

Recurrent scrotal edema in a patient with radiation enteritis: A case report

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Abstract. Since its introduction as an alternative treatment technique, radiotherapy has been increasingly used as the medical treatment of choice for patients with malignant tumors. However, radiotherapy is associated with a number of common, well-described side effects, which may compromise the quality of life of the patients. Scrotal edema is an infrequent complication in patients who undergo pelvic irradiation, which is suspected to be due to lymphatic obstruction. An extensive literature search found no previous case report describing this complication in patients receiving pelvic radiotherapy. Herein, we present a case of recurrent scrotal edema in a 59-year-old man with prostate cancer and radiation enteritis. Conservative therapy was applied and was successful in relieving the symptoms. To the best of our knowledge, this is the first case report of scrotal edema in a patient with radiation enteritis.

Introduction

Prostate cancer is the second most common type of cancer and cause of cancer-related mortality among men worldwide (1). The prostate cancer burden is expected to grow to 1.7 million new cases and 499,000 new deaths worldwide by 2030, simply due to the growth and aging of the global population (2). Surprisingly, we do not yet objectively know the optimal treatment for this disease. To date, radical prostatectomy and radiotherapy are the two most widely used treatment modalities for men with clinically localized prostate cancer (3). Although radiotherapy is a safe and effective procedure for the treatment of patients with early-stage prostate cancer (4), there are several common and well-described side effects, which may compromise the quality of life of the patients, some of which require admission to the hospital or even surgical

intervention, including urinary incontinence, erectile dysfunction and radiation enteritis (5,6). Scrotal edema is another rarely encountered complication, with only few reports in the literature. We herein report the case of a patient with radiation enteritis who presented with recurrent episodes of scrotal edema following pelvic radiotherapy.

Case report

A 59-year-old man was referred to our hospital with complaints of abdominal pain and abdominal distension for 2 days. The patient's medical history included prostate adenocarcinoma with a Gleason score of 5 and an initial prostate-specific antigen (PSA) level 6.3 ng/ml 3 years prior. The patient had received radiotherapy by a nearby tertiary level-of-care hospital to a total dose of 70 Gy within the next 7 weeks after diagnosis.

On admission, the patient's vital signs were stable, with a blood pressure of 125/78 mmHg and a heart rate of 86 bpm. A computed tomography (CT) scan revealed multiple gas-fluid levels in the intestinal tract and intestinal stenosis. The patient was first treated with fasting, nasogastric tube insertion, intravenous fluids and inhibition of gastric acid secretion after a presumptive diagnosis of intestinal obstruction caused by radiation injury. Surgery was performed on the following day. During surgery, there was no evidence of ascites, disease recurrence or metastasis; adhesions and fibrosis were limited to the right side of the pelvis, which conformed to radiation enteritis. The patient was submitted to laparoscopic surgery to remove the ileocecum and terminal ileum, combined with anastomosis of the ileum and the ascending colon. Postoperatively, the patient received intravenous fluids and nasogastric enteral nutrition (EN) for 5 days, until his well intolerance of total EN. Two weeks after the operation, the patient was allowed on a liquid diet.

However, on the fourth postoperative day, the patient complained of painless bilateral scrotal swelling, with ensuing walking difficulty. There was no associated pain or tenderness, and the scrotum did not present with other signs of inflammation. The physical examination revealed significant bilateral scrotal swelling, with extension of the edema to the inguinal canals bilaterally and the penile shaft (Fig. 1). The scrotum was erythematous, without signs of cellulitis or infection. Dipstick urinalysis revealed no abnormalities and the laboratory results revealed a normal white blood cell count ($7.8 \times 10^9/l$), normal

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Figure 1. Bilateral scrotal swelling, with extension of the edema to the penile shaft and the inguinal canals bilaterally.



Figure 2. The transillumination test of the scrotum did not reveal the presence of any abnormal masses.

urea and electrolyte levels, and an erythrocyte sedimentation rate of 2 mm/h. On palpation, the testes and epididymis were normal bilaterally, without pain or signs of pulsation. The transillumination test of the scrotum was positive (Fig. 2). An ultrasound examination revealed marked bilateral scrotal skin thickening and bilateral hydroceles (Fig. 3). A penile examination revealed edema of 90-95% of the penile shaft. The vascular examination revealed no dependent, distal edema. Following detailed medical history taking, the patient confirmed recurrent episodes of scrotal edema 1 year after radiotherapy, and denied the presence of other chronic illnesses, previous surgeries, history of sexually transmitted diseases, or drug

allergies. Taking into consideration the patient's medical history, we considered a diagnosis of secondary lymphedema caused by radiotherapy for prostate cancer. The patient received treatment with intravenous albumin, diuretics, and external use of Jin Huang San powder. After 1 week of conservative treatment, the patient had lost 4 kg in weight and the scrotal edema was almost entirely resolved.

Discussion

Wilhelm Roentgen discovered ionizing radiation in 1895. Within weeks of his discovery, scientists throughout Europe



Figure 3. Testicular ultrasound revealing marked bilateral scrotal skin thickening and bilateral hydroceles.

and the United States were experimenting with radiation for diagnostic and therapeutic purposes. Less than 2 years later, radiation-induced deep tissue injury was first reported by Walsh (7). Over the last century, therapeutic radiation techniques have been refined and their indications have been better defined. Abdominal or pelvic radiotherapy is now commonly used for primary or adjunctive treatment of gynecological, genitourinary and colorectal malignancies. However, radiation-induced injury remains a major concern, as it may lead to urinary incontinence, erectile dysfunction, radiation enteritis and lymphedema of the lower extremities (5,8).

Scrotal edema is a rare side effect of radiotherapy in men with pelvic cancer; Hunter and Peschel were the first to report persistent unilateral scrotal edema as a minor treatment-related complication of radiotherapy in 1989 (9). To date, only few studies have reported the development of scrotal edema in patients who received pelvic radiation; however, they offered no further details on the cases (10-13). Generally, the principal causes of scrotal edema in adults are localized trauma, abnormalities of the circulation, localized radiotherapy and lymphadenectomy. Although the clinical significance of some of the abovementioned risk factors has not been definitively determined, scrotal edema as a consequence of localized radiotherapy is occasionally encountered in patients with malignant pelvic tumors. Snijders-Keilholz *et al* reported no increased rate of lymphedema following postoperative radiotherapy; data from that study demonstrated that lower limb edema was observed in 11% of irradiated patients vs. 10% in patients not receiving radiotherapy (14). Kim *et al* reported

an overall leg edema rate of 13% after a median follow-up of 100 months in 800 patients who received adjuvant radiotherapy between 1979 and 2000 (15). However, in the present case, we treated a male patient with radiation enteritis, who exhibited recurrent episodes of scrotal edema following radiotherapy. After thorough examinations, we concluded that this case may be due to clinically suspected lymphedema. In terms of pathogenesis, lymphedema is the result of the accumulation of protein-rich fluid in the soft tissues secondary to inadequate lymphatic drainage. The alterations in lymphatic drainage may result from pathological changes, namely radionecrosis and granulation of small lymphatic vessels, lymph nodes, and soft tissue surrounding the vessels (16). These changes develop long after radiotherapy, which results in the longer latency of lymphedema appearance.

Recently, a population-based retrospective cohort study of 32,465 men with localized prostate cancer has quantified the incidence of several postoperative complications following treatment with radiotherapy or radical prostatectomy. It was demonstrated that radiotherapy was associated with a higher rate of hospital admissions, rectal or anal procedures, open surgical procedures and secondary malignancies, and lower rates of minimally invasive urological procedures. Postoperative radiotherapy of echelon lymph nodes with clinical lymphedema of the drained extremities is a typical long-term sequel (17). In patients with prostate cancer treated by radiotherapy, lymphedema of the scrotum has been less extensively investigated. Due to minimal invasiveness compared with open surgery, immediate radiotherapy has

become possible shortly after surgery. Several articles have recently described the occurrence of scrotal edema in patients with prostate cancer as a result of radiotherapy (10-12), but did not provide a detailed description of the cases. The present case highlights the fact that radiation enteritis may present with massive scrotal edema. The clinical presentation of this case is striking, as edema was confined to the scrotum, with minimal swelling of the lower limbs and abdominal region. This striking physical finding is the consequence of lymphoedema possibly caused by pelvic radiation injury, which may lead to lymphatic obstruction.

In conclusion, scrotal edema is a rare complication of pelvic radiotherapy. Due to the serious damage of lymphatic vessels, edema may become persistent, with gradually increasing severity with each recurrent attack, significantly compromising the patient's quality of life. Clinical attention should be focused on possible primary prevention, with attention to detail regarding radiation dose and applied technique, minimizing the risk of toxicity during pelvic radiotherapy. Preventive strategies may include focusing the radiation beam onto the lesion, thus minimizing the volume of exposed surrounding tissues within the radiation field, as well as adjusting the radiation dose.

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