CASE REPORT

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Erythroderma Flare-Up Caused by Chemoradiation

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Abstract

Background: Exfoliative erythroderma is a rare dermatological condition characterized by widespread erythema and scaling. It may occur idiopathically or be triggered by pre-existing skin diseases, systemic conditions, or medications.

Case Representation: A 55-year-old female undergoing chemoradiation for rectal cancer developed a systemic flare-up of erythroderma during radiation therapy.

Management and outcome: The patient was treated with topical and systemic corticosteroids along with emollients and moisturizers. Her symptoms improved significantly and resolved within one month of diagnosis. Dexamethasone was initiated at a dose of 4 mg three times daily and subsequently tapered according to clinical response. Topical clobetasone was administered concurrently for local symptom management.

Conclusion: Radiation-associated erythroderma is an uncommon adverse event. Early recognition and a multidisciplinary approach involving dermatology, radiation oncology, and medical oncology are essential for effective management and favorable outcomes.

Keywords: Erythroderma • Chemoradiation • Rectal Cancer • Abscopal Effect • Radiation Therapy

Introduction

Erythroderma is an uncommon and potentially serious inflammatory skin disorder characterized by intense, widespread erythema and variable scaling (1,2). The erythematous rash results in increased skin blood flow, which causes temperature dysregulation, fluid loss, and hypoalbuminemia (3). Even though many cases of paraneoplastic dermatoses have been reported during radiation therapy, erythroderma flare-up is a rare presenting feature documented in the literature. The flare-up has serious side effects that can significantly affect overall survival as well as lower the patient's quality of life (4).

Case presentation

A 55-year-old female presented to the clinic with bleeding per rectum, constipation, and weight loss for the past 6 months. The biopsy revealed adenocarcinoma of the rectum, and she was staged as T3N1M0 after a complete workup. She was also a known case of erythroderma, for which the initial histology was non-specific, and she was managed conservatively based on the clinical diagnosis. Before the start of radiation therapy, the patient's skin was scaly, but there was no itching or erythema.

The patient was planned for treatment as per the standard guidelines for the management of carcinoma rectum, which

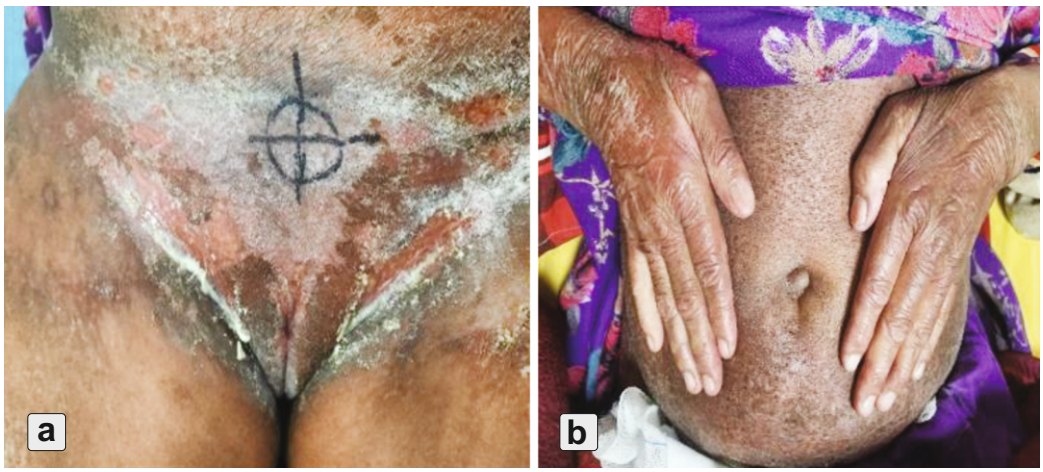

Figure 1a: Local flare-up observed during radiation therapy. **1b.** Systemic flare-up observed during radiation therapy.

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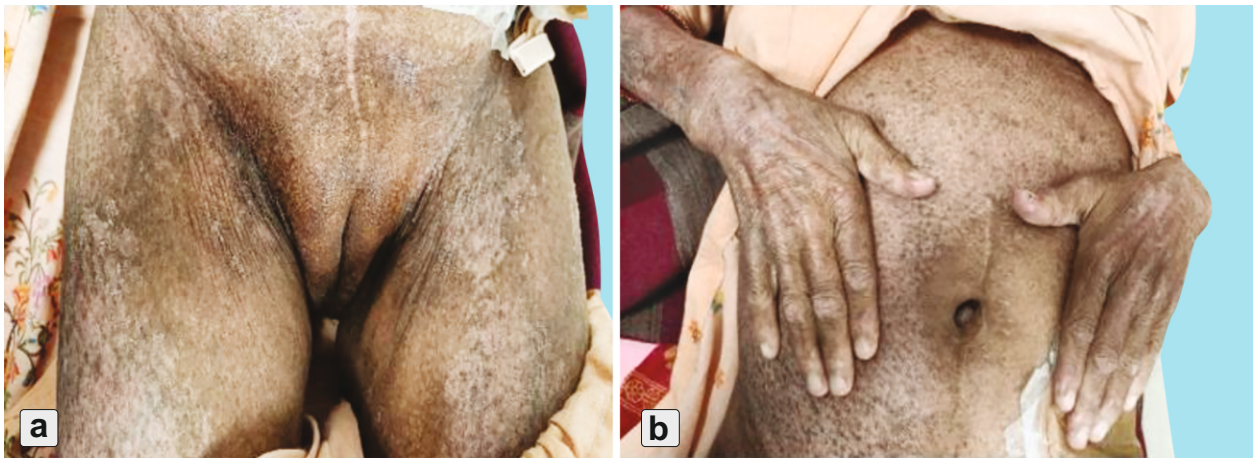

Figure 2a: Local area after 1 month of treatment, **2b.** Systemic response after 1 month

included long-course concurrent chemoradiation of 45 Gy in 25 fractions along with tablet capecitabine. However, at the time of diagnosis of rectal cancer and commencement of neoadjuvant chemoradiotherapy, the patient was not undergoing any specific treatment for erythroderma. She was examined weekly during radiation therapy (5). During the treatment, there was a local as well as systemic flare-up with symptoms of itching and redness of the skin after 20 fractions of radiation therapy (Figure 1a and 1b). The symptoms involved more than 90% of the body surface area and were concerning in terms of local disease control as well as the patient's quality of life. She was started on the management protocol for erythroderma alongside chemoradiation. Radiation therapy continued without any breaks, and the patient gradually improved. The itching reduced, the lesions started healing, and the redness also faded over time.

Investigations

The rash was found to be consistent with erythroderma. The patient had a baseline erythrocyte sedimentation rate (ESR) of 30 mm/hr; however, during the flare-up, the ESR increased to 70 mm/hr, with no evidence of infection. No other inflammatory markers were measured.

Differential diagnosis

In this case, erythroderma was diagnosed 10 years ago. An expert dermatologist examined skin lesions to assess the flare-up. Radiation dermatitis and infectious dermatitis were considered as the primary differential diagnoses.

Treatment

The patient was admitted and started on with cool saline water compressions, moisturisers, and systemic corticosteroid therapy was initiated with intravenous dexamethasone 4 mg administered three times daily, followed by gradual tapering of the dose. She was advised to wear loose-fitting, breathable clothing to reduce friction and irritation to the skin.

Outcome and follow-up

After completion of radiation therapy, the patient was reviewed after 1 month. The patient's dermatological symptoms had completely resolved (Figure 2a and 2b), and no itching was reported on follow-up. The patient completed treatment for carcinoma rectum without any delay.

Discussion

The immune-mediated responses that can occur in patients undergoing radiation therapy are known as the abscopal effect. This effect is a rare occurrence, observed in only a small percentage of cancer patients receiving radiation therapy. It is thought to result from radiation-induced activation of the immune system, which recognizes tumor-specific antigens released by the irradiated tumor and mounts an attack against both irradiated and non-irradiated tumors. This immune response is mediated by various immune cells, including T cells, natural killer cells, and dendritic cells.

After irradiation, dead and stressed cells release a variety of substances, giving ionizing radiation an immune-stimulating property. Radiation induces distinct forms of tumor cell death and, consequently, the release of pro-inflammatory cytokines, chemokines, tumor antigens, and other danger signals (6,7). Therefore, radiation has the potential to initiate an immune response (8), resulting in systemic effects inside and outside the irradiation field (9). Radiation therapy can also lead to changes in the tumor microenvironment, such as increased infiltration of immune cells and the release of immunogenic factors (10). Furthermore, radiation therapy can affect the function of immune cells such as T cells and natural killer cells, which are crucial for the immune response against tumors (11). Radiation therapy can increase the expression of immune checkpoint molecules such as programmed cell death protein 1 (PD-1) and cytotoxic T-lymphocyte-associated protein 4 (CTLA-4), which can inhibit T-cell function.

In this case report, the patient experienced a systemic flare-up involving more than 90% of the body surface area. Erythroderma is an uncommon but potentially serious inflammatory skin disorder characterized by intense, widespread erythema and variable scaling. The immune response plays a crucial role in the development of erythroderma (12). Inflammatory mediators produced by immune cells, such as cytokines and chemokines, can lead to the redness and inflammation seen in erythroderma. Additionally, activation of T cells and other immune cells can contribute to scaling and thickening of the skin (13).

Patient perspective

During the flare-up episode, the patient's attendant expressed concern about whether she would be able to complete the planned course of radiation therapy.

Learning points/Take home messages

1. Radiation therapy likely triggered a flare-up of erythroderma in a predisposed individual rather than being the direct cause of the condition. Importantly, radiation treatment is expected to contribute to local disease control.
2. Daily examination of the skin should be performed for early detection of erythroderma to prevent flare-ups.

3. The immune response may correlate with chemoradiation through the abscopal effect.

Ethical Approval

Ethical approval was not required for this case report in accordance with institutional policies. The study was conducted in compliance with the ethical standards of the institutional and/or national research committee and with the Declaration of Helsinki.

Patient Consent for Publication

Written informed consent was obtained from the patient for the publication of clinical details and any accompanying images. Efforts have been made to protect patient identity, and anonymity has been maintained wherever possible.

Conflict of Interest

The authors declare no conflict of interest.

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Author Contributions (CRediT Statement)

Patient Management: Karun Kamboj, Anil Gupta;
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Writing – Original Draft Preparation: Shwetima Chaudhary;
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Supervision: Karun Kamboj, Anil Gupta
All authors have read and approved the final version of the manuscript.

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Data sharing is not applicable to this article type (e.g., purely theoretical, review, commentary).

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