Oncology and Translational Medicine
DOI 10.1007/s10330-018-0271-1

April 2018, Vol. 4, No. 2, P72–P75

CASE REPORT

Recurrent ascites due to spontaneous intraperitoneal bladder rupture after pelvic radiation therapy for cervical cancer

Qian Shen[1], Yuping Yin[2], Lihong Zhang[1], Dongbo Liu[1], Shiying Yu[1], Huihua Xiong[1], Xianglin Yuan[1], Yongsheng Jiang[1] (✉)

[1] Department of Oncology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China
[2] Department of Gastrointestinal Surgery, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China

Abstract

Radiation cystitis is one of the major complications following radiotherapy for cervical cancer. However, spontaneous intraperitoneal bladder rupture as a result of radiation cystitis following radiotherapy for cervical cancer is extremely rare. Case presentation: We report a 52-year-old patient who received radiation therapy for cervical cancer 15 years prior to presentation. Eight years prior to presentation, she developed recurrent abdominal distension, oliguria, and ascites. Following ascites drainage and supportive treatment, all symptoms were relieved. However, all symptoms subsequently recurred every few months. The patient underwent exploratory laparotomy twice. The first exploratory laparotomy in July 2015 found no specific abnormalities. The second exploratory laparotomy in November 2016 found an intraperitoneal bladder rupture, and the patient underwent surgical repair. The ascites subsequently resolved. Conclusion: The occurrence of spontaneous intraperitoneal bladder rupture after radiation therapy for cervical cancer is rare. The prognosis is good when diagnosis and treatment are prompt.

Received: 3 April 2018
Revised: 13 April 2018
Accepted: 20 April 2018

Key words: radiation cystitis; spontaneous intraperitoneal bladder rupture; recurrent ascites; cervical cancer

Urinary bladder rupture is mostly associated with trauma, chronic bladder disease, or bladder outflow obstruction. Nontraumatic, spontaneous intraperitoneal bladder rupture, which is associated with pelvic radiation therapy, is rare in cervical cancer patients. The diagnosis of urinary bladder rupture may be difficult due to unreliable history and variable presentation. Spontaneous intraperitoneal bladder rupture is commonly initially misdiagnosed, and sometimes can be a life-threatening event.

Case presentation

A 52-year-old woman presented to the hospital (Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China) with abdominal distension, oliguria, and ascites for the first time in January 2010. She denied any history of trauma. She was diagnosed with cervical cancer in 2003. She underwent radical hysterectomy and pelvic lymph node dissection on March 24, 2003, and was diagnosed with squamous carcinoma of the cervix (stage IIb). She received postoperative pelvic concurrent chemo-radiotherapy, including pelvic radiation (Dt 4600 cGy/23 F) and brachytherapy (Dt 1700 cGy/3 F), then regular follow-up. After a 5-year follow-up period, there was no significant recurrence, the patient was asymptomatic, and regular follow-up was discontinued.

In January 2010, the patient was admitted to the hospital (Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China) because of abdominal distension and pain, decreased urine output, and a large amount of ascites. On examination, her temperature, blood pressure,

✉ Correspondence to: Yongsheng Jiang. Email: ysjiang.china@163.com

and heart rate were normal. Chest auscultation showed a regular heart beat without murmur and clear breath sounds without crackles. The abdomen was grossly distended with free fluid, and she had hypoactive bowel sounds. There were no features suggestive of peritonitis, no palpable liver or spleen, and no percussion pain in the kidney area. No abnormalities were found on gynecologic examination. The diagnosis at admission was suspected ascites of unknown cause and cervical cancer. Blood urea nitrogen and serum creatinine were slightly increased. The complete blood cell count, liver function, and coagulation tests were normal, and tumor marker levels, including carcinoembryonic antigen (CEA), squamous cell carcinoma antigen (SCCA), CA 153, CA 125, and CA 19-9 were also normal. Ultrasound examination showed a rough bladder wall and a large amount of abdominal and pelvic effusion. Computed tomography (CT) showed a large amount of ascites without evidence of malignancy or any obstruction. No obvious abnormalities were found on cystoscopy, other than pale bladder mucosa. Positron emission tomography PET/CT showed abnormally elevated fluorodeoxyglucose uptake in both the abdominal and pelvic cavities, with strong suspicion of metastatic lesions. Routine biochemical tests and pathological examination of the ascites fluid revealed the presence of red blood cells, lymphocytes, and mesothelial cells, but no cancer cells. The patient was diagnosed with incomplete malignant bowel obstruction, and was discharged after improvement with symptomatic and supportive treatment. From 2010 to 2015, the patient had recurrent abdominal pain and distension, with different amounts of ascites. No obvious abnormalities were found on CT and cystoscopy. The symptoms were relieved with ascites drainage and supportive treatment.

In July 2015, the patient was readmitted with the same symptoms, including abdominal pain, lower abdominal distension, and oliguria. PET/CT examination showed no specific abnormalities. A multidisciplinary team (MDT) consisting of an oncologist, gynecologist, gastroenterologist, and radiologist, decided to perform laparoscopic exploration, but no obvious abnormality was found. In 2015 and 2016, the patient experienced intermittent abdominal pain and a large amount of ascites. Symptoms usually occurred without apparent cause. The nonspecific treatment included ascites drainage and symptomatic and supportive treatment, since the cause of the ascites had not been identified. In November 2016, the patient presented with the same symptoms, and underwent exploratory laparotomy for the second time. The bladder wall was found to be extremely thin, and a very tiny fissure was found on the wall. After repair of the ruptured bladder, the patient recovered, and has not experienced ascites since then.

Discussion

Our case highlights three interconnected phenomena: radiation cystitis, recurrent ascites, and spontaneous bladder rupture.

Radiation cystitis is a common complication of cervical cancer after pelvic radiotherapy [1]. According to the time of occurrence and severity, radiation cystitis may be divided into three types: acute radiation cystitis, chronic radiation cystitis, and radiation-induced bladder fistula [2–3]. Acute radiation cystitis occurs during or soon after radiation treatment, usually within 6 months. It is mostly characterized by increased urinary frequency and urgency, with gross or microscopic hematuria [4], and is usually self-limited and generally managed conservatively [5]. Chronic radiation cystitis accounts for 80% of cases of radiation cystitis [6], and can develop 6 months to 20 years after radiation therapy. The main presenting symptom is hematuria, which may vary from mild to severe, life-threatening hemorrhage [5, 7]. Radiation-induced bladder fistula is often associated with the radiation dose, and can occur in some severe cases.

Spontaneous intraperitoneal bladder rupture is rare in cervical cancer patients who undergo radiation therapy, but can be life-threatening [8]. The most common causes of bladder rupture are blunt trauma, chronic bladder disease, or bladder outflow obstruction; other possible reasons include surgical procedures and irradiation to the pelvis [9–12]. Accurate diagnosis of spontaneous intraperitoneal bladder rupture is difficult before surgery and is often delayed in the absence of history of trauma or preexisting chronic bladder disease. Symptoms and signs of spontaneous intraperitoneal bladder rupture can be nonspecific and misleading [13–15]. Patients usually present with an acute abdomen, abdominal distension, oliguria/dysuria, and hematuria [12–13]. Symptoms may be insidious in onset, presenting only as ascites or acute renal failure[14, 16–18]. Ultrasonography and CT may miss most intraperitoneal bladder ruptures. CT cystography may help to diagnose bladder rupture, but it is difficult to identify tiny fissures [19]. The gold standard for the diagnosis of intraperitoneal bladder rupture is exploratory laparotomy. However, this operation is invasive for a patient without serious complications. Measuring urea and creatinine levels in ascites and serum is a simple and noninvasive diagnostic test, and an ascites-to-serum creatinine ratio > 1.0 usually supports the diagnosis of spontaneous intraperitoneal bladder rupture [20–21]. The conservative treatment of spontaneous intraperitoneal bladder rupture consists of antibiotics and percutaneous peritoneal drainage for patients with a history of pelvic irradiation [22–23]. For recurrent cases, or patients with severe symptoms after ineffective conservative therapy, immediate surgery, with repair of the urinary bladder in

2 layers, is strongly recommended [24–25]. After repair of the bladder, prolonged drainage is required, and patients must be educated to avoid bladder overdistension, because of increased risk of reperforation [26].

As described by Addar *et al* in 1996 [27], treatment of spontaneous bladder rupture must be individualized but should be based upon 6 principles as follows: (1) the defect must be identified and confirmed; (2) the peritoneal cavity should be thoroughly lavaged; (3) the defect should be widely excised; (4) reconstitution of the intact bladder should be performed using tissue with an intact blood supply, especially in radiated areas; (5) adequate healing with prolonged bladder drainage and prophylactic antibiotics should be promoted; and (6) primary or recurrent malignant disease should be excluded.

Seven years after surgery and radiotherapy, our patient began to experience intermittent abdominal pain and a large amount of ascites. During the next 6 years, although she had undergone cystoscopy, PET/CT, and even laparotomy, there were no positive findings to explain all the symptoms. We did not perform a peritoneal fluid analysis of urea and creatinine levels because we did not initially consider the possibility of spontaneous intraperitoneal bladder rupture. It was not until the second exploratory laparotomy that the bladder wall was found to be significantly thin, with a tiny localized fissure. After the bladder was repaired in 2 layers, the patient recovered and has not experienced abdominal pain and ascites again.

This case is rare. The patient was admitted to the hospital repeatedly over 6 years with recurrent ascites, but no peritonitis or acute renal failure. This patient was a dancer, and often delayed bladder emptying due to occupational reasons. Overdistension is hazardous for a bladder that has undergone radiation therapy and will aggravate the occurrence of all complications. Since the rupture site was extremely small and pelvic adhesions developed after surgery and radiotherapy, the fissure was not detected on cystoscopy and initial laparoscopic exploration.

This case shows that when a cervical cancer patient experiences ascites after radiotherapy, we should think of the possibility of rupture of the bladder [28]. For patients with recurrent ascites, cytology should be performed and urea and creatinine levels in the ascites fluid should be tested. Spontaneous intraperitoneal bladder rupture should always be considered in the differential diagnosis of patients who present with abdominal distension, oliguria, ascites, and increased levels of urea and creatinine in serum and/or peritoneal fluid aspirate [29]. The prognosis is good when diagnosis and treatment are prompt.

Conclusion

Spontaneous intraperitoneal bladder rupture is a rare cause of ascites, but when a patient presents with ascites and oliguria of unknown cause, especially with a history of radiation therapy to the pelvis, the possibility of spontaneous intraperitoneal bladder rupture should be considered in the differential diagnosis. To avoid the risk of death, prompt and precise diagnosis are mandatory. After proper surgical treatment, patients must be educated regarding bladder emptying, to prevent overdistension. We hope our case report heightens awareness of spontaneous intraperitoneal bladder rupture, so that these patients can be diagnosed promptly and treated appropriately to obtain the best possible outcomes.

Conflicts of interest

The authors indicated no potential conflicts of interest.

References

1. Alesawi AM, El-Hakim A, Zorn KC, *et al*. Radiation-induced hemorrhagic cystitis. Curr Opin Support Palliat Care, 2014, 8: 235–240.
2. Wit EM, Horenblas S. Urological complications after treatment of cervical cancer. Nat Rev Urol, 2014, 11: 110–117.
3. Li F, Guo H, Qiu H, *et al*. Urological complications after radical hysterectomy with postoperative radiotherapy and radiotherapy alone for cervical cancer. Medicine (Baltimore), 2018, 97: e0173.
4. Corman JM, McClure D, Pritchett R, *et al*. Treatment of radiation induced hemorrhagic cystitis with hyperbaric oxygen. J Urol, 2003, 169: 2200–2202.
5. Liem X, Saad F, Delouya G. A practical approach to the management of radiation-induced hemorrhagic cystitis. Drugs, 2015, 75: 1471–1482.
6. Mougin J, Souday V, Martin F, *et al*. Evaluation of hyperbaric oxygen therapy in the treatment of radiation-induced hemorrhagic cystitis. Urology, 2016, 94: 42–46.
7. Tahir AR, Westhuyzen J, Dass J, *et al*. Hyperbaric oxygen therapy for chronic radiation-induced tissue injuries: Australasia's largest study. Asia Pac J Clin Oncol, 2015, 11: 68–77.
8. Limon O, Unluer EE, Unay FC, *et al*. An unusual cause of death: spontaneous urinary bladder perforation. Am J Emerg Med, 2012, 30: 2081.e3–5.
9. Ketata S, Boulaire JL, Al-Ahdab N, *et al*. Spontaneous intraperitoneal perforation of the bladder: a late complication of radiation therapy for prostate cancer. Clin Genitourin Cancer, 2007, 5: 287–290.
10. Labanaris AP, Zugor V, Reinhold Nützel R, *et al*. Spontaneous rupture of the urinary bladder 10 years after curative radiotherapy. Sci World J, 2008, 8: 405–408.
11. Suzuki T, Usami A, Shinoda M, *et al*. Spontaneous bladder rupture occurred 17 years after radiation treatment for cervical cancer: a case report. Nihon Shokakibyo Gakkai Zasshi (Japanese), 2011, 108: 1437–1440.
12. Kivlin D, Ross C, Lester K, *et al*. A case series of spontaneous rupture of the urinary bladder. Curr Urol, 2015, 8: 53–56.
13. Dubey IB, Mohanty D, Jain BK. Diverse presentation of spontaneous rupture of urinary bladder: review of two cases and literature. Am J Emerg Med, 2012, 30: 832.e1–3.

14. Matsumura M, Ando N, Kumabe A, *et al.* Pseudo-renal failure: bladder rupture with urinary ascites. BMJ Case Rep, 2015, Nov 20, doi: 10.1136/bcr-2015-212671.
15. Sawalmeh H, Al-Ozaibi L, Hussein A, *et al*. Spontaneous rupture of the urinary bladder (SRUB); A case report and review of literature. Int J Surg Case Rep, 2015, 16: 116–118.
16. Bourgeois S, Decupere M, Devriendt D, *et al*. A case of pseudorenal failure – spontaneous rupture of the urinary bladder. Acta Gastroenterol Belg, 2017, 80: 419–421.
17. Mark A, Meister M, Opara B, *et al*. Nontraumatic urinary bladder rupture presenting as renal pseudo-failure and ascites. Radiol Case Rep, 2017, 12: 304–307.
18. Ridinger HA, Kavitt RT, Green JK. Urinary ascites and renal failure from unrecognized bladder rupture. Am J Med, 2012, 125: e1–2.
19. Montigny P, Pringot J, Billemont MF, *et al*. Traumatic urinary bladder rupture: the usefulness of CT cystography. JBR-BTR, 2013, 96: 90.
20. Abirami K, Sivaramakrishna G, Lakshmi AY, *et al*. Urinary ascites. Indian J Nephrol, 2012, 22: 143–144.
21. Arnold WC, Redman JF, Seibert JJ. Analysis of peritoneal fluid in urinary ascites. South Med J, 1986, 79: 591–594.
22. Abu Mahfouz I, Sayer T, Phillips C. Conservative management of spontaneous rupture of the urinary bladder. Int Urogynecol J, 2011, 22: 629–631.
23. Jones AL, Armitage JN, Kastner C. Conservatively managed spontaneous intraperitoneal bladder perforation in a patient with chronic bladder outflow obstruction. Urol Ann, 2014, 6: 370–372.
24. Johnsen NV, Young JB, Reynolds WS, *et al*. Evaluating the role of operative repair of extraperitoneal bladder rupture following blunt pelvic trauma. J Urol, 2016, 195: 661–665.
25. Wakamiya T, Kuramoto T, Inagaki T. Two cases of spontaneous rupture of the urinary bladder associated with radiation cystitis, repaired with omentum covering. Hinyokika Kiyo (Japanese), 2016, 62: 545–548.
26. Tsai CH, Wang YC, Wu SC, *et al*. Laparoscopic repair of extraperitoneal urinary bladder rupture after blunt abdominal trauma. Am Surg, 2012, 78: E385–E386.
27. Addar MH, Stuart GC, Nation JG, *et al*. Spontaneous rupture of the urinary bladder: a late complication of radiotherapy – case report and review of the literature. Gynecol Oncol, 1996, 62: 314–316.
28. Fujikawa K, Yamamichi F, Nonomura M, *et al*. Spontaneous rupture of the urinary bladder is not a rare complication of radiotherapy for cervical cancer: report of six cases. Gynecol Oncol, 1999, 73: 439–442.
29. Baseman AG, Snodgrass WT. Repeat spontaneous bladder rupture following radiation therapy. J Urol, 2003, 170: 2417.

DOI 10.1007/s10330-018-0271-1
Cite this article as: Shen Q, Yin YP, Zhang LH, *et al*. Recurrent ascites due to spontaneous intraperitoneal bladder rupture after pelvic radiation therapy for cervical cancer. Oncol Transl Med, 2018, 4: 72–75.