

RADIATION THERAPY: A BREAST CANCER CASE STUDY

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RADIATION THERAPY

- Uses beams of high doses of energy (ionizing radiation) which damages DNA causing cell death.
- More than half of all cancer patients will receive radiation as part of their treatment plan.
- Used to treat a variety of tumor types.
- Used in all oncology settings
 - Curative
 - Adjuvant & Neoadjuvant
 - Palliative

IONIZING VERSUS NON-IONIZING

- Non-ionizing radiation - longer wave lengths and less energy, not enough to ionize or break chemical bonds in atoms/molecules. Examples of non-ionizing radiation are microwaves and radio waves and visible light.
- Ionizing radiation – has shorter wave lengths and has enough energy to ionize atoms and break chemical bonds damaging DNA. Examples of this is x-rays, gamma rays (both are used in radiation therapy).


TYPES OF RADIATION THERAPY

External Beam

- Photon radiation – Reaches the target organ by entering and exiting the body. Delivered by a machine called a linear accelerator.
- Proton radiation – Enters and deposits dose. No exit dose, therefore, there is more normal tissue spared. Delivered by a machine called a cyclotron.

Brachytherapy

- Also called “local” or “internal”
- Radioactive devices are delivered or implanted directly to tumor site or tumor bed.
- Allows for treatment of higher doses.
- Can be permanent or temporary. Permanent implants will lose radioactivity over time.

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- Radiation is a **LOCALIZED** treatment:
 - Not systemic like chemotherapy, immunotherapy or hormonal therapy.

RADIATION TOXICITY

Most side effects related to radiation therapy are specific to area being treated

ACUTE EFFECTS: occur during or immediately following a course of radiation therapy.

LATE EFFECTS: occur from 2 months to years following completion of treatment

TWO MOST COMMON TREATMENT SIDE EFFECTS

- Incidence of **RADIATION DERMATITIS** is 90 to 95%. It is **cumulative** and typically **worsens over the second half of the course**. It can be mild or severe. It may continue to worsen for up to 2 weeks following completion of radiation. Once it reaches its peak injury, the skin will begin to heal and usually this is a quick process.
- Radiation treatment related effects are site specific except for fatigue. Incidence of **FATIGUE** is 80 to 100%.

RADIATION DERMATITIS: SKIN REACTION FROM RADIATION THERAPY

Grade 1- Faint Erythema/dry desquamation

Grade 2 - Moderate or brisk erythema/patchy moist desquamation confined to the skin folds and creases. Moderate edema.

Grade 3 - Moist desquamation other than skin folds or creases. Bleeding with minor trauma.

Grade 4 - Skin necrosis or ulceration of full thickness dermis, spontaneous bleeding from the affected site, skin graft indicated, life threatening consequences.

- CTCAE 5.0

GRADE 1 RADIATION DERMATITIS



Grade 1- Faint
Erythema/dry
desquamation

GRADE 2 RADIATION DERMATITIS



Grade 2 - Moderate or brisk erythema/patchy moist desquamation confined to the skin folds and creases. Moderate edema.

GRADE 3 RADIATION DERMATITIS



Grade 3 - Moist desquamation other than skin folds or creases. Bleeding with minor trauma.

CASE STUDY

- Mrs. S is a 50-year-old patient who's receiving adjuvant radiation for locally advanced breast cancer to her right breast. She is premenopausal and will start Tamoxifen post radiation.
- Mrs. S has a BMI of 30 and a history of Type II Diabetes, GERD and asthma. She also has a history of smoking cigarettes.
- She is nearing the end of her 4th week of a 6 week course of radiation to her right breast.
- She asks to be seen one morning because the skin under her right breast is "stinging" and she is unable to wear her bra.

CASE STUDY – ASSESSMENT AND EVALUATION

- Upon assessment you note her right breast is erythematous in the lower half and there is an open area in the right inframammary fold that appears moist.
- It is very tender to touch and is in an area of friction, where her bra may be rubbing against it.

PRACTICE QUESTION

Upon assessment you note Mrs. S's right breast is erythematous below the nipple and there is an open area in the right inframammary fold that appears to be peeling and moist.

What Grade Radiation Dermatitis does Mrs. S. have?



GRADE 2

RISK FACTORS FOR RADIATION DERMATITIS

- Older age
- Malnutrition and obesity
- Chronic sun exposure
- Smoking history
- Comorbidities
 - Diabetes
 - Metabolic Syndrome

OTHER FACTORS THAT CONTRIBUTE TO RADIATION DERMATITIS:



Cumulative dose



Location of treatment field



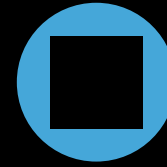
Fraction size and schedule



Larger treatment field



Duration of treatment



Techniques employed



Use of bolus material



PRACTICE
QUESTION

What are comorbidities that may contribute to the risk and severity of Mrs. S's radiation dermatitis?



Diabetes

Smoking

High BMI

SKIN CARE DURING RADIATION THERAPY

- Wash with a mild moisturizing soap and skin care with a general emollient cream.
- Antiperspirants/deodorants do not seem to cause harm and can decrease sweating.
- Topical steroids for pruritis
- Silver sulfadiazine for severe moist desquamation or any s/s infection.
- Zinc oxide for moist desquamation
- Loose comfortable clothing, reduce friction
- Wong (2013), ONS PEP

FATIGUE

- Cancer related fatigue: distressing, persistent, and subjective sense of tiredness, or exhaustion, that is not proportional to activity and interferes with usual function.
- 80% to 100% of patients with cancer experience fatigue.
 - ONS PEP

FATIGUE – GRADING

Fatigue	Grade 1: fatigue relieved by rest
Fatigue	Grade 2: fatigue not relieved by rest, limiting instrumental ADL
Fatigue	Grade 3: fatigue not relieved by rest, limiting self care ADL

CASE STUDY

Mrs. S also reports she is fatigued.

She continues to work part time in a sedentary job.

She goes to bed after dinner, but sleep is inconsistent.

She denies pain, anxiety, or depression. She is "just tired".

PRACTICE
QUESTION

What Grade is Mrs. S's fatigue?

GRADE 2



Grade 2



TREATMENT OF FATIGUE RECOMMENDED FOR PRACTICE

Exercise

Can be combinations of aerobic and
resistance

FATIGUE MANAGEMENT

Likely to be effective:

- Cognitive Behavioral Interventions/Approach for Sleep
- Energy Conservation and Activity Management
- Management of Concurrent Symptoms
- Massage/Aromatherapy Massage
- Mindfulness-Based Stress Reduction
- Yoga

Likely to be ineffective:

- Modafinil – stimulant

- ONS PEP

LATE TOXICITIES

SITE SPECIFIC

- Fibrosis
- Radiation pneumonitis (after treatment to the breast/chest)
- Bone fractures (rib fracture after treatment to breast/chest)
- Secondary cancers – very rare and usually many years later

IN SUMMARY- RADIATION

- Uses beams of high doses of energy (ionizing radiation) which damages DNA causing cell death.
- Used to treat all disease types for curative and palliative.
- Localized treatment – site specific
- External beam (photon and proton) and Internal (brachytherapy)
- Side effects (dermatitis and fatigue) usually resolve within a couple of months after treatment.
- Late side effects can occur but are rare.

QUESTION & ANSWER

- Please feel free to email with any questions while your studying.
- Good Luck!
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Thank
you