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A Prospective Study of the Size, Number and Histopathology of New and Recurrent Bladder Tumors

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Abstract

Introduction: We prospectively registered the grade, stage, number and size of bladder tumor recurrences as to our knowledge this has not yet been done. New tumors were included in the study for comparative purposes.

Methods: All 581 transurethral resections, random biopsies and fulgurations for a suspected bladder tumor were prospectively registered during a 15-month period at a single institution. Tumor size was determined using the size of the resection loop or biopsy forceps as a reference.

Results: Of all suspected new and recurrent bladder tumors 22% were benign or inflammatory lesions. A total of 167 patients with a new urothelial tumor and 214 recurrences in 166 patients were registered during the study period. Compared to new tumors, recurrences were more often noninvasive (88% vs 67%, $p < 0.001$), more often 10 mm or less in diameter (63% vs 18%, $p < 0.001$) and more often multifocal (55% vs 38%, $p < 0.01$). New and recurrent tumors had a median size of 20 and 8 mm, respectively.

Conclusions: The absolute majority of suspected bladder tumor recurrences are benign or low grade noninvasive malignant tumors and are less than 10 mm in diameter. This finding suggests that there is great potential for cost reductions when a significant proportion of patients with suspected recurrences after treatment of low grade tumors could undergo biopsy and fulguration using local anesthesia in the office instead of general anesthesia.

Key Words: urinary bladder neoplasms, recurrence, tumor burden

Transurethral resection is used for the diagnosis and initial treatment of a suspected bladder tumor. Between 40% and 70% of all patients with an initial diagnosis of non-muscle invasive bladder cancer will have at least 1 recurrent tumor in the subsequent 5 years.[1,2] Many patients will experience multiple recurrences and the total number of transurethral operations for recurrences is higher than for newly diagnosed tumors. The large number of surgical procedures for recurrences strongly contributes to the high costs per patient for bladder cancer.[3] There are many population based reports where grade, stage, number and size of all new bladder cancers can be found.[1,4–6] To our knowledge there is not a single publication on such data for recurrent tumors. We present results from a prospective registration of recurrent tumors where new tumors are included for comparative purposes.

Patients and Methods

Patient Selection and Study Design

We performed a prospective, population based registration of all patients with a suspected malignant bladder tumor

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from January 1, 2010 to March 31, 2011 treated at a single institution in a large city (population 656,720 in 2010). Between 80% and 90% of all transurethral bladder tumor operations in this city are performed at our hospital and the remainder are performed at 2 small private hospitals.[5]

Immediately after the operation tumor size, number and new or recurrent status were recorded on a form from which a database was constructed. Later we added the results of the histopathological analysis. Tumor size was recorded in 3 dimensions, if feasible, and the largest measurement was used for calculations. The diameter of the largest tumor was recorded when there were multiple tumors. We used the resection loop (7 mm) and the biopsy forceps (4.5 to 5 mm depending on type) or fulguration electrode (1.5 mm) to estimate size.

Definitions and Statistics

We subdivided the histopathological findings into urothelial tumor, other malignant tumor, atypia, inflammation and benign/normal. The atypia group was an intermediate group in which the histopathological findings combined with bladder wash cytology showed some cellular dysplasia but not enough for a diagnosis of malignancy. The tumor was staged according to the TNM system[7] and graded using WHO 1999 criteria.[8] Papillary urothelial neoplasm of low malignant potential (PUNLMP) was defined as urothelial malignancy in this report. Histopathological examinations were performed by 1 experienced pathologist. Patients with a stage T1 tumor were re-evaluated at the weekly routine meeting between the authors and the pathologist.

All procedures were registered, although 1 specific tumor was only included once (ie repeat resections excluded from calculations). For calculations of tumor volume we used the formula for an ellipsoid since the 3 measurements of each tumor varied in most cases.[9] The chi-square test was used for comparison among groups.

Results

All Patients

A total of 579 transurethral operations were registered in 432 patients during the 15-month study period. Of the operations 86% were performed or supervised by a specialist in urology. Median patient age was 74 years (range 25 to 95) and 69% were male. Tumor size was not stated in 25 operations (10 suspected new tumors and 15 suspected recurrences) since the borders of the lesions were difficult to estimate or in patients without an evident lesion where random biopsies were taken.

Benign findings (normal or inflammation) were found in 50 of 233 operations (22%) for a suspected new tumor and in 71 of 326 operations (22%) in patients with a suspected recurrence. There was histopathological evidence of a new malignant urothelial tumor in 167 patients, and in 214 operations in 166 patients with a history of bladder cancer (table 1). This resulted in an estimated ratio of 1.3 operations for recurrent tumors for every patient with a newly diagnosed bladder tumor. The ratio increased to 1.4 when fulgurated lesions were included and to 1.5 when the atypia group was included.

Suspected New Malignant Bladder Tumors

A total of 248 operations were performed in 233 patients with no history of bladder cancer. Repeat resections were performed in 13 patients (15 operations). Median patient age was 72 years (range 25 to 95) and 66% of patients were male.

Tumor size and histopathology of all suspected new tumors are shown in table 2, and urothelial malignancies are specified according to stage and grade in table 3. In some cases the biopsies were too small to determine the stage and the tumors are specified as Tx. The median size of new urothelial malignancies was 20 mm. The majority of patients, 102 of 167 (61%), had solitary tumors, while 29 (18%) had 2 tumors and 30 (18%) had 3 tumors or more. Information was missing for 3 patients (2%).

Suspected Recurrent Tumors

A total of 326 operations for suspected recurrence were performed in 229 patients. The first bladder cancer operation was performed before or during the study period. Overall 161 patients were treated for 1 recurrence during the 15-month study, 43 were treated for 2 recurrences and 25 for 3 or more recurrences. Median patient age was 75 years (range 25 to 95) and 73% of the patients were male. Repeat resections were performed in 7 patients (1 patient twice).

Table 1.
Number of suspected new and recurrent tumors

Histopathological Diagnosis	No. New (%)	No. Recurrent (%)	Totals
Urothelial malignancy*	164 (70)	214 (66)	378
Other malignancy†	8 (3)	–	8
Atypia‡	11 (5)	26 (8)	37
Inflammation	34 (15)	45 (14)	79
Benign/normal	16 (7)	26 (8)	42
No histology (fulguration only)	–	15 (5)	15
Totals	233 (100)	326 (100)	559

*Includes carcinoma in situ.
†Primary tumor in colon, prostate, cervix uteri or lymphoma.
‡Includes lesions that are neither benign nor malignant.