Case report

Urothelial carcinoma arising within bladder diverticulum—Report of a case and review of the literature

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A B S T R A C T

Bladder diverticulum is an outpouching of bladder mucosa through the musculature of the bladder wall. The incidence of bladder diverticulum in Taiwan is about 1.7% in children and 23.4% in adults. Intradiverticular carcinoma of urinary bladder is uncommon. It ranges from 0.8% to 14.3%. Here we report a case of urothelial carcinoma within a bladder diverticulum. A 60-year-old male patient had history of BPH under medical treatment and right ureteral stone treated with extracorporeal shock wave lithotripsy (ESWL). He presented with painless gross hematuria about 3 months after ESWL. Intravenous pyelography showed a filling defect within the bladder diverticulum. Histopathological diagnosis of low grade urothelial carcinoma arising from the bladder diverticulum was made following cystoscopic biopsy. Laparoscopic partial cystectomy was performed with subsequent intravesical chemotherapy. Tumor recurrence was found not from the previous diverticulum but from another area during regular cystoscopy at the 6-month postoperative follow up. He underwent transurethral resection of bladder tumor. Pathology revealed a noninvasive, high grade urothelial carcinoma. There was no further bladder tumor recurrence during the 1-year follow-up period. Bladder-sparing surgery with close cystoscopy follow up for intradiverticular urothelial carcinoma can be applied as an alternative treatment modality.

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1. Introduction

Bladder diverticulum is an outpouching of the urothelial mucosa lining from the muscular network of the bladder. Bladder diverticula are either congenital or acquired, and are caused by a defect of the bladder wall and increased intravesical pressure. The lack of a muscle layer in bladder diverticulum results in a loss of contractility, which results in urine stasis in the diverticulum. Chronic irritation of intradiverticular urine stasis may be the cause of chronic inflammation or infection. The potential risk of malignant neoplastic change inside the bladder diverticulum increases. Primary neoplasms arising within a bladder diverticulum are uncommon. The incidence ranges from 0.8% to 14.3%. It draws attention because of the difficulty in early diagnosis and a higher risk of early invasion. Poor prognosis has already been documented.

We present a case of urothelial carcinoma arising within a bladder diverticulum. Laparoscopic surgery with a bladder preserving procedure provides an alternative treatment modality. The relevant literature is reviewed.

2. Case report

The 60-year-old male patient, a chronic smoker, had a history of BPH under regular medical treatment. Right flank pain occurred about 2 years previously. Right ureteral stone with obstructive uropathy and left renal stone was diagnosed. The right ureteral stone was successfully treated by extracorporeal shock wave lithotripsy (ESWL). However, he presented with painless gross hematuria about 2 months after ESWL. He had atypical cells in the urine cytology. Intravenous pyelography (IVP) revealed a filling defect within the bladder diverticulum (Fig. 1). Subsequent cystoscopy showed multiple papillary tumors within a single diverticulum located at left posterior wall of bladder (Fig. 2). The size of the diverticulum measured about 3 × 3 × 3 cm³. A biopsy from the papillary tumor specimen revealed a low grade papillary urothelial carcinoma. Subsequent computed tomography also demonstrated multiple tumors within the bladder diverticulum (Fig. 3). There was no evidence of lymphadenopathy, or distant or bony metastasis. No body weight loss was noted in the past year.
During admission, hematological and biochemical studies were within normal limits. Prostate specific antigen (PSA) was 1.49 ng/mL. Transurethral resection of bladder tumor was not feasible due to narrowing of the diverticular neck. Therefore, he underwent laparoscopic partial cystectomy. Cystoscopy was performed at first to stent the left ureter with a temporary straight ureteral catheter. A four-port transperitoneal approach was employed. It is not easy to identify the diverticulum, due to its smaller size, under laparoscopy. Under the guidance of cystoscopic light from bladder below, the diverticulum was finally identified. After the diverticulum was identified, the bladder wall (about 1 cm lateral to the diverticulum) was grasped. The water in the bladder was emptied through the cystoscope. A Foley catheter was re-inserted to maintain intra-vesical low pressure, and prevented urine spillage during the partial cystectomy procedure. Partial cystectomy was then carried out to resect the entire diverticulum with margin. The specimen was put in an Endo Catch bag immediately after complete resection. The distance from the resection margin to the diverticular neck is about 0.4 cm in the direction of the orifice and 1 cm elsewhere in the

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**Fig. 1.** Intravenous pyelography shows a sacculaion from the left side of the urinary bladder. There is a filling defect within the bladder diverticulum.

**Fig. 2.** Cystoscopic finding reveals papillary tumors arising within the bladder diverticulum located at the left posterior lateral wall.

**Fig. 3.** Contrast-enhanced abdominal computed tomography demonstrates a bladder diverticulum protruding from the left posterior lateral wall with a soft tissue nodule in the sac.
In patient with bladder diverticulum, most of the neoplasm would be located within the diverticulum. Carcinomas arising within the diverticulum are not uncommon. The incidence ranges from 0.8% to 14.3%. Urothelial carcinoma was the most common type of malignancy (78%), followed by squamous cell carcinoma (17%), coexistence of urothelial carcinoma and squamous cell carcinoma (2%), adenocarcinoma (2%), and other rare tumors.

Most bladder divertica are asymptomatic. Neoplasms arising within a bladder diverticulum poses difficulty in early diagnosis. The cardinal clinical presentation is painless gross hematuria for diverticular tumor. According to Melekos et al, 87.5% of patients with bladder diverticular neoplasm presented with hematuria. The diagnostic modalities is similar to that of bladder cancer. Urine cytology, cystoscopy, and radiologic examinations such as IVP, computed tomography or magnetic resonance imaging are useful in the diagnosis of bladder diverticular cancer.

The modalities of surgical treatment varies from conservative transurethral resection to aggressive radical cystectomy. Transurethral resection is a standard for removal of bladder tumor. However, the anatomic structure of bladder diverticulum made it impossible to complete resection of diverticular tumor in some cases such as where there was narrowing of the diverticular neck. It also poses risks of tumor spread from the more easily ruptured diverticular wall due to the lack of a muscular layer. Partial cystectomy is a good alternative for the treatment of bladder diverticular cancer. With advances in minimal invasive surgery, laparoscopic diverticulectomy or partial cystectomy was gradually accepted by urologists in this clinical scenario with promising results. In cases of Wang et al and ours, tumor recurrences away from the previous diverticular site were all noted after laparoscopic partial cystectomy. Both underwent transurethral resection of bladder tumor and intravesical chemotherapy. The result was good and no more recurrence were found until now.

The poor prognosis of bladder diverticular cancer was reported in earlier studies. Kelalis and McLean reported that the average period of survival was only 11 months in 19 cases of bladder diverticular cancer. Faysal and Freiha also reported a low disease-free survival rate of about 8% in 11 cases with bladder diverticular cancer. They suggested radical cystectomy as a gold standard for patients with bladder diverticular cancer. However, recent studies have demonstrated better outcomes for these patients. Golijanin et al reported significant differences in 5-year disease-free survival among patients with superficial tumors (83 ± 9%), superficially invasive tumors (67 ± 7%), and extradiverticular disease (45 ± 14%). All of their 39 patients underwent transurethral resection of bladder diverticular cancer initially. The most important factor of prognosis is clinical stage, regardless of the histological grade. They also mentioned favorable outcomes in another series with 71% disease-free survival at 5 years in Daniel’s series and 89% 4-year disease specific survival in Garzotto’s series with relative conservative approaches.

In conclusion, conservative transurethral resection seems to be adequate for patients with superficial noninvasive urothelial carcinoma with bladder diverticulum. Laparoscopic partial cystectomy is a favorable alternative for these patients and those who pose superficial invasive bladder diverticular carcinoma provided transurethral resection is not feasible or complete. Close postoperative follow up is very important because of the high recurrence rate.

Conflicts of interest

The authors declare that they have no financial or non-financial conflicts of interest related to the subject matter or materials discussed in the manuscript.
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References