Skin Manifestations on Radiotherapy Patients in Dr. Moewardi General Hospital Surakarta

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Abstract: Radiotherapy is a common treatment modality for cancer and 50% of cancer patients receive radiotherapy as a preoperative, postoperative and palliative therapy. Radiotherapy treatments cause various reactions to the skin and cause pain, discomfort, irritation, itching, and burning sensations. Side effects that occur in the skin due to radiation is classified into two, namely acute radiation dermatitis and chronic radiation dermatitis. This study aimed to determine the skin manifestations which occur in radiotherapy patients in Dr. Moewardi General Hospital Surakarta. A retrospective descriptive was conducted in Dr. Moewardi General Hospital with the patient of radiotheraphy. The data were taken from medical record and direct observation. Thirty two patients were included in this study, 20 female patients and 12 male patients, with the age ranged from 32 to 78 years old. Nasopharyngeal cancer is the most patients radiotherapy. Of all 32 radiotherapy patients only 1 (3.2%) patient received radiotherapy dose 2.5 Gy per fraction, and 24 (75%) patiens had 66 Gy for total dose. According to the National Cancer Institute grade 1 acute radiation dermatitis occurred in our radiotherapy patient was erythematous patch with partial hyperpigmentation 48.3%.

1 INTRODUCTION

Radiotherapy is a common treatment modality for cancer and 50% of cancer patients receive radiotherapy as preoperative, postoperative and palliative therapy (Ali et al., 2014). Radiotherapy treatments cause various reactions to the skin and pain, discomfort, irritation, itching, and burning sensations. Skin-induced changes in radiation can result in disruption of daily activity and quality of life. Skin reactions to radiation largely depend on the technique, total dose, volume, and variety of therapy in each individual (McQuestion, 2011). Side effects that occur in the skin due to radiation is classified into two namely acute radiation dermatitis and chronic radiation dermatitis. Manifestations of acute radiation dermatitis include erythema, edema, burning, pruritus, pigmentation, desquamation, hair loss, loose nails, bullae, erosion and ulceration. While the manifestations of chronic radiation dermatitis consist of excessive wrinkling, skin atrophy, hyperpigmentation, permanent hair loss, dryness of the skin and keratosis (Ali et al., 2014).

1.1 Acute Radiation Dermatitis

Acute radiation dermatitis is one of the most common skin reactions caused by radiotherapy and often occurs within 90 days of exposure (Bray et al., 2016).The severity of skin reactions may occur from mild erythema, desquamation to ulceration. Erythema can be the first symptom that appears 24 hours after exposure. Erythema can subside within a few days. And generalized erythema can occur in the second week until the fourth week of therapy. Other skin changes such as dry skin, hair loss, and hyperpigmentation can also be seen (Hegedus et al., 2016). During the third week to the sixth week of treatment, if the cumulative radiation dose reaches 20 Gy, dry desquamation may occur. A more severe reaction of moist desquamation is seen when the total radiation dose on the skin is 40 Gy or more. The severity of the disease can be assessed on a scale of 1-4 according to the National Cancer Institute. First degree is dry desquamation along with widespread erythema.

Second degree appears rapid erythema or local slough. This reaction causes a moist desquamation confined to the skin fold after the cumulative

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radiation dose reaches 40 Gy or more. The presence of moist desquamation increases the risk of infection. Patients may experience increased pain due to exposure to nerve (Bray et al., 2016). Third degree occurs dermatitis with confluent desquamation. Fourth degree is characterized by ulceration, and necrosis (Hymes et al., 2006).

The classification of acute radiation dermatitis:
Grade 0 - None
Grade 1 - Faint erythema or dry desquamation
Grade 2 - Moderate to brisk erythema or patchy moist desquamation, mostly confined to skin fold and creases; moderate erythema
Grade 3 - Moist desquamation other than skin folds; pitting edema, bleeding from minor trauma and abrasion
Grade 4 - Skin necrosis or ulceration of full-thickness epidermis; may have spontaneous bleeding from affected area.

1.2 Chronic Radiation Dermatitis

The skin will look relatively normal for different durations of time after radiotherapy and chronic changes will not develop for months or years after receiving radiotherapy (Bray et al., 2016). Severe chronic skin reactions develop more than 90 days after radiotherapy is complete. These skin reactions include epidermal depletion, dermal atrophy, vascular damage, fibrosis that develops as a progressive induration with edema formation, and thickening of the dermis. Other effects which will occur later are depigmentation, telangiectasis, and dermal necrosis with ulceration occurring after radiotherapy (Hegedus et al., 2016). Chronic radiation dermatitis is a true late-stage reaction that develops months to years after exposure to radiotherapy (Bray et al., 2016).

To determine the degree of skin reaction due to exposure to radiotherapy requires thorough history about the length of radiotherapy recieved, the first appearance of skin reaction and then perform physical examination. The results are then compared with the National Cancer Institute classification for acute radiation dermatitis. Therefore we conducted this study to determine the skin manifestation in patient undergoing radiotherapy in Dr. Moewardi General Hospital Surakarta.

2 METHODS

This retrospective descriptive study was conducted in the Radiotherapy Division of Dr. Moewardi General Hospital Surakarta. All of the data were taken from skin examination and from medical record data. Data collected were sex, age, type of cancer, common exposed areas, and dermatological status.

3 RESULTS

Our study obtained 32 subjects, 20 females and 12 males. Most patients receiving radiotherapy started at the age of 46, this ranged from 46 to 65. Head and neck (62.5%) were the most common exposed sites, followed by mamae area (25%). The most cancer type in our study is nasopharyngeal cancer (40.6%). Erythematous patches with partial hyperpigmentation (48.3%) was the most common skin manifestation, while erythematous patches was less common (28.1%). Based on national cancer institute all of skin manifestation was grade 1 acute radiation dermatitis. Of all 32 radiotherapy patients only 1 (3.2%) patient received radiotherapy dose 2.5 Gy per fraction. The most widely accepted total dose of radiotherapy patients in Dr. Moewardi General Hospital was 66 Gy (Table 1)(Fig.1).

4 DISCUSSION

Intrinsic factors such as general skin condition, nutritional status, age, comorbid disease (diabetes mellitus and connective tissue disorders) and ethnicity all modulate the risk of acute skin reaction (Hegedus et al., 2016). Skin manifestation can affect both sexes though in our study they mostly affected female. According study by Mateusz Spalek in 2016 stated that female sex is still suspected as an independent predictor of severe skin reactions (Spalek, 2016). Skin reactions due to radiotherapy based on the age are related to skin healing ability, as they decrease with age. It is caused by aging, loss of collagen, and decreased capillary tissue. Based on radiotherapy exposure location, the head and neck area was found to be the largest area affected 62.5% so that it may cause increased skin reactions more frequently due to the area having thin epidermal layers on that area (Ali et al., 2014).

Table 1. The data of patiens receiving radiotherapy and their skin manifestation

	Total (n=32)	Percentage (%)
Gender		
Male	12	37.5
Female	20	62.5
Age (year)		
26-35	2	6.3
36-45	7	21.9
46-55	8	25.0
56-65	8	25.0
>65	7	21.9
Expose area		
Head and Neck	20	62.5
Breast	8	28.1
Abdomen	4	9.4
Type of cancer		
Breast cancer	8	25.0
Nasopharyngeal cancer	13	40.6
Larynx cancer	3	9.4
Lung cancer	2	6.3
Ear cancer	1	3.1
Palatum cancer	1	3.1
Hypopharynx cancer	1	3.1
Cervix cancer	3	9.4
Skin manisfestation		
Patch erythematous	9	28.1
Patch erythematous with partial hyperpigmentation	14	48.3
Patch hyperpigmentation with crust	2	6.3
No skin manifestation	7	21.9
Degree of acute radiation dermatitis		
First degree	32	100
Second degree	0	0
Third degree	0	0
Fourth degree	0	0
Fractional dose		
2 Gy	31	96.8
2,5 Gy	1	3.2
Total dose of radiation		
40 Gy	3	9.4
50 Gy	1	3.1
60 Gy	4	12.5
66 Gy	24	75.0

Study from Ahmad Ameri and Mona Malekzadeh, 2017 reported that radiation dermatitis is commonly seen in patients with breast cancer, head and neck cancer, lung cancer and sarcoma due to the superficial position of these cancer and higher radiation dose affect the skin (Ameri & Malekzadeh, 2017).

According to the National Cancer Institute grade 1 acute radiation dermatitis occurred in our radiotherapy patients was erythematous patch with partial hyperpigmentation. The severity of the skin manifestation is related to both intrinsic and extrinsic factors. Extrinsic factors include the total dosage of radiation, fractioned delivery schedules, volume of irradiated tissue and the radiosensitivity of the involved tissue (Bray et al., 2016).

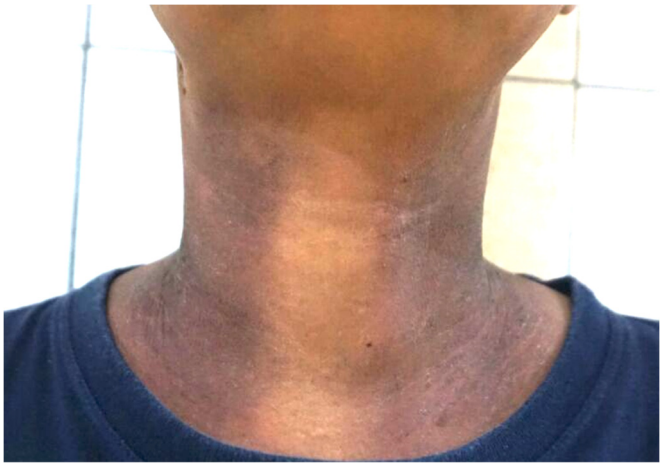

Figure. 1: First degree of acute radiation dermatitis

Among patients received radiotherapy in Dr. Moewardi General Hospital, only 1 (3.2%) patient had radiotherapy dose of 2,5 Gy per fraction and 24 (75%) patients with total dose of 66 Gy. Radiation doses of more than 2 Gy per fraction are linked with the development of more severe delayed skin reactions (Hegedus et al., 2016). The level of damage received equates directly to the amount of radiation exposure (Maddocks-Jennings,. et al., 2005). Based on the Fanni Hegedus study, Laju M, Matthew, and Robert Schwartz stated that a total of 40 Gy or more dose can cause severe skin manifestations such as moist desquamation. This is also supported by studies conducted by Fleta N. Bray, Brian J. Simmons, Aaron H. Wolfson, and Keyvan Nouri who also support it. This is evidenced in a study by Rodrigo Mosca et al in 2013 how the effect of total dose and dose fractional affects the appearance of skin manifestations in mice, whereas at 2 Gy fractional dosage has caused transient erythematous. However, in that study it was found that lower doses ranged from 1 - 43.5 Gy, 2 - 58 Gy, 3 - 72.5 Gy did not result in severe dermatitis reaction (Mosca et al., 2013). In acute radiation dermatitis does not require immediate treatment. The healing occurs about 28-40 days after the peeling and can recover within 3-6 months after exposure (Jaschke et al., 2017).

5 CONCLUSIONS

Based on our finding, it is necessary to have a thorough examination when we have cancer patient so that we can give better management for the skin problem.

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