Case Report

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Spontaneous Bladder Rupture After Radiotherapy

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Abstract

Radiotherapy, applied to the lower abdomen and pelvis may result in urological complications due to damage to surrounding healthy tissues. A seventy-year-old male patient who underwent radical prostatectomy and who received 35 fractions of radiotherapy (2 Gy per fraction, total of 70 Gy) to the prostate bed using an intensity-modulated radiotherapy technique for biochemical recurrence presented to our clinic with haematuria. Cystoscopy revealed perforation in the left lateral wall of the bladder.
Keywords: Humans, urinary bladder, radiotherapy, rupture, spontaneous

Introduction

Spontaneous bladder rupture was first described by Altman and Horsburgh in 1966 in a case report. Such cases are very rare (<1%) and those caused by radiotherapy are even rarer. The possible causes of spontaneous bladder rupture include bladder and pelvic organ tumours, radiotherapy applied in pelvic organ tumours, neurogenic bladder, excessive alcohol consumption, presence of bladder in the hernia sac, chronic cystitis. In a recent review of 351 patients with spontaneous bladder rupture, it was initially misdiagnosed in 64% of cases and had an overall mortality rate of 15%, highlighting the importance of early diagnosis and appropriate management. Here, a case with spontaneous bladder rupture after radiotherapy is presented and the recent literature is discussed (1,2).

Case Report

A seventy-year-old man who underwent radical prostatectomy five years ago and who received 35 fractions of radiotherapy (total of 70 Gy) six months ago for biochemical recurrence presented to our clinic with haematuria. Physical examination revealed no pathological findings and no obvious abnormality. The patient had coronary artery disease and hypertension. Family history revealed that his aunt had breast cancer. He wasn't a smoker. Urodynamic evaluation was not performed, as the patient had no lower urinary tract symptoms. On admission, creatinine was 0.8 mg/dL, white blood cell count was $6x10^3$/µL, prostate specific antigen was <0.008 µg/L, total testosterone was 11 ng/dL, chemical analysis of complete urinalysis showed >200 RBC/µL. Ultrasonography revealed that bladder contours were slightly trabeculated and a catheter balloon was observed in the lumen. Seven x 3 cm cystic area was observed on the left anterolateral side of the bladder. The patient underwent cystoscopy and a perforation area was observed in the left lateral wall. Intraoperative cystogram was then performed and extravasation extending to the retroperitoneum was observed (Figure 1). In our case, the bladder perforation was a small defect (1 cm in diameter) and was localized extraperitoneally without any connection to the peritoneal cavity. Adequate urinary drainage was achieved with 18 Fr foley catheter. Urine culture obtained at the time of admission was sterile. Intravenous antibiotics from the cephalosporin group were administered prophylactically during the initial hospitalization period. Antibiotic therapy was continued for the duration of the indwelling urinary catheter to reduce the risk of infection, particularly given the presence of urine leakage into the extraperitoneal space. Then, the patient was followed up for 15 days. After 15 days, no extravasation was observed in the control cystogram. Upon discharge, the patient was prescribed an oral antibiotic from the penicillin group.

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

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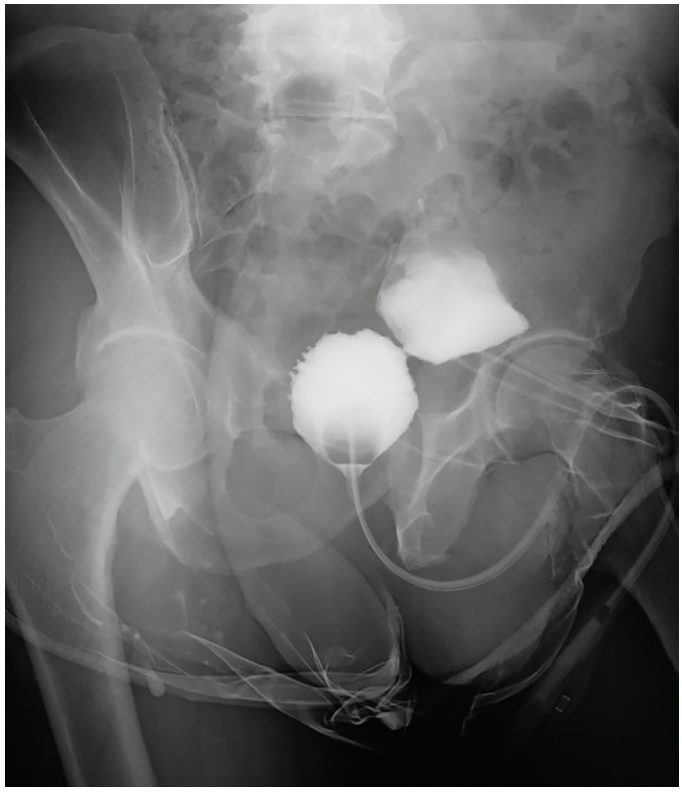

Figure 1. Cystogram showing extraperitoneal bladder rupture

Discussion

Spontaneous bladder perforation after radiotherapy is a very rare condition. According to available data, the incidence is reported to be 1:126.000. It has been reported that the incidence of side effects after curative radiotherapy is approximately 10% and 3% of these side effects are urological problems (haematuria, fistula development, cystitis and fibrosis). Spontaneous bladder rupture has been reported even 30 years after radiotherapy treatment. It is thought to be caused by radiation damage affecting division delay and interphase pause leading to cellular death and further bladder damage (3-5).

In addition to radiotherapy, other potential risk factors for spontaneous bladder rupture were considered, including infravesical obstruction and bladder-specific conditions such as tuberculosis, schistosomiasis, candidiasis, eosinophilic cystitis, and emphysematous cystitis. Structural abnormalities like bladder diverticulum and ischemic necrosis caused by atherosclerotic plaque emboli have also been reported. Bladder carcinoma is another well-recognized risk factor. Long-term cyclophosphamide therapy and early intravesical administration of mitomycin C may contribute to bladder wall damage and rupture. Neurological disorders such as paraplegia with cystitis, multiple sclerosis, and tabes dorsalis can also predispose patients to rupture. In addition, acute alcohol intoxication and the use of clean intermittent catheterization are considered possible contributing factors (4). However, the patient had no neurological disorders, diabetes, voiding dysfunction, urethral stricture, urinary retention, history of infections, or alcohol use. Therefore, radiotherapy remained the only identifiable risk factor in this case.

Bladder perforations occur extraperitoneally in 60%, intraperitoneally in 30% and both extraperitoneally and intraperitoneally in the remaining 10%. Intraperitoneal bladder ruptures usually occur in the dome of the bladder, while extraperitoneal leaks are mostly located in the lateral walls. Intraperitoneal rupture of the bladder usually presents with sudden onset of abdominal pain, rebound, defence, distension, peritonitis findings such as high fever and decreased urine output. Changes in urea and creatinine values are due to reabsorption of both substances through the peritoneum. This condition is difficult to differentiate from other causes such as acute renal failure. Bladder rupture must be included in the differential diagnosis because of the physical examination findings seen in acute abdomen syndrome. Delay in diagnosis may lead to a mortality rate of up to 25% if it lasts for more than 24 hours (1,6). On the other hand, extraperitoneal ruptures usually present with fewer abdominal symptoms because urine does not leak into the peritoneal cavity and changes in serum electrolyte levels and elevated blood urea nitrogen (BUN) and creatinine levels are not usually the case. In extraperitoneal ruptures, contrast extravasation around the perivesical area is clearly visible. Here, also, accurate diagnosis, appropriate treatment and early intervention are essential to prevent complications (7,8).

In the literature, cystography and computed tomography are prominent in the diagnosis of bladder rupture. In cystography, extravasation of radiopaque substance given into the bladder is diagnostic (3).

There are no specific guidelines on the treatment of spontaneous bladder rupture. The European Association of Urology (EAU) recommends that intraperitoneal bladder rupture should always be surgically repaired because of its potentially life-threatening potential. For example, in the cases of Ketata et al. (4), the rupture was intraperitoneal and repair was started with laparotomy. However, conservative treatment may be considered in extraperitoneal bladder rupture. In the literature, it has been reported that both intraperitoneal and extraperitoneal bladder ruptures have been successfully treated conservatively under certain conditions without serious infection, bleeding or major injuries. In the cases of Basiri and Radfar (9), despite the presence of intraperitoneal rupture, complete recovery was achieved with conservative management (urethral catheterization and antibiotic therapy). In the case reported by Welp et al. (10), an extraperitoneal rupture that developed during treatment in a patient receiving chemoradiotherapy for cervical cancer was managed conservatively and the patient did not require surgery. The main elements of the conservative approach are adequate urinary drainage and appropriate antibiotic treatment. An indwelling catheter or puncture drainage catheter may be used for urine drainage. Additionally, laparoscopic surgical intervention may be performed in cases of intraperitoneal rupture without severe infection or other organ damage (2,8).

Conservative treatment is a safe and effective option for carefully selected patients with extraperitoneal bladder rupture. However, several potential complications should be taken into account. These include delayed or insufficient healing, which may lead to persistent urine leakage, perivesical abscess, or fistula formation. Extended catheterization may also increase the risk of infection, such as urinary tract infections or, in rare cases, urosepsis. For this reason, patients managed conservatively require close clinical and radiological monitoring. If complications arise, surgical intervention should be considered promptly (11).

Conclusion

Bladder rupture, which is a rare complication of radiotherapy, should be kept in mind in a patient who has a history of radiotherapy and presents with haematuria or abdominal pain.

Ethics

Informed Consent: Written informed consent was obtained from the patient for publication of this case report and accompanying images.

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Publication: The results of the study were not published in full or in part in form of abstracts.

Contribution: There is not any contributors who may not be listed as authors

Footnotes

Authorship Contributions

Surgical and Medical Practies: İ.O.K., G.A., F.Ç., Concept: İ.O.K., G.A., Design: G.A., F.Ç., Data Collection or Processing: G.A., S.N.K., Analysis or Interpretation: İ.O.K., G.A., S.N.K., Literature Search: G.A., S.N.K., F.Ç., Writing: G.A.

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