled nursing facility), as well as discharge with visiting nurse (VNA). In addition, we examined whether a patient was discharged home with antibiotics or surgical drains. Readmissions were defined as unplanned admission to the hospital within 30 days of discharge from the index hospitalization.

Clinical variables were correlated using $\chi 2$ test and Student's *t*-test as appropriate for univariate analysis against each specific variable and readmission. Standard univariate analyses were performed, as were logistic regression models to describe predictors of readmission within 30 days from surgery. Variables that were significant in the univariate analyses were included in the multivariate analysis. Statistical analyses were conducted using R package (version 2.2.3) and SPSS statistical software (version 23.0, SPSS, Inc., Chicago, IL).

3. Results

A total of 363 patient encounters were included in the analysis. Due to the recurrent nature of this disease process, there were 54 patients who underwent more than one resection. Median age at time of surgery was 59 years old (range = 48–74), and patients had a median BMI of 27.9 (23.9–32.7). While the median number of comorbidities was 2, it is important to note that 28.4% of patients had 3 or more major comorbidities requiring chronic care by a primary care physician, as documented by patient's pre-operative history and physical. Most patients had Stage 1 (50.7%) or in situ (35.6%) disease and the most represented histology (81.2%) was squamous cell carcinoma (SCC), though melanoma (11.0%), basal cell carcinoma (1.9%), and other malignancies (5.8%) were also represented. Radical vulvectomy was performed in 39.1% of patients. Of the 141 procedures listed as a radical vulvectomy, 43.7% were total radical vulvectomy procedures whereas the remaining underwent a radical hemi-vulvectomy, radical wide local excision, radical anterior vulvectomy, or radical posterior vulvectomy. In our cohort 23.4% of patients required a lymph node assessment. Of those patients who underwent a lymph node assessment, 25.8% had unilateral dissection, 42.4% had bilateral dissections, and 31.8% underwent a sentinel lymph node procedure. In our cohort, 28 patients (7.7%) had undergone previous radiation therapy and only 3.6% of patients required adjuvant therapy after resection. The median length of stay on index admission was 0 days (0–2) for all patients. (Table 1)

Thirty two patients (8.8%) had perioperative complications. Wound infections requiring antibiotics, reoperation, or drainage were the most frequent ($n = 13$) representing 3.6% of patients. Other complications were rare. Cardiopulmonary events such as pulmonary embolism, pleural effusion or MI occurred in 3 patients (0.8%). Estimated blood loss >2 L (0.3%), transfusion >4 units of packed red blood cells (0.3%), and unplanned ICU admission (0.3%) were also rarely seen (Table 1).

Of our entire cohort, 17 women (4.7%) were readmitted to the hospital within 30 days of discharge. Of these patients, 88.2% were readmitted because of complications with their wound. While wound

Table 1
Patient demographic characteristics.

Total patient encounters ($n = 363$)	
Age, median (range) (years)	59 (47–76)
Length of stay (mean, days)	1.69
Stage, *n* (%)	
Stage I	184 (50.7%)
Stage II	14 (3.9%)
Stage III	31 (8.5%)
Stage IV	5 (1.4%)
In situ	129 (35.6%)
Histology, *n* (%)	
Squamous cell	295 (81.2%)
Melanoma	40 (11.0%)
Basal cell carcinoma	7 (1.9%)
Other	21 (5.8%)
Comorbidities, *n* (%)	
0	88 (24.2%)
1	94 (25.9%)
2	78 (21.5%)
3 or more	103 (28.4%)
Radicality, *n* (%)	
Simple vulvectomy	221 (60.9%)
Radical vulvectomy	142 (39.1%)
Nodal Assessment, *n* (%)	
None	278 (76.6%)
Unilateral	22 (6.1%)
Bilateral	36 (9.9%)
Sentinel	27 (7.4%)
Other, n (%)	
Prior XRT	28 (7.7%)
Adjuvant therapy	13 (3.6%)
Perioperative complications, *n* (%)	
EBL > 2 L	1 (0.3%)
Transfusion > 4 units	1 (0.3%)
Unplanned ICU admission	1 (0.3%)
Re-operation	2 (0.6%)
Cardiovascular event	3 (0.8%)
Collection/infection	13 (3.6%)
Readmission within 30 days	17 (4.7%)
Discharge planning, *n* (%)	
Home with visiting nurse	73 (20.1%)
Post acute care facility	28 (7.7%)
Discharge with antibiotics	63 (17.4%)
Discharge with drains	68 (18.7%)

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