ELSEVIER

Urologic Oncology: Seminars and Original Investigations 32 (2014) 40.e17–40.e22

UROLOGIC ONCOLOGY

Original article

Presence of detrusor muscle in bladder tumor specimens—predictors and effect on outcome as a measure of resection quality

Ohad Shoshany, M.D.[a,b], Roy Mano, M.D.[a,b], David Margel, M.D.[a,b], Jack Baniel, M.D.[a,b], Ofer Yossepowitch, M.D.[a,b,*]

[a] *Department of Urology, Rabin Medical Center, Beilinson Campus, Petah-Tikva, Israel*
[b] *Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel*

Received 4 March 2013; received in revised form 31 March 2013; accepted 23 April 2013

Abstract

Objectives: To identify predictors of the absence of detrusor muscle in bladder tumor specimens and analyze its effect on clinical outcome as an indicator of resection quality.

Methods: The bladder cancer database of a tertiary medical center was queried for patients who underwent complete transurethral resection of bladder tumor (TURBT) between 2008 and 2009. Study end points were absence of detrusor muscle in the surgical specimen and its association with disease recurrence/progression.

Results: Detrusor muscle in the surgical specimen was found in 265 of the 332 study patients (79%). The likelihood of finding muscle increased with higher clinical stage (Odds Ratio [OR]-1.8), higher tumor grade (OR-3), larger tumor size (OR-3.2), multifocal disease (OR-1.7), and nonpapillary morphology (OR-2.3). History of bladder cancer, surgeon's experience, and tumor location in the bladder had no effect. In the whole study population, neither tumor recurrence nor disease progression was associated with absence of detrusor muscle. In patients with T1 tumors, absence of detrusor muscle in the specimen was associated with higher early recurrence rate but not worse long-term outcome.

Conclusions: Absence of detrusor muscle in TURBT specimens is not determined by the technical difficulty of the procedure or surgical experience. Surgeons are more prone to obtain deep muscle in large, nonpapillary-appearing tumors, likely reflecting efforts to attain accurate staging in these cases. The presence or absence of detrusor muscle may serve as a surrogate of resection quality in patients with T1 tumors, but its general applicability to the overall population of patients undergoing TURBT remains questionable.

Keywords: Bladder cancer; Transurethral resection; Histology; Detrusor muscle; Surgical quality

1. Introduction

Transurethral resection of bladder tumor (TURBT) is the mainstay of bladder cancer treatment and one of the most common endoscopic urologic surgeries. It is used to determine tumor histology, stage and grade, and, in patients with non–muscle invasive disease, it is also considered a therapeutic procedure. Proper TURBT mandates wide and deep resection around the tumor to ensure removal of all visible disease and adequate tumor staging. Because the accuracy of patholgical evaluation depends predominantly on the quality of specimen provided by the urologist [1], the adequacy of resection becomes the primary determinant of patient outcome.

Stringent criteria for standard TURBT are lacking [2], and the considerable variability in tumor characteristics (number, size, morphology, and location) and bladder wall thickness among patients renders the nature of TURBT stochastic and difficult to characterize. Recent studies in surgical oncology have emphasized the importance of quality control in breast [3], gastric [4], prostate [5], and muscle-invasive bladder cancer [6]; however, indicators for quality assurance in TURBT are more difficult to set. Several investigators proposed that the presence or absence of detrusor muscle in the surgical specimen may be used as a surrogate marker of resection quality in TURBT [1,7]. Others argued that including detrusor muscle in obvious low-grade papillary tumors may not be critical [8]. The aim of the present study was to identify predictors of the presence of detrusor muscle in TURBT specimens and to analyze its effect on clinical outcome.

* Corresponding author. Tel.: +972-3-9376553; fax: +972-3-9376569.
E-mail address: oferyoss@netvision.net.il (O. Yossepowitch).

1078-1439/$ – see front matter
http://dx.doi.org/10.1016/j.urolonc.2013.04.009

2. Material and methods

After obtaining institutional review board approval, we queried our prospectively assembled bladder cancer database for all patients who underwent TURBT between 2008 and 2009. In the present study we included only patients with newly diagnosed or recurrent bladder cancer in whom tumor resection was deemed complete. Exclusion criteria were restaging TURBT, tumor in bladder diverticulum, and incomplete resection (including confirmatory biopsy before cystectomy for an apparently muscle-invasive disease).

All TURBT procedures were performed with white-light cystoscopy and a standard monopolar cautery resectoscope system. Every operation began with systematic inspection of the bladder using a 30° lens, and all abnormalities, namely size; number; site; and appearance of each tumor, were recorded. Subsequently, stepwise resection of all visible tumors was performed including suspicious and reddened areas. In general, it is our departmental practice to routinely extend the resection laterally into normal mucosa and obtain detrusor muscle in all patients irrespective of tumor appearance. This is done either by resecting deep into the muscle layer or completing the excision by cutting the tumor base separately. The resection is deemed complete when no tumor is apparent and glistening yellow fat is observed between deep muscle fibers or perivesical tissues. According to established clinical guidelines, patients with high-grade T1 urothelial carcinoma were scheduled for repeat TURBT generally within 6 weeks of their initial diagnosis. Patients with low-grade noninvasive-appearing tumors were offered a single intravesical instillation of mitomycin C (40 mg) within 6 hours of resection, unless contraindicated by bleeding or possible perforation. Specimens were analyzed by 3 different pathologists and reviewed by a dedicated urologic pathologist who assigned tumor staging according to the 2002 American Joint Committee on Cancer tumor, node, metastasis classification system and grading based on the 1997 WHO-International Society of Urologic Pathologist consensus classification. The presence of muscularis propria was determined by identifying rounded bundles of smooth muscle fascicles attached to urothelial neoplasm, intact urothelium or isolated from the urothelium. Clear distinction was made between muscularis propria and the fine irregular wisps of muscle fibers representing vestigial remnants of muscularis mucosae.

The first follow-up cystoscopy was scheduled for 3 months after the resection. Subsequent surveillance was tailored to the individual risk of tumor recurrence and progression. Low-risk patients were generally monitored with cystoscopy every 6 months for 2 years and annually thereafter, and intermediate- and high-risk patients were followed with cystoscopy every 3 months for 2 years, every 6 months during the subsequent 3 years and annually thereafter.

The study end points were absence of detrusor muscle in the surgical specimen and its association with disease recurrence and progression. The following assumptions/definitions were employed for purposes of analysis: (1) tumor size, as reported by the surgeon, was stratified into large (>3 cm) and small (≤ 3 cm). (2) To study the effect of surgical experience on outcome, the operating surgeons were categorized into senior (attending) and junior (resident). It is our policy to vigilantly supervise residents during these procedures. (3) To study associations between clinical-pathological characteristics and the presence of detrusor muscle in TURBT specimens, carcinoma in situ was grouped together with stage Ta into a single category, tumor morphology was dichotomized into papillary and nonpapillary (including solid, sessile, and nodular), and multifocality was defined as more than 1 lesion. (4) Recurrence was defined as histologically confirmed tumor recurrence, and progression was defined as any increase in tumor stage (Ta to $\geq$ T1 or T1 to $\geq$ T2) or grade (low grade to high grade).

Baseline categorical variables between subgroups were compared by the chi-square test or Fisher exact tests for proportions. Univariate and multivariate stepwise logistic regressions were used to determine associations between clinical variables and presence of detrusor muscle in the specimen. The Kaplan-Meier method was used to generate probabilities of disease recurrence and progression and log-rank test was used to compare estimates between patients with and without detrusor muscle in the surgical specimen. All statistical analyses were 2 sided and performed using Stata version 10.1 (Stata Corporation, College Station, TX).

3. Results

Of the 448 patients who underwent TURBT in our department during the study years, we excluded 51 who had a restaging procedure, 64 thought to have had residual tumor after resection, and 1 with tumor in diverticulum, leaving 332 patients (74%) for analysis. Mean patient age was 73 years; 190 patients (57%) had a history of bladder cancer and 121 (36%) had received intravesical therapy (Table 1). The vast majority of tumors (73%) were resected by senior surgeons, 72% had a papillary appearance and 57% were located along the lateral bladder wall.

Overall, detrusor muscle was present in 265 (79%) of the specimens. The association between clinical-pathological variables and presence of detrusor muscle in the specimen is described in Table 2. On univariate analysis, the probability of finding detrusor increased with higher clinical stage (Odds Ratio [OR]-1.8), higher tumor grade (OR-3), larger tumor size (OR-3.2), multifocal disease (OR-1.7), and nonpapillary morphology (OR-2.3). On multivariate stepwise logistic regression controlling for all features, mutifocality was the strongest predictor of the presence of detrusor muscle in the specimen (OR-2.1, 95% confidence interval (CI) 1.06–4.1,