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Benign urinary bladder masses: rare entities

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Abstract

Background This study aimed to present the characteristics and outcomes of benign urinary bladder masses, as well as the characteristics of the patients diagnosed with such lesions.

Methods A single-center, cross-sectional, retrospective study was conducted. The study involved patients who underwent transurethral resection of the primary bladder tumor over a four-year period (May 2017–2021) and were subsequently diagnosed with a benign bladder lesion.

Results Out of 478 patients who underwent transurethral resection of the primary bladder tumor, 26 (5.4%) were diagnosed with a benign bladder lesion. The most common benign bladder lesion was urothelial papilloma (50%, 13 patients). The majority of patients with urothelial papilloma were men (76.9%) and had a history of smoking (61.5%). The mean age was 62 years. Most were diagnosed accidentally (69.2%), while others presented with hematuria (23.1%) or dysuria (7.7%). Most urothelial papillomas had a macroscopic polypoid appearance (61.5%), and most of them were solitary (84.6%), with a mean size amounting to 1 cm. Only one patient experienced a recurrence and developed papillary urothelial neoplasm of low malignant potential (PUNLMP). Cystitis cystica/glandularis and polypoid cystitis were the second most commonly diagnosed benign bladder lesion, each identified in 3 patients. Singular cases of leiomyoma, inflammatory myofibroblastic tumor, chondroma, paraganglioma, villous adenoma, eosinophilic cystitis (pseudotumor), and ectopic prostatic tissue are described.

Conclusion Benign bladder lesions constitute a group of various rare entities that can clinically and radiologically mimic urothelial carcinoma, but mostly show a good prognosis and a low incidence of recurrence.

Keywords Benign bladder tumors, Urothelial papilloma, Cystitis cystica, Cystitis glandularis

1 Background

Urinary bladder masses are a common occurrence, with most of them being malignant tumors. Urothelial carcinoma is the most common histopathological type, accounting for 90% of diagnosed bladder neoplasms [1]. Several types of benign masses can develop in the urinary bladder, but these are uncommon and account for 1–5% of all bladder tumors. Benign urinary bladder masses can initially be confused for bladder cancer, as they exhibit similar clinical presentations and radiological features

[2, 3]. A definitive diagnosis is made by histopathological examination of the resected specimen. Due to their rare occurrence, benign bladder tumors are underreported in literature. Most of the studies available in the literature describe single case reports or small case series reporting on these rare entities [4, 5].

The aim of our study was to present the characteristics and outcomes of benign urinary bladder masses, as well as the characteristics of the patients diagnosed with and treated for such lesions.

2 Methods

A single-center, retrospective, cross-sectional study was conducted. Our hospital's Research Ethics Committee reviewed and approved the study protocol. Patients who underwent bladder tumor surgery at our hospital over the four-year period considered (May 2017–2021) and

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who were subsequently diagnosed with a benign bladder lesion were included in the study. Patients with malignant bladder tumors were excluded from the study. To protect patient confidentiality, each patient was assigned an identification number, and their identity remained anonymous throughout the study. The hospital's electronic medical records were retrospectively reviewed for data acquisition purposes. The authors confirm the availability and accessibility of all original data reported in this study. The variables taken into account include demographic data (sex, age, smoking history, comorbidities), the initial presenting bladder tumor symptom (hematuria, dysuria, or incidental finding), histopathological findings of the resected bladder tumor tissue, the macroscopic appearance of the tumor, the number, size, and location of tumors described by the surgeon during transurethral resection, and recurrence rates during the follow-up period.

2.1 Statistical analysis

Categorical variables are described as whole numbers (n) and percentages (%). Continuous variables are presented as median and range, or as mean and standard deviation (SD). The normality of data distribution was verified using a Kolmogorov–Smirnov test. All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.

3 Results

During the four-year period considered, a total of 478 adult patients underwent transurethral resection of the primary bladder tumor at our hospital. Out of those 478 patients, 26 (5.4%) were diagnosed with a benign bladder lesion, thus meeting the inclusion criteria.

The most common benign bladder lesion was urothelial papilloma (50%, 13 patients). The characteristics of the patients diagnosed with urothelial papilloma and tumor characteristics are presented in Table 1. The majority of patients were middle-aged men with a history of smoking. Tumors tended to have a polypoid appearance, and they were mostly asymptomatic, solitary, and small in size. Only one out of said 13 patients experienced a recurrence and developed papillary urothelial neoplasm of low malignant potential (PUNLMP), which was diagnosed during a follow-up cystoscopy performed nine months after the initial transurethral surgery. No recurrences or progressions have been identified during the subsequent follow-up period. Follow-ups with a regular annual cystoscopy are still ongoing for all patients.

Cystitis cystica/glandularis and polypoid cystitis were the second most commonly diagnosed benign bladder lesions, with each lesion being identified in 3 patients. A detailed summary of the patients' characteristics and

Table 1 Overview of the characteristics of patients diagnosed with urothelial papilloma and tumor characteristics

<i>Patient characteristics</i>	
Number of patients (%)	13 (100)
Male	10 (76.9)
Female	3 (23.1)
Age (years), mean (SD)	62 (9.8)
Smoking history, n (%)	8 (61.5)
Number of comorbidities, median (range)	1 (0–3)
<i>Presenting symptom, n (%)</i>	
Incidental ultrasound finding	9 (69.2)
Gross hematuria	3 (23.1)
Dysuria	1 (7.7)
<i>Tumor characteristics</i>	
Appearance, n (%)	
Polypoid	8 (61.5)
Papillary	5 (38.5)
Focality, n (%)	
Solitary	11 (84.6)
Multiple	2 (15.4)
Size, cm, mean (SD)	1 (0.47)
Location, n (%)	
Lateral wall	7 (54)
Trigone	3 (23)
Posterior wall	3 (23)
<i>Follow-up, months, mean (SD)</i>	34 (8.2)
Recurrence, n (%)	1 (7.7)

SD: Standard deviation

lesion features is presented in Table 2. Two patients with cystitis cystica/glandularis presented with dysuria and had a history of recurrent urinary tract infections (UTIs), while the third patient presented with hematuria and had a chronic indwelling urinary catheter. Among the two symptomatic patients with papillary cystitis, one had a history of recurrent UTIs, and the other had undergone pelvic irradiation for prostate cancer.

The remaining 7 patients represent isolated cases of rare histopathological entities. Singular cases of leiomyoma, inflammatory myofibroblastic tumor, chondroma, non-functional paraganglioma, villous adenoma, eosinophilic cystitis (pseudotumor), and ectopic prostatic tissue are reported in Table 3. Only the patient diagnosed with non-functional paraganglioma was found to have a recurrence during their follow-up cystoscopy performed 3 months after the initial resection. This finding may indicate that the lesion was not completely resected during the initial surgery. A repeated resection of the tumor was thus performed, confirming the initial diagnosis. No recurrences have been identified during the subsequent follow-up period. The origin of the villous adenoma was found

Table 2 Overview of the characteristics of patients diagnosed with cystitis cystica/glandularis and polypoid cystitis and lesion characteristics

	Cystitis cystica/glandularis	Polypoid cystitis
<i>Patient characteristics</i>		
Number of patients	3	3
Sex	Male, male, female	Male, female, male
Age (years)	43, 74, 31	77, 83, 69
Smoking history	yes, no, no	No, no, yes
Comorbidities, n	0, 0, 0	1, 4, 1
Presenting symptom	Dysuria, dysuria, gross hematuria	Gross hematuria, gross hematuria, incidental finding
<i>Characteristics of the bladder mass</i>		
Appearance	Bullous/papillary, cystic, bullous/papillary	Bullous/papillary, papillary, papillary
Focality	Solitary, solitary, solitary	Solitary, multiple (2), solitary
Size, cm	3, 0.5, 3	2, 1 + 0.5, 2
Location	Trigone, neck, neck	Neck, posterior wall, lateral wall
Follow-up, months	29, 28, 39	39, 33, 37
Recurrence	No, no, no	No, no, no

Table 3 Overview of the characteristics of patients diagnosed with rare benign urinary bladder lesions and lesion characteristics

	Leiomyoma	Inflammatory myofibroblastic tumor	Chondroma	Paraganglioma	Villous adenoma	Eosinophilic cystitis	Ectopic prostatic tissue
<i>Patient characteristics</i>							
Sex	Female	Male	Female	Female	Female	Male	Male
Age (years)	60	39	59	72	53	75	66
Smoking history	Yes	No	Yes	No	No	No	No
Comorbidities, n	1	0	1	1	0	5	1
Presenting symptom	Incidental finding	Gross hematuria	Incidental finding	Incidental finding	Gross hematuria	Gross hematuria	Incidental finding
<i>Characteristics of the bladder mass</i>							
Appearance	Solid	Solid	Solid	Solid	Solid	Solid	Papillary
Focality	Solitary	Solitary	Multiple (2)	Solitary	Solitary	Solitary	Solitary
Size, cm	1.5	3.5	0.5 + 0.5	4	2.5	4	1
Location	Lateral wall	posterior wall	Dome	Anterior wall	Dome	Anterior wall	Lateral wall
Follow-up, months	28	28	51	45	37	28	
Recurrence	No	No	No	Yes	No	No	No

to be a urachal diverticulum, and the patient was thus subjected to the resection of the diverticulum and the underlying portion of the bladder. A histopathological examination of the resected specimen confirmed the initial diagnosis. All five patients diagnosed with a benign tumor are scheduled for continuous follow-ups with an annual cystoscopy, while others are being followed up with regular urological examinations.

4 Discussion

Urothelial papilloma is a rare type of benign bladder neoplasm that tends to affect men more than women and is usually diagnosed at a younger age compared to urothelial carcinoma [6–8]. In our study, more than 75% of patients with urothelial papilloma were male, and the mean age was 62 years, which is lower than the average age for bladder cancer diagnosis reported by the American

Cancer Society (73 years) [9]. In our study, more than two thirds of urothelial papilloma cases were detected incidentally by ultrasound performed for other reasons, while the rest of the patients presented with hematuria or dysuria. In contrast, bladder cancer presents with hematuria in more than 80% of cases [10]. Most urothelial papillomas are solitary and relatively small tumors, although multifocality has been reported [6–8]. Our results also showed a predominance of solitary papillomas, with a mean average size of 1 cm. Only two out of 13 patients had multifocal masses. The reported recurrence rate of urothelial papilloma in the literature ranges from 4 to 9%, with progression rates to high-grade carcinoma ranging from 2 to 9% [6–8]. In our study, only one out of 13 patients experienced a recurrence and developed PUN-LMP. Different authors recommend various surveillance programs due to a small, but existing risk of recurrence and progression [5–7]. Therefore, our patients are scheduled to undergo annual follow-ups with cystoscopy.

Cystitis cystica/glandularis and papillary cystitis were the second most commonly diagnosed benign bladder lesions. Cystitis cystica/glandularis arises from the cystic overgrowth of von Brunn nests, i.e. invaginations of the urothelial surface. Papillary cystitis is a reactive proliferative lesion resulting from inflammation and edema in the lamina propria. These lesions are usually associated with chronic irritation or inflammation of the bladder, although their exact cause may remain unclear [11, 12]. Five out of six cases in our study were associated with recurrent UTIs, chronic indwelling urinary catheterization, or pelvic irradiation. Cystitis cystica/glandularis and papillary cystitis are common, but often asymptomatic, and they thus mostly remain undetected. In rare cases, they can mimic bladder cancer by presenting with symptoms such as dysuria, hematuria, or incidentally detected bladder masses on imaging. The potential precancerous nature of cystitis cystica/glandularis is a topic of debate, as some studies indicate an elevated risk of bladder cancer, while others do not support this claim. Papillary cystitis is a benign lesion with no malignant potential. Urologists should be aware of these lesions to avoid misdiagnosis, and more research is needed to clarify their clinical implications [11–13].

During our study period, we were able to identify and report on seven singular cases of benign bladder lesions that presented as a bladder mass. Bladder leiomyoma is a rare tumor with a higher incidence in females. It has an excellent prognosis with no reported cases of malignant transformation after surgical treatment [14]. Our study involved a 60-year-old female patient who presented with a solitary, solid bladder mass measuring 1.5 cm, incidentally detected via ultrasound. After complete transurethral resection, the patient showed no

recurrence during the follow-up period. Inflammatory myofibroblastic tumors mainly occur in the lungs but may, in rare cases, also be found in the urinary bladder. While most of said tumors are considered benign, some may have malignant potential. The prognosis is relatively good, with a low risk of distant metastases and a local tumor recurrence rate of only 4% after surgery [15]. Our study involved a 39-year-old male who presented with hematuria, and the tumor was a solid, solitary mass measuring 3.5 cm. The patient did not experience any recurrence during the follow-up period.

Extra-skeletal chondromas are rare benign tumors composed of mature hyaline cartilage, with genitourinary chondromas being even rarer. There have only been a few reported cases of bladder chondromas, all in women in their sixth to eighth decade of life. Transurethral resection is an effective management strategy, although ongoing surveillance is recommended due to reported local recurrence rates [16]. One of our patients was a 59-year-old woman with an ultrasound finding that pointed to a bladder tumor. Endoscopically, two small masses were detected and resected, and the patient remained recurrence-free during the follow-up period.

Heterotopic pheochromocytoma, also known as paraganglioma, is a rare tumor that arises from sympathetic ganglia. Paraganglioma of the urinary bladder is extremely rare, occurring more commonly in females. It can be functional (i.e. secrete catecholamines) or non-functional. Only 10% of cases are malignant. Symptoms are often nonspecific, and surgical resection is the recommended treatment. Long-term follow-up is advised due to the possibility of recurrence and metastasis [17]. Our study included a 72-year-old asymptomatic woman who was incidentally found to have a 4 cm solid bladder mass. After an initial resection, a recurrence was detected during a follow-up cystoscopy three months later, probably indicating an incomplete removal. A repeated resection confirmed the initial diagnosis, and no further recurrences were observed during the follow-up period.

Villous adenoma is rarely found in the urinary tract, with a predilection for the urachus, dome, and trigone in the bladder. It lacks specific diagnostic features on imaging or cystoscopy, and complete removal and thorough sampling are recommended so that no aggressive component is missed, as it may have malignant potential. Distinguishing it from adenocarcinoma is challenging, but isolated villous adenoma has an excellent prognosis after surgical resection, with rare recurrences [18]. Our study also identified a case of villous adenoma measuring 2.5 cm in a 53-year-old woman with hematuria. The adenoma originated from a urachal diverticulum, and the patient underwent resection of both the diverticulum

and the underlying portion of the bladder. The patient remained recurrence-free during the follow-up period.

Eosinophilic cystitis is a rare condition involving inflammation of the bladder, predominantly with eosinophils. In some cases, a bladder mass may be formed. Most cases have no apparent cause, but possible associations include a history of allergies, asthma, bacterial infections, and medication use [19]. Our study involved a 75-year-old male patient with multiple comorbidities and no known predisposing factors for eosinophilic cystitis, who presented with gross hematuria. Analyses revealed a large (4 cm) solid bladder mass, which was completely resected. The patient remained asymptomatic during the follow-up period.

Ectopic prostatic tissue is a rare condition mainly affecting young males. Bladder polyps are a rare presentation of this condition, with less than 50 cases reported to date. It is important to be aware of this condition, as it may be mistaken for a neoplastic process [20]. Our study involved a 66-year-old asymptomatic man with an incidentally found papillary bladder mass on the lateral wall of the bladder. After transurethral resection, a histopathological examination revealed benign ectopic prostatic tissue.

Even though our study adds to the limited literature on the characteristics and outcomes of benign bladder lesions, we do acknowledge its limitations. The small sample size, attributed to the low incidence of said lesions, limits the generalizability of our findings. Additionally, the retrospective and observational design of our study may have introduced biases and inaccuracies in data collection.

Benign bladder masses are rare entities that can clinically and radiologically mimic malignant bladder tumors, but they mostly show a good prognosis. Although rare, benign lesions need to be considered in the differential diagnosis of bladder masses to avoid overtreatment. A histopathological analysis is required to distinguish them from bladder cancer. The recurrence rate is generally low, but increases with incomplete resection. Therefore, the treatment should aim for complete resection, and regular follow-ups are advised for the purpose of monitoring possible recurrences [7, 14–17]. The findings of this study contribute to the limited literature concerning this topic and point to the need for further research for the purpose of understanding said rare entities better.

5 Conclusion

Benign urinary bladder masses are a heterogeneous group of uncommon conditions that presents with similar clinical and radiological features as urothelial carcinoma. In our study, urothelial papilloma was the most frequently diagnosed benign bladder lesion, followed

by cystitis cystica/glandularis and polypoid cystitis. We were also able to identify and report on seven distinct benign entities that presented as a bladder mass. We observed that benign lesions had a favorable prognosis and a low risk of recurrence.

Abbreviations

PUNLMP	Papillary urothelial neoplasm of low malignant potential
UTI	Urinary tract infection

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Not applicable.

Author contributions

DJ and MŠ conceived of the presented idea and designed the study protocol. DJ and IJ collected and analyzed data. MŠ supervised the project. DJ and IJ wrote the manuscript. All authors read and approved the final version of the manuscript.

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Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the Institutional Ethics Committee of University Hospital Center Split (Class: 500-03/23-01/89; Ref. No. 2181-147/01/06/LJ.Z.-23-02). Patient consent to participate was not required due to the retrospective design of the study.

Consent for Publication

Written informed consent for publication of details relating to individual participants was obtained from each patient.

Competing interests

The authors declare that they have no competing interests.

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