Prevention and Management of Radiation Dermatitis: Variation Based on Anatomic Target

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ABSTRACT

Radiation dermatitis (RD) is a universal adverse consequence of radiation therapy (RT) and is associated with a dramatic barrier dysfunction and inflammation. The management of RD depends upon the anatomic target: internal malignancy (IM) versus skin cancer (NMSC). For IM, it is critical to address RD for both morbidity and the ability to continue treatment. While multiple treatment options exist, barrier repair using a ceramide dominant triple lipid prescription formulation has been shown to have significant benefit. For NMSC, radiation dermatitis is a necessary side effect potentially increasing the effect of radiation therapy. Barrier repair should occur after treatment is completed.

BACKGROUND

RT is a cornerstone in the treatment of cancer and RD is both a significant concern in the treatment of IM and needed in the treatment of NMSC. RD can range from mild erythema to severe ulceration, with over 95% of patients treated for IM experiencing moderate to severe reactions often impairing patient quality of life and requiring modification or interruption of the treatment. While RD is a universal concern, its clinical management differs substantially depending on the anatomical target of the tumor being treated.

METHODS

A literature search was conducted using PubMed. Results were screened for relevance, and the search was further enhanced through citation tracking and author's clinical experience.

RESULTS & DISCUSSION

RD management strategies differ for IM vs. NMSC. For IM, where RD is a side effect of treatment, maintaining an intact skin barrier is a priority. Traditional management includes emollients, corticosteroids and antimicrobial agents, which in most cases fail to address the underlying barrier dysfunction that defines RD and may contribute to significant patient morbidity and delayed healing. Lipid-based formulations can play a critical role in restoring the epidermal barrier. A ceramide-dominant, triple lipid prescription formulation (Primus Pharmaceuticals, Inc., Scottsdale, Arizona) (EC) consisting of a specific combination of a ceramide, cholesterol, and fatty acids in a physiologic 3:1:1 ratio can be used to replicate native stratum corneum lipids.

RESULTS & DISCUSSION (CONT.)

EC relies on barrier restoration, anti-inflammatory effects, and moisturization to rebuild the "brick-and-mortar" lipid matrix. The lipids in EC form lamellar bodies in these cracks and slow the water loss, allowing the skin to heal. Additionally, conjugated linoleic acid (CLA) in EC modulates PPAR-γ pathways, reducing inflammation post-radiation.

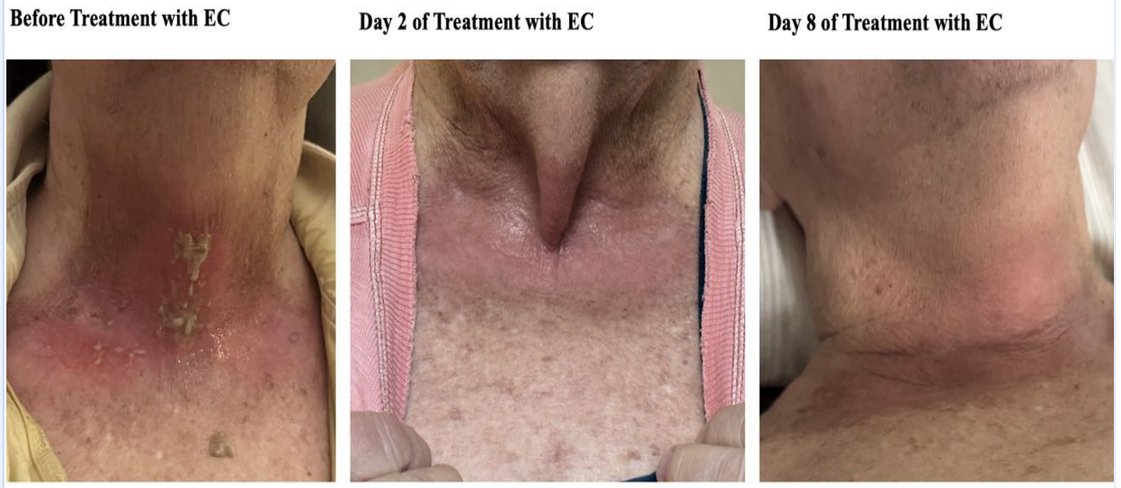

Figure 1: Treatment of RD with EC in a patient with throat cancer.

Figure 1 shows an 81-year-old with Stage 1 throat cancer receiving RT. Aquaphor was used prophylactically, however, the patient developed grade 4 RD with severe discomfort and sleep disturbances. The patient paused RT and started treatment with EC twice a day. He reported significant improvement in sleep and pain relief after one day of use and improved to grade 2 RD on day 1 and to grade 1 RD on day 5 of EC administration. On day 8, the patient maintained substantial resolution of RD and resumed RT.

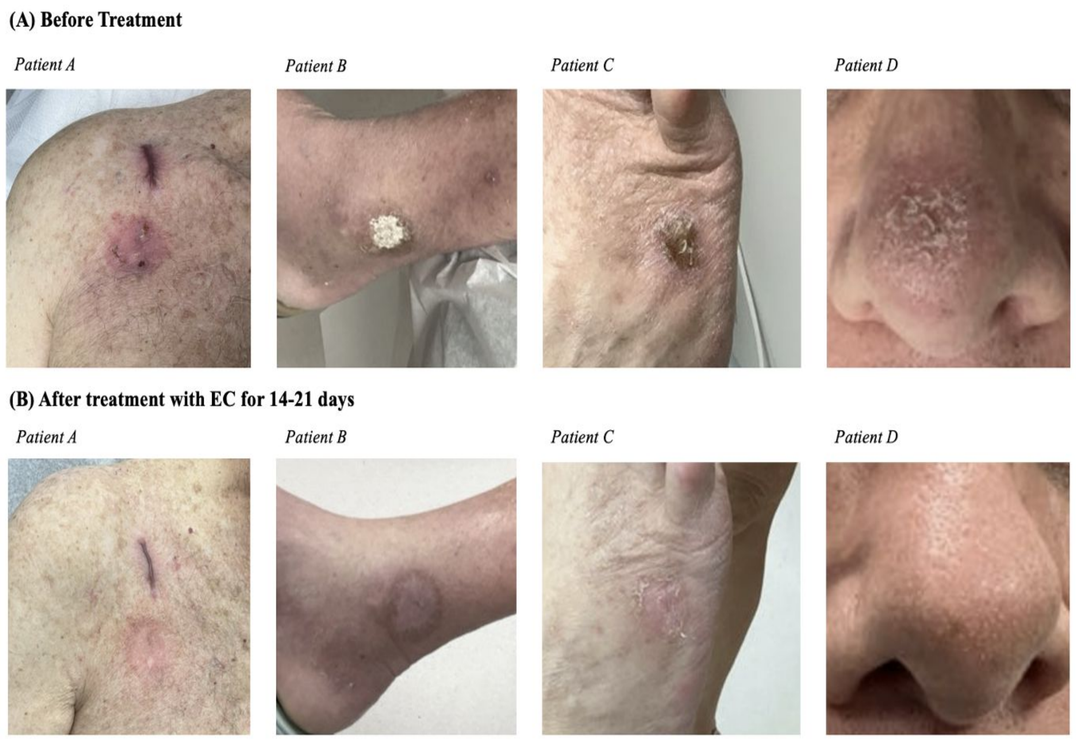

Figure 2: Treatment of RD with EC in patients with NMSC.

For NMSC intervention during RT must be carefully weighed to avoid interfering with therapy and often requires clinicians to limit interventions that could interfere with treatment efficacy.

RESULTS & DISCUSSION (CONT.)

RD is an expected consequence of treating NMSC, given that the skin itself is the target of therapy. Emerging evidence even suggests that radiation-induced inflammation plays a role in local tumor immune activation, aiding in the eradication of malignant keratinocytes. Therefore, low-grade RD is expected, and the management of RD must often be delayed until the NMSC has been treated, while trying to avoid the more severe Grades 3 and 4. Management of RD in NMSC must balance symptom relief with the need to avoid disrupting the therapeutic effects of radiation. Mild to moderate reactions (grades 1–2) are generally expected and accepted. The management often centers around continued supportive skin care, including gentle cleansing and the use of barrier ointments. Severe RD (grades 3–4) may necessitate interruption of RT. In such scenarios, wound care, including debridement, dressings, and systemic or topical antibiotics, may be required. After the treatment course, it is critical to re-establish the barrier function. EC is designed to mimic the skin's natural barrier and prevent transepidermal water loss and maintain skin hydration without impairing the efficacy of SRT.

Figure 2 shows examples of patients that developed RD during SRT for NMSC. The patients used EC twice a day for 14-21 days and had complete resolution of RD. The patients reported significant improvement in pain within a few days of using EC.

CONCLUSION

In conclusion, RD is a virtually universal side effect of RT and presents a clinical challenge in IM while being necessary in the treatment of NMSC. In IM, preserving skin barrier is essential to prevent morbidity and avoid treatment interruptions. In NMSC, RD is inevitable and acceptable, and interventions must be conservative or delayed to avoid undermining the therapeutic efficacy of RT. The use of EC has proven beneficial in the treatment of RD.

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