Potential Treatments for Radiation Dermatitis

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Abstract

Radiation therapy used alone or in combination with chemotherapy and/or surgery for the treatment of cancer can be extremely problematic and painful to the patient. The adverse effects of radiation therapy include dryness, itching, peeling, or blistering of the skin. There are numerous formulas and compounds that can be utilized to help patients with radiation burns. The compounding pharmacist, physician, and patient can work together to help increase the quality of life for a patient that is undergoing a treatment that can be very mentally and physically painful. This article discusses some of the agents used by compounding pharmacists to provide medicinal alternatives to cater to a cancer patient’s individualized needs.

Radiation therapy is a form of cancer treatment that uses high doses of radiation to kill cancer cells and stop them from spreading. Approximately 60% of patients with cancer require radiation therapy, whether it is alone or in combination with chemotherapy and/or surgery. While it is effective at killing cancer cells, it also affects the nearby healthy cells, thus leading to adverse effects such as dryness, itching, peeling, or blistering of the skin. Most of these side effects will subside within two months after radiation is finished but can be extremely problematic and painful to the patient.

Compounded Alternatives

Although remedies to soothe the skin are usually chosen based upon physician preference, the compounding pharmacist can provide numerous products to cater to their patient’s individualized needs. While clinical trials are lacking in evidence as to the efficacy of commonly used agents, there are proposed and logical reasons to believe that they are effective for some patients and certainly do no harm. These agents include, but are not limited to:
Lidocaine

Lidocaine is a topical anesthetic and is indicated for use in burn patients. Lidocaine is an ideal analgesic because it provides relief without any significant systemic side effects such as lethargy, respiratory depression, or abuse that opioid pain relievers can cause. In a study by Brofeldt et al, it was determined that there was a significant decrease in pain score with application of lidocaine cream. In addition, lidocaine has inherent antimicrobial properties that prove very useful to combat the increased susceptibility a burn patient has to infections. To prevent potential side effects and variable plasma levels, caution should be used when applying greater than 2 grams of lidocaine.

Urea and Aloe Vera

Dry skin care is considered by most to be mainstay therapy for radiation burns. Urea is a keratolytic agent with water-binding properties that softens hyperkeratotic areas by dissolving the extracellular matrix. It can increase the moisture of skin, which will promote cell proliferation and repair in the basal cell layers. Its success in dry skin treatment is most likely attributed to its water-binding properties. It is well known that aloe vera can be very soothing when applied to a burned area. While it seems logical that it would help with pain from radiation burns.
results from clinical trials are somewhat surprising. There is no hard evidence showing that aloe vera gel significantly reduced radiation-induced skin side effects. However, in one study, aloe vera was effective in reducing the incidence of moderate to severe erythema. Erythema is a redness of the skin as a result of hyperemia of the capillaries in the lower layers of the skin. It occurs with any skin injury, infection, or inflammation. It is believed that the moisturizing effects of aqueous cream alone reduced skin dryness and the associated cracking and scaling of radiation-treated skin more effectively or the same as aloe vera. Although the evidence from clinical trials is not in aloe vera’s favor, numerous amounts of commercially available burn creams still include it as one of the main ingredients. The addition of aloe vera to a water-based cream such as urea cream may provide additive skin-soothing properties and help calm the patient mentally, due to its widespread reputation for being effective in the treatment of burns.

**Corticosteroids**

Topical corticosteroids such as triamcinolone or hydrocortisone are among physician favorites for treatment of radiation burns. They decrease inflammation at the burn site by suppressing the migration of polymorphonuclear leukocytes and also reversing increased capillary permeability. Numerous studies have proven the efficacy of topical corticosteroids in decreasing the severity of inflammation caused by radiation burns. The addition of a topical steroid to an emollient cream is more effective than emollient cream itself in reducing radiation dermatitis. Regenecare is a commercially available product that contains aloe, collagen, and lidocaine. The addition of a corticosteroid gel/cream to this available product is very simple and quick for the compounding pharmacist, and the preparation can provide optimal pain control to the patient.

**Collagen**

Rapid healing of a radiation burn wound is essential to prevent secondary infections and to move forward with radiation therapy. Collagen has been shown to improve wound healing by delivering growth factors to the wound site. Growth factors such as platelet-derived growth factor (PDGF) and vascular endothelial growth factor (VEGF) were found to be increased in acute wounds, while decreased in nonhealing wounds. Therefore, it was proposed that growth factor substitution may help with wound healing. In a study by Jeschke and colleagues, collagen accelerated epidermal regeneration and locally increased growth factor concentrations in rats. It did not, however, increase neoangiogenesis or VEGF concentrations, which may be desirable since these feed tumor growth. It is not yet determined as to whether the other growth factors that collagen stimulate have any affect on tumor growth and, therefore, its use should be at the physician’s discretion, especially in a patient with skin cancer.

**Misoprostol**

Misoprostol is a synthetic prostaglandin E1 analog that replaces the protective prostaglandins consumed with prostaglandin-inhibiting therapies. It has been found to be an effective radioprotector in animal studies—it was shown to prevent oncogenic transformation of Syrian hamster embryos exposed to radiation in utero. Embryo-oncogene studies in humans is lacking, but as with aloe vera, it is used in many compounds for burn patients.

**Conclusion**

There are numerous formulas and compounds that can be utilized to help patients with radiation burns. The compounding pharmacist, physician, and patient can work together to help increase the quality of life for a patient that is undergoing a treatment that can be very mentally and physically painful. Although efficacy or evidence altogether may be
MISOPROSTOL RADIATION BURN MOUTH RINSE

For 100 mL

- Misoprostol: 2.4 mg
- Diphenhydramine hydrochloride: 100 mg
- Lidocaine hydrochloride: 1 g
- Glycerin: 5 mL
- Alcohol 95%: 6 mL
- Sorbitol 70% Solution: 12 mL
- Methycellulose 1500 cps: 1 g
- Sodium saccharin: 160 mg
- Citric acid: 40 mg
- Flavor of choice: q.s
- Preserved water: 0 mL

METHOD OF PREPARATION
1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Pulverize the misoprostol tablets to a very fine powder.
4. Add the diphenhydramine hydrochloride, lidocaine hydrochloride, sodium saccharin, and citric acid powders and mix well.
5. Add the glycerin and mix well to form a smooth paste; add the alcohol and sorbitol solution.
6. Incorporate the methycellulose powder slowly, followed by portions of the preserved water almost to volume.
7. Add the desired flavor, followed by additional preserved water to final volume and mix well.
8. Package and label.

STABILITY
Beyond-use date: 14 days when stored in a refrigerator

HYDROCORTISONE 3% TOPICAL GEL

For 100 mL

- Hydrocortisone, micronized: 3 g
- Propylene glycol: 1 mL
- Methocellulose 3% gel: q.s

METHOD OF PREPARATION
1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Mix the propylene glycol and hydrocortisone to form a smooth paste.
4. Incorporate the methocellulose gel geometrically to final volume.
5. Package and label.

STABILITY
Beyond-use date: 30 days

LIDOCAINE 2% IN ALOE VERA LOTION

For 100 mL

- Lidocaine hydrochloride: 2 g
- Aloe vera lotion: q.s

METHOD OF PREPARATION
1. Calculate the required quantity of each ingredient for the total amount to be prepared.
2. Weigh and/or measure each ingredient accurately.
3. Dissolve the lidocaine hydrochloride in the aloe vera lotion with mixing.
4. Package and label.

STABILITY
Beyond-use date: 30 days

References