SIDE-EFFECTS OF RADIOTHERAPY

1. Introduction
2. Common side-effects
3. Skin reactions
4. Assessment of skin reactions
5. RTOG scale
6. General skin care recommendation
7. References
8. Partners

EBreast II

Author: Liis Randle
Tartu Univeristy Hospital

Radiotherapy, is a local treatment method for treating tumors with ionizing radiation.

Inevitably, it also affects healthy tissues and can cause various side-effects.

The most common side-effect of radiotherapy is a skin reaction - skin damage in the irradiated area.

This learning material provides knowledge of common side-effects during radiotherapy, recommendations for daily care, assessment and management of skin reactions.

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What are the common side-effects during radiotherapy?

Fatigue

Skin irritation

Breast edema

Radiotherapy may cause or increase the risk of:

Lymphedema

Implant based side-effects

EBreast II

Fatigue is the most common side-effect of breast cancer treatment.

Fatigue is reported by a substantial majority of patients during their initial treatment:

- surgery, radiation, and/or chemotherapy.

Fatigue in radiotherapy can last a few weeks or months.

Nutritional complications can cause fatigue: changes in body composition and nutritional deficiencies (2-3).

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How to manage fatigue?

- **Exercise:** begin with low intensity and duration of exercise and then to progress slowly and modify the exercise plan as conditions change.
- **Eating:** fruits and vegetables and whole grains. Getting enough protein, vitamins and minerals. Drinking enough water.
- **Medication:** no magic pill for the cure of fatigue. Patient needs to inform the Oncologist or General Practitioner (GP).
- **Daytime naps** no more than 30 minutes.
- **Having a routine and keeping a diary.**
- **Getting help** - patient needs to accept offers of help and goodwill from family and friends.
- **Support group** - information from nurse, RTT and/or Oncologist.

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Patients need do nice things for themselves and give permission to rest and recover, for as long as it takes (19).

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A skin reaction to radiotherapy is likely in most patients.

It will not happen straight away but tends to develop gradually throughout treatment, and usually starts to settle 2–4 weeks after treatment finishes.

Most common skin irritation can be itchiness, redness, peeling or blistering, similar to a sunburn (1,4).

ALLOWED TO RECOMMEND

NOT ALLOWED TO RECOMMEND

- Wearing loose-fitting cotton clothing in the radiation treatment area.
- Using creams and lotions (to avoid itchy skin) that are only recommended by an oncologist or treatment staff.
- Half an hour water treatments during the treatment period.
- Swimming in chlorine-containing pools (swimming pools), if there have not been occurred any skin reactions during radiation treatment. Afterwards rinsing the skin thoroughly (5).

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- Using deodorant (as they contain various particles that can irritate the irradiated skin), perfumes, make-up, powders or shaving products in the radiation treatment area.
- Shaving the treatment area. In case of a need: use an electric shaver and stop immediately if there is a signs of skin irritation.
- Put a patch (including pain patches) on the skin of the treatment area.
- Contact with very hot and cold temperatures (hot tubs, hot water bottles, heating pads, cooler bags).
- Scratching the itching skin.
- Sunbathing during and after treatment. In case of need cover the treatment area with loose-fitting clothes (5).

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Breast edema (swelling) is characterized by skin changes, hardness of the breast and pain, but can also be present without visible swelling.

The breast size can increase by more than one cup size.

Irradiation causes hardening of the fat tissue. Since a female breast contains lots of fat tissue, it is likely to undergo those changes post-radiation.

In many patients, breast edema is already present prior to radiotherapy:

- Breast-conserving surgery causes breast swelling, due to damage to the lymphatic system.
- It could be mistaken for typical post-operative complaints such as pain, swelling, tensed skin, etcetera, which aren't in fact directly associated with breast edema.

Treatment is not necessary in cases of mild breast symptoms and/or transient breast edema.

Treatment is necessary with persistent breast edema and/or patients in who the breast complaints are very pronounced and irritating (6).

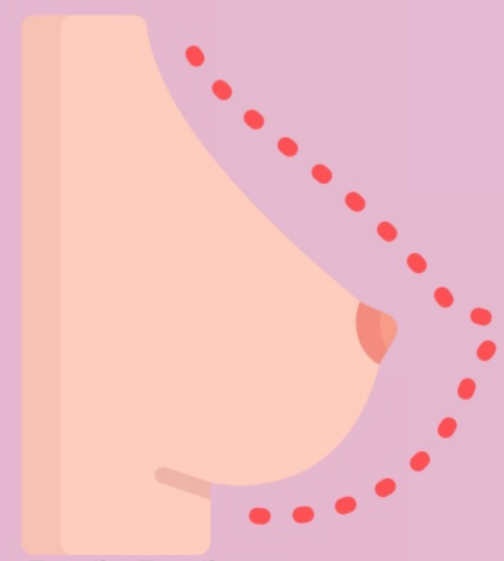
Patient from Tartu University Hospital

How to manage breast edema?

EBreast II

How to manage breast edema?

It is recommended to closely monitor those patients in whom breast edema symptoms do not decline within 6 months after termination of radiotherapy and provide them with the appropriate therapy.



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- Wash the skin daily with neutral soaps, dry the skin thoroughly with attention for the inframammary fold and to use low pH lotions and emollients.
- Maintain or achieve a healthy/normal BMI, protect the skin from sunburn and wear appropriate clothing and bra.
- Avoid trauma, disinfect and treat wounds immediately, avoid sauna visits and seek medical help in case of skin changes.
- Bandaging and/or compressions garments is used in order to decrease the lymphedema volume for which most commonly, short-stretch multilayer bandages are used.
- Exercise - as well aerobic exercise as resistance training (6).

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Radiotherapy may cause or increase the risk of:

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It is caused by interruption of the axillary lymphatic system by surgery or radiotherapy, which results in the accumulation of fluid in subcutaneous tissue in the arm, with decreased distensibility of tissue around the joints and increased weight of the extremity.

It is primarily diagnosed clinically by medical history and physical examination.

Prevention of getting lymphedema:

- Avoidance of trauma/injury.
- Prevention of infection.
- Avoidance of arm constriction.
- Use and exercise of the limb (2).

Patient from Tartu University Hospital

How to manage lymphedema?

The aim of treatment is to improve the flow of lymph fluid through the affected area.

Common nonpharmacologic treatment interventions:

- elevation, massage and exercise,
- application of external pressure with compression garments or compression pumps,
- complex physical therapy.

Less common therapies:

- surgical procedures,
- electrically stimulated lymphatic drainage (7-8).

More ways to manage...

- Using protective gloves for household work and gardening.
- Avoiding venipuncture, blood pressure measurement, and injections in the affected arm.
- Preventing infection with timely first aid.
- Immediately identifying and treating any sign of infection.
- Avoiding heat and excessive sun exposure.
- Avoiding constricting clothing on the affected extremity.
- Using the affected limb in moderation.
- Not carrying heavy objects.
- Avoiding repetitive motion (7-8).

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Breast reconstructive surgery with silicone implants is routinely one of the techniques performed immediately after a mastectomy and before adjuvant radiotherapy.

Despite its therapeutic advantages, post-mastectomy radiation therapy (PMRT) increases the risk of complications and often provides poor cosmesis in women with breast reconstructions.

Minor complication:

- grades I and II capsular contractures,
- seromas,
- potential infections treated with oral antibiotics,
- minor wound healing abnormalities,
- minor mastectomy flap necrosis that heal spontaneously.

Major complication:

- threatened implant exposure,
- wound dehiscence,
- loss of implant due to exposure,
- mastectomy skin loss,
- capsular contracture grades III and IV,
- hematoma, pain/tightness, injection port migration,
- deflation and infection leading to loss of implant (9-11).

Continue reading...

The complexity of integrating implant base-based immediate breast reconstruction (IB-IBR) and PMRT underscores the need for **close communication in multidisciplinary team to best prospectively coordinate and deliver patient-centered breast cancer care.**

Decision-making regarding the possibility of IB-IBR belongs to the surgeon and is based on the assessment of feasibility, the patient's characteristics and wishes, as well as the surgeon's skill and expertise.
However, to offer breast cancer patients best outcomes in terms of disease control, toxicity, cosmesis and quality of life after reconstruction – **surgeons and radiation oncologists need to develop "shared views" on risks and priorities for the particular patient.**

Thus, a radiation oncologist should always be present at the pre-surgery clinical meetings that plan breast reconstructions.

Patients must be well informed, not only regarding potential benefits of IB-IBR, but also on the possibility of an increased risk of complications in the PMRT setting (13).

EBreast II

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Skin reaction is one of the common reactions that occur in patients with breast cancer.

Reactions occur within 1–4 weeks of treatment and range from erythema to dry or wet desquamation; ulceration may occur in more severe cases. Skin toxicity may affect women for a long time post-treatment.

Whole prevention of the skin reactions seems unlikely, but there should be a constant drive to delay onset and minimize the severity of a reaction, to reduce discomfort and prevent further complications.

Radiobiologically, skin reactions tend to peak towards the end of the treatment course and are often at their worst in the first two weeks after treatment has completed.

Everyone respond differently to treatment.

Skin reactions severity may depend on the demographic or disease-related and treatment-related factors (4, 14-15).

Demographic and treatment related factors

Demographic or disease-related characteristics:

- age, ethnic origin, smoking, obesity, breast size, skin type;
- hormonal status;
- infection;
- related illnesses (e.g. diabetes, cardiovascular disease);
- poor compliance with skin care regimen;
- prior exposure to some chemotherapy agents (i.e doxorubicin "recall" reaction);
- skin folds;
- suitability for protective dressings.

Treatment-related characteristics:

- treatment technique, dose, volume, fractionation, beam energy, use of bolus, immobilisation devices;
- addition of systemic anti-cancer therapies (SACTs);
- irradiation area (e.g. areas containing skin folds, such as neck, breast and axilla) (4,16).

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Demographic and treatment related factors

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Use of RTOG (Radiation Therapy Oncology Group) scale or other validated scales is important for documentation of the visual component.

The patient's description of the symptoms experienced and how the reactions affect quality of life should always be a theme for health care providers.

It is important to note that visible skin toxicity is not always in line with the patient's experience.

Patients might react differently to "similar looking" reactions.
Be aware of risk factors, for example, treatment during summer and general condition (15).

Information and support

Further reading of clinical measaurements tools

EBreast II

Recommendation for clinical practice:

Practice must be evidence based and constantly updated in order to provide trustworthy and adequate information.

Be aware that recommendations might be followed “blindly.” Thus, it is important to explain the background for recommendations and outline alternatives if it does not work.

Information should be given both oral and written.

Information should be repeated and adjusted to the patient when skin reactions appear.

As reactions expect to increase after the treatment ends, some patients will have a great need for information and support in the weeks following radiotherapy.

Patients might benefit from having a primary radiation therapist (15).

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EBreast II

Overview of clinical measurement tools:

Please follow the link:
https://www.semanticscholar.org/paper/Putting-evidence-into-practice.-Feight-Baney/32fc1678adc064259f1e2d40d5d310d281f48f51/figure/1

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RTOG scale 1-4:

RTOG 1

RTOG 2

RTOG 2.5, 3

RTOG 4

RTOG 1

Assessment:

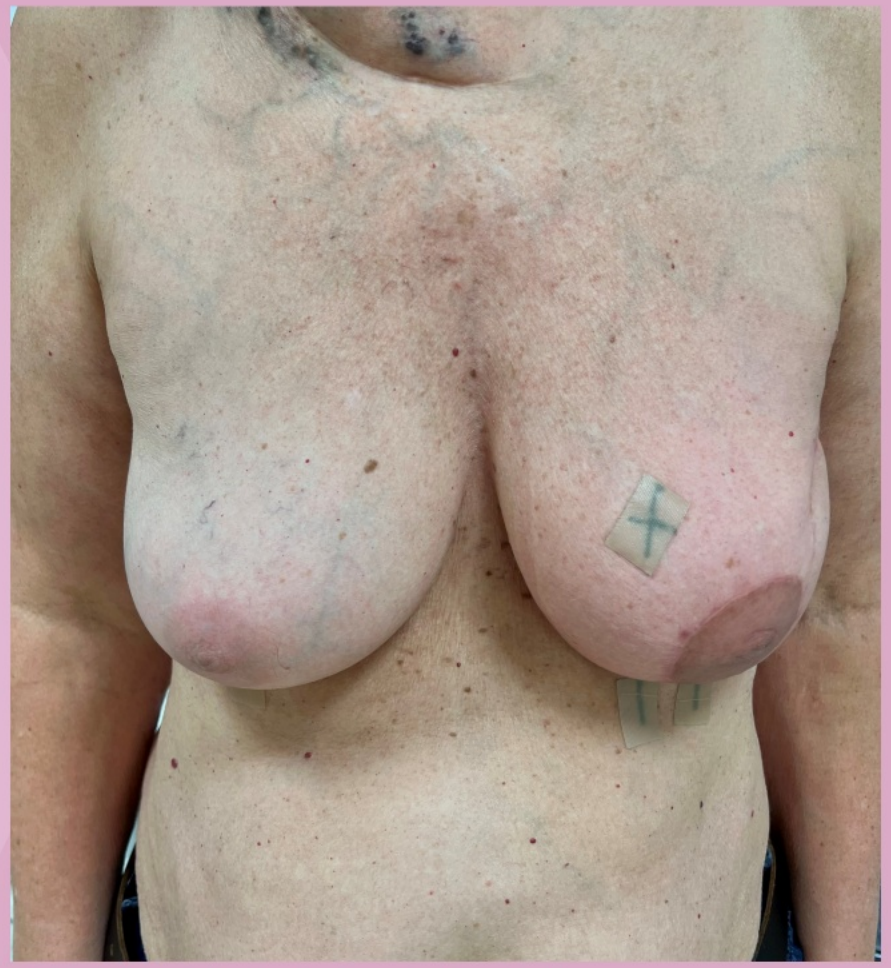
- Faint erythema.
- Dry desquamation and moderately sensitive.

Recommendation:

- If necessary, increase the frequency of using the water-based cream.
- 1% hydrocortisone cream (for itching) can also be used.
- Painkillers if needed.

Purpose:

- To promote hydrated skin, patient comfort and maintain skin integrity.
- To treat itchy skin.
- To reduce pain, soreness and discomfort (18).



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RTOG scale 1-4:

RTOG 1

RTOG 2

RTOG 2.5, 3

RTOG 4

RTOG 2

Assessment:

- Tender or bright erythema/dry desquamation.
- Sore, itchy and tight skin.

Recommendation:

- If necessary, increase the frequency of using the water-based cream.
- Mepitac silicone tape.
- Continue as for RTOG 1.

Purpose:

- As RTOG 1 (18).

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EBreast II

RTOG scale 1-4:

RTOG 1

RTOG 2

RTOG 2.5, 3

RTOG 4

RTOG 2.5

Assessment:

- Patchy moist desquamation.
- Yellow/pale green exudate.
- Soreness with oedema.

Recommendation:

- Continue using the water-based cream on healthy skin.
- Do not use hydrocortisone cream on broken skin.
- Cover broken skin with exudate with a suitable patch (Mepilex Border Lite, Mepitac Silicone Tape).
- Pain relief.

Purpose:

- To promote comfort.
- Reduce risk of complications of further trauma and infection.
- To reduce pain, soreness and discomfort (18).

RTOG 3

Assessment:

- Confluent moist desquamation.
- Yellow/pale green exudate.
- Soreness with oedema.

Recommendation:

- Continue as for RTOG 2.5.

Purpose:

- As RTOG 2.5 (18).

Patient from Tartu University Hospital

EBreast II

RTOG scale 1-4:

RTOG 1

RTOG 2

RTOG 2.5, 3

RTOG 4

RTOG 4

Assessment:

- Ulceration, bleeding, necrosis (rarely seen)

Recommendation:

- Consultation with a wound care specialist (18).

RTOG scale 1-4:

RTOG 1

RTOG 2

RTOG 2.5, 3

RTOG 4

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Patient should keep the skin clean.

The irradiation area should be washed daily gently with warm water and mild soap and rinsed thoroughly, tapping the skin dry with a soft dry towel.

Rubbing the skin mechanically with washing gloves, sponge and for example brush is strictly not recommended due the tenderness of the skin.

Using alcohol or alcohol-containing products on the skin of the irradiation area is prohibited (4).

General advice

EBreast II

The patient should inform the GP, oncologist or treatment staff if:

- body temperature is 38°C or higher;
- in case of chills;
- growing pain or discomfort;
- if a rash or blisters have occurred,
- erythema or oedema of the skin, moist desquamation and secretion has appeared;
- if any other problem or symptom causes concern (15).

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