

Case Report

Brachytherapy seeds as a nidus for urethral stone formation: A case report

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Abbreviations & Acronyms

MRI = magnetic resonance imaging
PSA = prostate-specific antigen
TUR = transurethral resection

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Introduction: Iatrogenic foreign bodies can cause urolithiasis. However, iodine seeds used in brachytherapy are not a known cause of stone formation. We report a rare case of urethral stone formation with brachytherapy seeds determined to be the nidus, which occurred 9 years after permanent seed brachytherapy for prostate cancer.

Case presentation: An 87-year-old man with a history of prostate cancer treated with brachytherapy presented to our hospital with macroscopic hematuria. He underwent transurethral resection of the mucosa with erythema 4 years after brachytherapy. Cystoscopy revealed urethral stones on the bladder neck. Transurethral lithotripsy was performed and the nidus of stone formation was revealed to be an aggregate of iodine seeds.

Conclusion: In the course of the long-term follow-up after brachytherapy for prostate cancer, the possibility of the formation of the urethral stone associated with iodine seeds should be considered when gross hematuria is observed.

Key words: brachytherapy, cystoscopy, hematuria, prostate cancer, urolithiasis.

Keynote message

Iatrogenic foreign bodies can cause urolithiasis. This is the first report of urethral stone formation following brachytherapy for prostate cancer, wherein iodine seeds acted as the nidus. In the course of the long-term follow-up after brachytherapy for prostate cancer, the possibility of the formation of the urethral stone associated with iodine seeds should be considered when gross hematuria is observed.

Introduction

Iatrogenic foreign bodies are capable of causing urolithiasis. However, iodine seeds used in brachytherapy are not a known cause of stone formation. Here we present a case of urethral stone formation with brachytherapy seeds determined to be the nidus occurring 9 years after permanent seed brachytherapy for prostate cancer.

Case presentation

An 87-year-old man presented to our hospital with macroscopic hematuria in August 2018. He had a history of prostate cancer, which was treated with permanent seed brachytherapy in January 2009. At that time, his serum PSA concentration was 7.79 ng/mL and the Gleason score was 6 (3 + 3). He was diagnosed with a cT1c prostatic adenocarcinoma, which was treated with 90 iodine-125 seed implant. X-ray images obtained after brachytherapy showed no evidence of seed migration to the urethra (Fig. 1a).

No tumor recurrence or metastasis was detected in the following 9-year period, and the patient's serum PSA concentration decreased to 0.02 ng/mL. However, 4 years after brachytherapy, he developed several episodes of gross hematuria. No obvious seed migration was detected on X-ray images (Fig. 1b). Cystoscopy revealed an erythema on the bladder neck (Fig. 2a). He underwent TUR of the mucosa with erythema to achieve control of

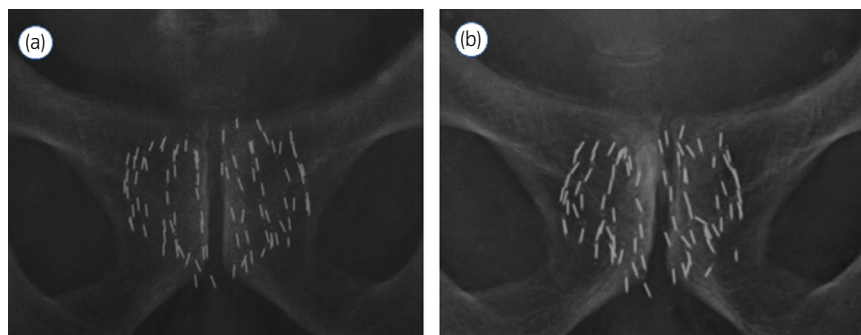


Fig. 1 (a) X-ray after brachytherapy showed no evidence of seed migration to the urethra. (b) No obvious seed migration was detected on X-ray images before TUR of the mucosa with erythema.

bleeding, and the gross hematuria was resolved. The pathology report showed inflammatory cell infiltration, erosion changes and Von Brunn's nests. A pathological diagnosis of cystitis with regenerative atypia was made. There was no evidence of malignancy.

Upon presentation with gross hematuria in August 2018, urine testing revealed no pyuria, and the patient reported no other urinary symptoms. Laboratory data were within the standard limits. X-ray images showed no migration of seeds. T2-weighted MRI showed a 12-mm lesion with low intensity on the bladder neck (Fig. 2b). Cystoscopy was performed and revealed an adhesion of stones consistent with the MRI findings (Fig. 3a).

We performed a transurethral lithotripsy under spinal anesthesia in October 2018. Three iodine seeds were found inside the stone, suggesting that the nidus of stone formation was an aggregate of iodine seeds (Fig. 3b). The stones comprised 68% calcium phosphate and 32% calcium oxalate. The postoperative course was good, and the patient was discharged on postoperative day 7. The patient's hematuria resolved, and there has been no recurrence.

Discussion

Urolithiasis typically occurs due to foreign bodies, obstruction, or infection. Medical actions, such as silk sutures, Foley balloon fragments, hemiorrhaphy mesh, artificial blood vessels, intrauterine devices, metal clips used in laparoscopic

pyeloplasty, and hemostatic clips used in robotic prostatectomy, can result in such foreign bodies.^{1,2}

To the best of our knowledge, there is only one report on urethral stone formation after brachytherapy for prostate cancer.³ However, there has been no report on urethral stone, wherein iodine seeds acted as the nidus and composed the stone. Theoretically, if seeds exist in the urethra, they can cause stones. The reason for the lack of previous reports may be because the intraoperative planning of brachytherapy for prostate cancer is designed such that the seeds are not exposed to the urethra.

In our case, the patient underwent TUR of the bladder neck after brachytherapy. It is thought that the iodine seeds were exposed to the bladder neck where the tissue was roughened over time, which acted as a nidus for stone formation.

Bladder cancer, mucosal membrane irritation, and radiation cystitis were reported to cause hematuria after brachytherapy for prostate cancer.⁴⁻⁶ A previous study revealed that in the majority of men who underwent brachytherapy for prostate cancer, grade 2-3 urinary disorders improved within 2 years.⁷ Genitourinary outcomes were reported using the Common Terminology Criteria for Adverse Events, version 4.0. Grade 2 refers to symptoms that have no influence on the lifestyle and respond to simple outpatient management, and grade 3 refers to painful symptoms that affect the lifestyle; may require hospitalization or minor surgery. In this paper, we report an unusual presentation of grade 3 gross hematuria after brachytherapy for prostate cancer. A detailed

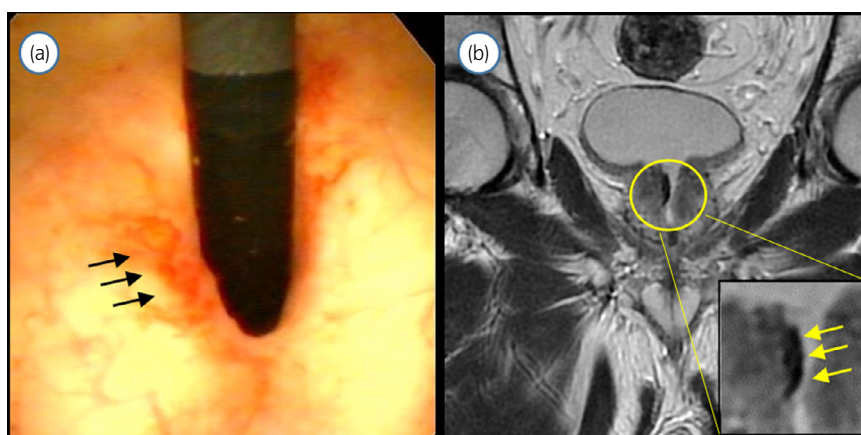


Fig. 2 (a) Cystoscopy showed an erythema on the bladder neck before TUR of the mucosa with erythema. (b) T2-weighted MRI showing a 12-mm lesion with low intensity on the bladder neck.

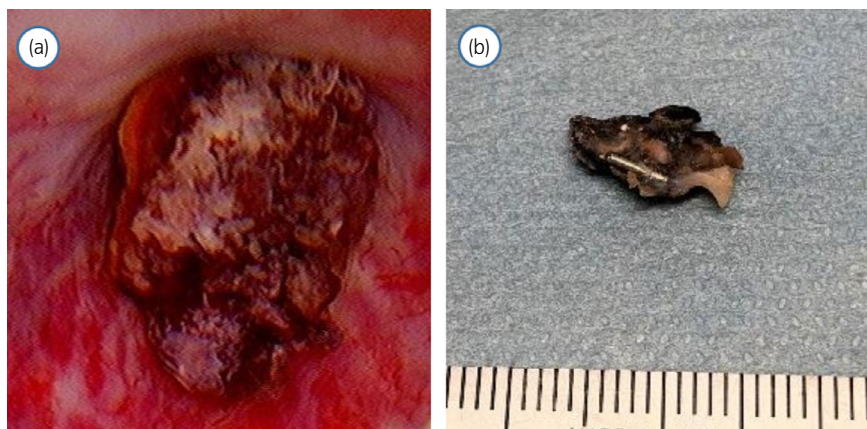


Fig. 3 (a) Cystoscopy revealed a stone on the bladder neck before transurethral lithotripsy. (b) Iodine seeds were the nidus for urethral stone formation.

examination of gross hematuria that developed in the ninth year after surgery triggered the discovery of a stone. Thus, in the course of long-term follow-up after brachytherapy for prostate cancer, the possibility of stone formation associated with iodine seeds should be considered when gross hematuria is observed.

Most urinary stones originate from constituents of urine, such as calcium oxalate, phosphate, or uric acid. Foreign body stones are typically composed of a mixture of calcium oxalate, phosphate, or struvite.¹ Similar to other reports, in our report, the patient's stones comprised a mixture of calcium oxalate and calcium phosphate. Urine analysis showed no evidence of pyuria; therefore, we speculate that struvite was not detected because there was no apparent infection.

Seed exposure to the urethra might occur owing to previous TUR. Therefore, it is recommended that care must be taken by urologists while performing TUR of prostate or transurethral coagulation after seed implantation to not expose the seeds to the urethra.

Conflict of interest

The authors declare no conflict of interest.

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