



Original article

Survival outcomes of organ sparing surgery, partial penectomy, and total penectomy in pathological T1/T2 penile cancer: Report from the National Cancer Data Base

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Abstract

Purpose: To describe the survival outcomes of organ sparing surgery (OSS), partial penectomy (PP), and total penectomy (TP) in pathological stage pT1/pT2 penile cancer (PC) as reported in the United States National Cancer Data Base.

Methods: Patients with pT1/pT2 PC, treated with surgery as their primary treatment modality were classified into 3 groups according to the type of surgery into OSS, PP, and TP. Patient and tumor characteristics of the groups were compared using bivariate analysis, and Cox-proportional hazard model was used for survival analysis.

Results: A total of 4,238 patients were examined. There were 1,211, 2,360, and 584 patients in the OSS, PP, and TP groups, respectively. In 83 patients, the type of surgery was missing. The 5- and 10-year overall survival rates for OSS, PP, and TP were 88% and 74% vs. 85% and 72% vs. 79% and 63%, respectively ($P \leq 0.001$). In addition, in a multivariable model for predictors of patient survival, OSS did not predict poor patient survival (hazard ratio = 0.88, CI: 0.64–1.21).

Conclusions: Our results demonstrate, at national level, OSS in early stage PC provided comparable outcomes in selected patients compared to PP and TP. Also, organ preservation was not associated with any significant reduction in patient survival in early stage PC. Our results help with early stage PC patient informed treatment decisions and anticipated outcomes. © 2017 Elsevier Inc. All rights reserved.

Keywords: Penile cancer; Penectomy; Survival; Organ sparing surgery

1. Introduction

Penile cancer (PC) is a rare cancer with an estimated incidence of 1 in 100,000 men in the United States and Western Europe [1]. The American Cancer Society estimated that 2,160 new patients will be diagnosed with PC in 2017 with 360 patients dying from the disease during the same year [2]. In a recent report from the United States, 86.5% of patients with nonmetastatic penile squamous cell

cancer (SCC) present with early stage disease T1–2 [3]. Also the most common site of presentation for PC is the distal penis; the glans and prepuce in 47.7% [4]. Although the most common presenting grades are the moderately and well-differentiated grades, and the most common growth pattern is superficial spreading (42%) and the least common is multicentric (8%) [5].

The 3 different surgical approaches for early stage PC are partial penectomy (PP), total penectomy (TP), and organ sparing surgery (OSS). Surgeries in the latter group include laser surgery, Mohs micrographic surgery, circumcision, glanssectomy, glandular resurfacing, and wide local

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excision. Traditional PP is considered separate from this group [6,7]. Each of the 3 surgical approaches has its own advantages and disadvantages. TP has a low recurrence rate in early stage PC. However the psychological and functional outcomes of the procedure are devastating [8]. PP is associated with a low recurrence rate in early stage PC [9,10]. However, leakage and urine spraying remain a problem and in a significant proportion of patients the remaining penile stump may not be sufficient for adequate sexual intercourse [11]. OSS has emerged as an attractive surgical option since most presenting PC are distal, early stage, well to moderately differentiated and the traditional 2 cm safety margin is no longer indicated [1]. Although OSS confers better functional, psychological outcomes than TP and PP, it carried the highest local recurrence rate and needs more intense follow up than PP and TP [1,12].

The aim of this report is to assess and compare the overall survival outcome of OSS, PP, and TP in early stage PC, pT1/pT2 as reported on the national level.

2. Materials and methods

2.1. Data source

The National Cancer Data Base (NCDB), a joint project of the American Cancer Society and the Commission on Cancer of the American College of Surgeons, is a nationwide, facility-based, comprehensive clinical surveillance resource oncology data set, which currently captures 70% of all newly diagnosed malignancies in the United States annually [13]. The disease course and treatments at a participating NCDB institution are coded and reported based on the facility oncology registry data standards manual (<http://www.facs.org/cancer/coc/fordsmanual.html>). An Institutional review board exemption from review was granted since no patient, physician, or hospital identifiers were examined.

2.2. Patient population

We identified 4,238 PC patients with pathological stage pT1 and pT2 in the NCDB treated by surgery as their primary treatment modality. Only patients with SCC of the penis were included. Exclusion criteria included patients with distant metastasis (M1) at diagnosis; patients with non-SCC of the penis and pT3/pT4. There were 83 patients (61 with pT1 disease and 22 with pT2 disease) where the type of surgery was missing and were not included in the analysis. The study period was from 2004 to 2014. Patients were classified into 3 groups according to the initial surgery performed. OSS group included patients who received surgical treatment short of partial or total amputation (PP and TP groups).

2.3. Statistical analysis

Bivariate analyses were used to present associations between demographics and pathological characteristics and pathological tumor, node, and metastasis stage or surgery types. Study ended owing to death, loss-to-follow-up, or by the end of 2014. Cox proportional hazard model was used to assess survival by different surgery types. Patients with missing value for follow up ($n = 480$) were not included in the survival model. All analyses were conducted using Stata 14.0 (Stata Corp LP, College Station, TX).

3. Results

We identified the records of 4,238 patients diagnosed with pT1/pT2 PC included in the NCDB between the years of 2004 and 2014. There were 2,649 (62.5%) patients with T1 disease and 1,589 (37.5%) patients with T2 disease. Patients with were classified into 3 groups; OSS ($n = 1,211$), PP ($n = 2,360$), and TP ($n = 584$). The mean follow up for the entire group was 3.54 years (standard deviation ± 2.71). Patient demographics and tumor characteristics of the 2 pathological groups (pT1 and pT2) are illustrated in Table 1.

3.1. Patient and tumor characteristics

3.1.1. OSS group

This group included 1,211/4,155 (29.14%) patients. Compared to the other groups, OSS was more likely to be performed in academic institutions or comprehensive cancer programs (> 500 cancer procedures/y) (52.5%). Patients tended to live < 50 miles from the treating facility (85.5%) and in a Metro area (80.7%). They also had the lowest incidence of poorly differentiated tumors (13.1%). This group, compared to the other 2 groups, had the highest positive surgical margin rate (19.2%), had 77.2% of the tumor size < 3 cm, with the lowest incidence of positive lymph node (LN) metastasis of only 2.4% and the least likely to receive chemotherapy during the course of their disease (4.8%). Also, the majority of these patients (90.5%) were pT1 disease (Table 2).

3.1.2. PP group

This group formed the majority of the surgical procedures offered to patients with pT1/pT2 disease in the United States. The group included 2,360/4,155 (56.79%) patients. Like the OSS group, most of the patient in this group had a tumor size < 3 cms (59.7%). The procedure was equally offered to pT1 (53.6%) and pT2 (46.4%) patients. The incidence of nodal metastasis in the PP group was 8.1%, and 6.5% received chemotherapy during the course of their disease. The positive margin rate in this group was 7.2% (Table 2).

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