Effect of Pelsan cream on skin epithelial revitalisation during radiotherapy after surgical procedures and chemotherapy

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Aim: Radiodermatitis or radiation induced skin reactions (RISR) occur in the majority of patients receiving ionizing radiation treatment. Typical effects are erythema (redness) and dryness of skin, burning, itching, fibrosis and ulceration. The impact and assessment of radiodermatitis include clinical effects and the subjective experiences of patients.

Method: A clinical study was conducted to evaluate the effect of a dedicated regenerative cream (Pelsan) in patients with breast cancer and head and neck tumors (HN cancer) who were undergoing radiotherapy after surgery and chemotherapy. 60 Patients received treatment with Pelsan cream prior to, during, and after radiotherapy. Clinical effects in/on these patients were compared to 60 patients exposed to the same radiation therapy regime using a skin cream or lotion they customarily use at home.

Results: A total of 120 patients were observed between February and May 2015. In the examination group, 4 patients with breast cancer and 3 HN can-

cer patients presented a G2 toxicity and 2 patients had a G3 skin reaction. In the control group 6 patients with breast cancer and 4 HN cancer patients presented a G2 toxicity. Radiation-induced skin reaction grade G3 developed in 3 patients.

Conclusion: The study confirms the protective role of Pelsan cream used in radiotherapy of breast and HN cancer. Topical treatment with this cream is effective as a preventative measure retarding the onset and the degree of damage (grade of radiodermatitis).

Key words: radiodermatitis, radiotherapy, breast cancer, HN cancer, radiation induced skin reactions (RISR)

Introduction

Radiation therapy after surgery is a standard and integral procedure for the treatment of malignant invasive breast tumors.

The radiation dose to be applied on the breast is initially limited by acute reactions, then followed by irreversible toxic radiation damage. Today, the radiation dose to be applied on a tumor or its seat is defined and determined by several prognostic factors such as: tumor size, histo-pathological report, histological tumor differentiation, degree of lymphovascular and perineural invasion, performance status, proliferation index (Ki-67 index), and hormonal and nodal status.

Complications during radiation therapy are in direct correlation with the applied (tumor) dose. During the application of high-energy photons and electrons, energy radiation from 4 MV and 6MV (megavolts), induces a reduced negative effect on the skin since the maximum dose absorbed is below the skin surface (At 4 MV photons, 1 cm below the skin surface; at 8

MV focal dose, 2 cm below the skin).

According to the RTOG classification (Radio Therapeutic Oncology Group), acute cutaneous complications during and after radiation treatment are classified into 4 stages:

Grade 0 No changes

Grade 1 Light and/or painless erythema, epilation, desquamation, dryness

Grade 2 Sensitive and /or intense erythema, desquamation, partial sweating, moderate edema

Grade 3 Desquamation, widespread sweating, marked edema

Grade 4 Ulceration, haemorrhage, necrosis

Pelsan. Pelsan is a skin regenerator cream designed to be used after exposure to ionizing radiation. In addition to its antibacterial effect, the cream has hydrating ability (creating a moist environment), thus enabling rapid recovery of damaged skin and restoration of normal structural and physiological characteristics. Pelsan cream does not contain metal ions and can be used regularly throughout radiotherapy treatment. Pelsan contains:

- Bisabol (the active ingredient of chamomile), prevents inflammation, soothes irritated and inflamed skin and provides an antibacterial effect.
- Jojoba oil, extracted from the Jojoba plant is excellent for skin hydration.
- Shea butter, obtained from the kernel of the African Shea tree, penetrates the epidermal layer of the skin. This helps to restore the elasticity of mature skin, prevents cell damage, stimulates cellular activity and revitalizes rough skin damaged by radiation.
- Willow extract with antibacterial effect.

Common complications. During radiation therapy of malignant tumors, the appearance of skin changes may be early or late and acute or chronic. Early or acute changes occur within 6 months after commencent of treatment, and late or chronic after 6 months.

Skin erythema on irradiated skin is the earliest change and occurs in the first week of radiation as a result of dermal capillary congestion. The skin becomes red, edematous, warm, and painfully sensitive.

Dry desquamation occurs as a result of a reduction in the germinative layer of the epidermis, because cells from this layer replace destroyed cells from a peeled layer. This phase is characterized by itching and peeling of large layers of epidermis. The intact epidermal cells increase in number and replace the destroyed epidermal cells in a period of three to four weeks.

Moist desquamation occurs if all the cells in the basal layer of the epidermis are destroyed after a period of 4 weeks, as in that time all squamous cells becomes desquamated and fall away from the skin surface. As there are no new cells, serum slowly passes from dermal capillaries on the surface. Necrosis or ulceration of the skin can also occur as complications of radiation therapy

Changes in skin pigmentation: Skin hyperpigmentation (resulting from increased melanin production in melanocytes) is the result of the ionizing effect and the activation of the enzyme tyrosinase, which converts tyrosine into melanin.

By splitting, melanin cells move to the upper skin layers, become darker and cause hyperpigmentation Suppression of the sebaceous glands caused by ionizing radiation results in a dryness of the skin. Dry skin and reduced fat on the skin surface leads to the development of fissures, infections and subsequent skin necrosis.

Epilation (hair loss) is a reversible process that occurs at the end of the second week of radiation therapy This is as a result of disruption of mitotic activity in the germ cells of hair follicles. Hair regrowth begins at the end of the second month and lasts until the end of the first

year.

Skin telangiectasia (local capillary dilatation) are late sequelae of radiation and result from endarteritis obliterans, due to the development of subendothelial fibrosis in epidermal capillaries.

Epidermal atrophic changes and dermal fibrotic changes are the late effects of radiation. The epidermis becomes thin and translucent. Acute inflammatory changes in the dermal tissue, followed by a reparative process, are transformed into mature connective tissue with marked hyalinization. This skin can be easily injured and wounds heal very slowly.

Research goal

Research goal is to determine the effect of Pelsan cream in the revitalization of the epithelium of the skin during radiation therapy in patients with malignant tumors of HN region, ie tumors of the base of the mouth, tongue, epipharyngeal and tumors in hypopharynx, larynx and thyroid gland and also breast cancer surgery and chemotherapy.

Materials and methods

The research was conducted in a prospective study that included a total of 60 patients with postoperative radiotherapy indicated by the local Oncological Commission, from mid-February 2015 until the end of May 2015. During the fractioned radiation treatment, Pelsan cream was applied to 60 patients (40 patients with breast cancer and 20 patients with tumors of ENT region). The study was performed on patients who had radiotherapy during a period of 15 to 33 working days. The youngest patient was a 37 year old and the oldest, an 82 year old.

The treatment was carried out daily by applying cream to the skin surface after radiotherapy fraction. The treatment was continued two weeks after radiotherapy treatment finished. The product is packaged in bottles with dispenser and is easy to use. Before the start of radiation

treatment, an oncologist had verbal contact with each patient, introducing the topical use of the cream, method of application, and included a patient after obtaining written consent.

This study excluded patients who had previous radiotherapy, connective tissue disease, ulceration and bleeding of the skin, inadequately healed surgical incisions, skin diseases such as, (eczema, psoriasis, erythema) and also patients who have diabetes. Fractionated radiotherapy was applied by linear accelerators with photon energies 6 and 15 MV flanked from radiation field in breast cancer and a number of 3D tumors of HN region. Radiation fields were verified before starting radiation therapy, after half of the planned treatment and at the end of treatment.

The following variables were observed: Radiodermatitis (grades1-4), redness, inflammatory reaction (itching, dry, flaked skin) and allergic reactions.

Results and discussion

Of the total number of patients included in the study (40 patients with breast cancer and 20 patients with tumors of ENT region), 5 patients with breast cancer and 4 patients with tumors of HN region reported a change in the form of radiation dermatitis was grade 2 (moderate erythema or beginning of moist desquamation) and at one patient was grade 3 (confluent moist desquamation at more than 1.5 cm of the skin). Other patients did not experience skin lesions (grade 0) or the observed changes were in the form of mild to moderate erythema without desquamation - Grade 1

In the examination group, 5 patients with breast cancer and 4 HN cancer patients presented a G2 toxicity. Radiation-induced skin reaction grade G3 developed in one patient. Other patients had G1 toxicity or were without any radiation induced skin reaction.

In the control group 11 patients with breast cancer and 8 HN cancer patients presented a G2 toxicity. Radiation-induced skin reaction grade G3 developed in 4 patients.

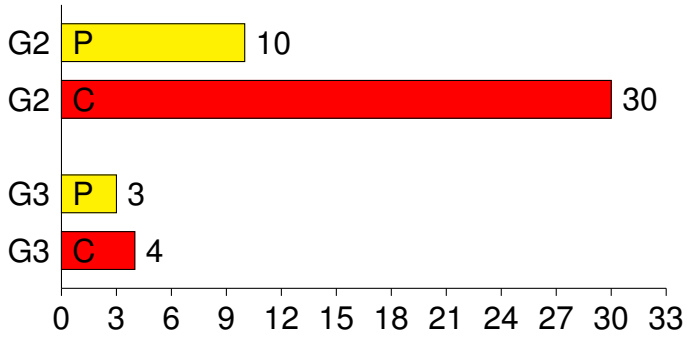

Figure 1: Patients in the control group (C), patients were more likely to present radiation-induced complications than patients in the examination group (P)

(a) Before radiotherapy (b) After 16 fractions (c) After 25 fractions

Figure 2: Without complication after radiotherapy with Pelsan cream

(a) Before radiotherapy (b) Halfway radiotherapy (c) End of radiotherapy

Figure 3: Without complication after radiotherapy with Pelsan cream

(a) After 4 fractions

(b) After 14 fractions

(c) After 10 fractions

(d) After 25 fractions

Figure 4: Radiation dermatitis Grade 2 and 3

(a) Beginning of radiotherapy

(b) End of radiotherapy

Figure 5: Radiation dermatitis

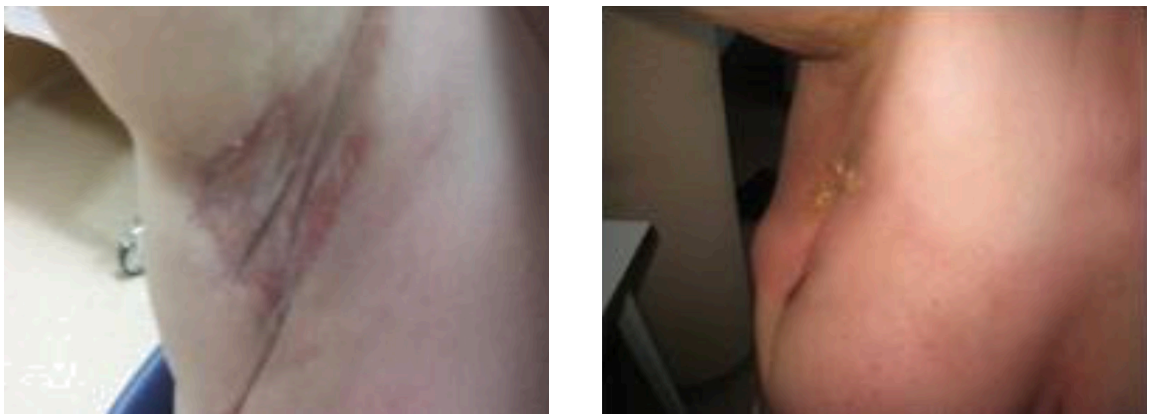

Figure 6: Cutis excoriation and vesiculae in axilar regia during 22 fraction radiotherapy for breast cancer.

Figure 7: Moist desquamation at the end of radiotherapy Tu in HN region (25 fractions + 10 boost fractions).

Figure 8: Moist desquamation during radiotherapy after 21 fractions.

(a) After 25 fractions. An other cream was used between sessions

(b) After 2 weeks use of Pelsan and boost RT 6 fractions

Figure 9: Radiation dermatitis

(a) Ulceration (b) Hyperpigmentation (c) Depilation

Figure 10: Complications during radiotherapy

Moist desquamation (Figure 6, 7 and 8) occurs if all the cells of the basal layer of the epidermis are destroyed, after a period of 4 weeks, because then all squamous cells become desquamated and fall from the skin surface. As no new cells are formed, serum passes from dermal capillaries to the skin surface.

Ulceration on the neck skin (Figure 10a) after 28 fractions without Pelsan cream therapy. Radiotherapy was terminated.

Skin hyperpigmentation (Figure 10b) due to increased melanin production in melanocytes induced by ionizing radiation after the complete radiation therapy (TD50Gy / 25 fr).

Epilation-hair loss (Figure 10c) is a process that appeared at the end of the third week of radiation as a result of disruption of mitotic activity in the germ cells of hair follicles. This process is reversible. Hair regeneration begins at the end of the second month and lasts until the end of the first year.

The results of the study with Pelsan cream showed that the application of this preparation during a fractioned radiation regime plays a significant role in the prevention of higher radiation dermatitis grades (G2, G3 and G4). Pelsan cream provides normal skin moisture, hydrates the skin, reduces inflammation and in a high percentage (about 85% of patients) reduces redness of the radiated regia. Since Pelsan does not contain pharmaceutical ingredients, toxicity of this product is not expected, there are no known interactions between Pelsan and other medications. Application of Pelsan cream is recommended during radiation therapy until at least two weeks after radiotherapy has ceased.

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