



## Bladder Diverticulum with Stone and Transitional Cell Carcinoma: A Case Report

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### ABSTRACT

The incidence of bladder diverticulum is approximately 1.7% in children and 6% in adults. Dysplasia, leukoplakia, and squamous metaplasia and stone formation may develop in diverticulum and sometimes with malignant changes. The most common histological subtype of diverticulum tumors is transitional cell carcinoma (TCC). Herein we report 2 such cases of transitional cell carcinoma arising in diverticulum of the urinary bladder, one of which was associated with diverticular stones.

### INTRODUCTION

Bladder diverticulum is herniation of the bladder mucosa through bladder wall musculature (detrusor muscle). The incidence of bladder diverticulum is approximately 1.7% in children and 6% in adults [1]. Dysplasia, leukoplakia, and squamous metaplasia develop in approximately 80% of diverticulum. Chronic infection and inflammation, secondary to urinary stasis, were responsible for this situation [2].

Bladder tumors arising inside a diverticulum are uncommon, with a reported incidence ranging from 0.8 to 10%. The most common histological subtype of diverticulum tumors are transitional cell carcinoma (TCC) and squamous cell carcinoma (SCC), constituting 70 to 80% and 20 to 25% of all tumors, respectively [3]. TCC together with SCC is reported in 2% of all tumors while adenocarcinoma constitutes the other 2% of these diverticular tumors.

### CASE REPORT

#### *Case Number 1*

A 55 year-old male patient presented with lower urinary tract symptoms (LUTS) for 1 year. He had no history of hematuria. His

urinalysis showed 0 to 2 pus cells but no red blood cells (RBC). No growth was present in the urine culture. Kidney, ureter, and bladder X-rays (KUB) were suggestive of a radio-opaque shadow in the left ureter line at the level of L-5 vertebrae (Figure 1). But the ultrasonography (USG) was suggestive of stones within a large bladder diverticulum with a thickened and irregular bladder wall while the prostate was normal in volume. Cystoscopy suggested the diverticulum in the left lateral wall of the bladder and it was covered with necrotic calcified tissue, along with a stone and a papilliferous growth surrounding it. Transurethral biopsy was performed, which showed low-grade, non-invasive urothelial tumors on histopathological examination.

Since the metastatic workup was negative for any local regional or distant metastasis, partial cystectomy was done and patient had an uneventful recovery. Final histopathology suggested low-grade TCC with a surgical margin free from tumor invasion. At the 1-year of follow-up with a cystoscopy check, the patient is tumor free.

#### *Case Number 2*

A 72 year-old-male patient presented with hematuria. Urinalysis showed RBC 15-20/HPF, 5 to 6 pus cells, and the culture was

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Figure 1. An opacity that is approximately 2 cm in its longest axis.



Figure 2. USG shows a big diverticulum in the left lateral wall.



Figure 2. USG shows a big diverticulum in the left lateral wall.



positive for *E. coli*. The USG suggested a large diverticulum in the right lateral wall of the bladder along with a tumor. A computed tomography (CT) scan showed a large diverticulum with a tumor (2 cm x 3.5 cm) within it with no enlarged lymph nodes (Figure 3). Transurethral resection (TUR) biopsy was done and it suggested muscle invasive TCC. Radical cystectomy with an ileal conduit was done, and the histopathology suggested muscle invasive TCC. At the 6-month follow-up, the patient is doing well.

## DISCUSSION

Mucosal herniations through areas of congenital or acquired weakness in the muscular bladder wall are called diverticulum. Congenital bladder diverticulae are usually asymptomatic and usually detected incidentally during investigation for recurrent urinary tract infection, hematuria, or bladder emptying disorder. While acquired bladder diverticulae almost always occur secondary to intravesical obstruction [1]. It was previously

thought that bladder tumors originating within a diverticulum were uncommon. However, according to the current study, neoplastic changes were present in half of cases (36/71; 51%), including both noninvasive (16/36; 44%) and invasive (20/36; 56%) carcinoma. Patients with invasive carcinoma in diverticulum have an increased frequency of less common bladder cancer subtypes. Bladder tumors in a diverticulum are a diagnostic and therapeutic problem. Yagci et al. pointed out that the neoplasms originating from a bladder diverticulum

are characterized by early transmural invasion and have a tendency for higher histopathological grades [4]. Cheng et al. corroborated this result and indicated that neoplasms originating in a bladder diverticulum are characterized by a high incidence of local recurrence [5]. Lack of muscle fibers in the diverticulum makes it difficult to stage the tumor. Therefore, the tumor invades earlier and more readily than in a normal bladder wall because the bladder contains thick muscle.

The initial examination of patients with vesical diverticular tumors often consists of excretory urography and cystourethroscopy. The most common radiographic finding of a diverticular tumor is an intraluminal-filling defect, and these are best visualized in postmicturition films of excretory urography or cystography series. They may also appear as the foci of mucosal irregularity, an incompletely filled diverticulum, or nonvisualization of a previously identified diverticulum. Still, with these techniques, diverticular neoplasms may remain underdiagnosed due to nonopacification owing to the narrowed neck of diverticulum. In comparison, in recent years, cross-sectional imaging studies like CT and MRI are being used more commonly with greater accuracy for the diagnosis and staging of such intradiverticular tumors. A CT scan shows a focal or diffuse thickening of the diverticular wall while early peridiverticular tumor extension is seen as obscuration of the pelvic fat planes surrounding the neoplasm. Multiplanar imaging and excellent soft-tissue contrast resolution of MRI facilitate accurate delineation of the primary neoplasm, determination of intramural invasion, and extravascular tumor extension [6].

The transurethral approach for the treatment of diverticular tumors is often difficult and inappropriate due to the narrow diverticular neck, thin submucosal layers, and fear of bladder perforation with complete resection. Hence, pathologic staging following transurethral resection is difficult and often inaccurate [1]. Therefore, some authors advocate a very aggressive surgical approach involving open exploration and partial or radical cystectomy without prior transurethral resection [7]. A multimodal aggressive approach, including surgery, radiation, and chemotherapy, has been suggested by Garzotto et al. The authors claimed that a downstaged tumor by preoperative irradiation had a better survival than for those with no downstaging [8]. However, others have advocated a selective individualized approach, taking into account the clinical stage and pathologic grade of the tumor [3]. Low-grade, low-stage tumors may be successfully treated with diverticulectomy alone; however, the ability to reliably predict stage and grade preoperatively is limited, and this should be undertaken only with extreme caution and with adequate counseling and follow-up [1]. Whatever the approach, close

surveillance is always warranted.

## CONCLUSION

When imaging demonstrates bladder-filling defects, the differential diagnosis should include malignant and benign neoplasms, blood clots, edema in the wall due to an adjacent stone, ureterocele, an enlarged prostate, muscular wall hypertrophy, postoperative changes, endometriosis, and fungus balls. Neoplasia and stones may develop in a bladder diverticulum. Until now, only a few case reports of bladder diverticulum with stones and TCC have been reported. We should be vigilant in this regard, and diverticulum should be managed before complications develop.

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