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Factors Regulating Acute Radiodermatitis

A Prospective Study

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Abstract

Introduction: Radiodermatitis can cause a real discomfort for patients and can lead to the cessation of the treatment. The aim of our study was to identify different factors regulating acute radiodermatitis.

Material and Methods: From January 2016 to December 2017, We conducted a prospective trial with collaboration of dermatologist and radiotherapist of hassan II hospital in Fez.

Results: Radiodermatitis stage 1 were found in 20%. The predominent irradiated area in this stage was face and neck in 42% and breast in 27%.

Radiodermatitis stage 2 were seen in 40%. 41% in head and neck and 24% in the breast.

Radiodermatitis stage 3 were found in 23%. Radidermatitis STAGE 3 were seen only in 3 areas : perineal area (59%), face and neck (22%), breast (19%).

Radiodermatitis stage 4 in 17% seen only in 2 areas : perineal 72%, face and neck in 27%.

Conclusion: Radiodermatitis is one of the most common side effects experienced by patients undergoing radiotherapy. In our study the factors influencing radiodermatitis were age of the patient, sexe, obesity, smoking, perineal location, photoexposed areas, higher radiation doses.

Keywords: Acute radiodermatitis, regulating factors, Radiotherapy side effects.

Introduction

Radiotherapy is used to treat several types of cancer (breast, digestive, nasopharynx, prostat,....).It is described that more than half of these patient will develop radiodermatitis also known as radiation induced skin cancer or radiation injury of the subdermal fat. (1, 2, 3) These radiation dermatitis have been recognised since the beginning of the 20th century. (4, 5)

Radiodermatitis can cause a real discomfort for patients and can lead to the cessation of the treatment. (1, 5)

The need of treating and preventing this dermatitis had pushed many clinicians to explore the underlying factors and management of radiodermatitis. But despite this growing interest, much remains to be discovered.

Material and Methods

From January 2016 to December 2017, We conducted a prospective trial with collaboration of dermatologist and radiotherapist of hassan II hospital in Fez.

Every day, a dermatologist was available in the radiotherapy departement, to examine all the patient undergowing a radiotherpy treatment that day. Pictures were taken for all the patient at the first time and in each follow-up.

Inclusion criteria used are:

patients undergowing radiotherapy treatement.

Patients presenting dermatoses in patients on the areas of radiation.

The search strategy employed MeSH terms and keywords designed to optimize the identification of randomized trials, guidelines, and systematic reviews on radiation dermatitis for acute reactions.

Every day, a dermatologist was available in the radiotherapy departement, to examine all the patient undergowing a radiotherpy treatment that day. Pictures were taken for all the patient at the first time and in each follow-up.

We used the Radiation Therapy Oncology Group (RTOG) for the classification of acute dermatitis (3,6).

	RTOG
1	**No change from baseline/ no symptoms**
2	**Follicular, faint or dull erythema, epilation, dry desquamation, decreased sweating**
3	**Tender or bright erythema, patchy moist desquamation, moderate edema**
4	**Confluent moist desquamation other than skin folds, pitting edema**
5	**Ulceration, hemorrhage necrosis**
6	**Death related to treatment effects**

All Data was noted on excel, statisctical analysis was made using Epi info.

The trial protocol was approved by the Institutional Ethical Committee of the Hassan II University Hospital. Informed, written consent of all participants was taken prior to enrolment.

Results

The study was conducted since march 2016 until december 2017, 174 patients have been included. 125 females and 49 males developped a radiodermatitis in different stages. Patients were aged between 14 and 74 years with a mean age of 34,4. More than 60% of the patient had a body mass index > 30 and 37% were smokers.

70% were having a concomittant chemotherapy. 83 % case were irradiated on the neck and face (parotid, maxillary sinus, larynx,..), 30% were irradiated on the perineal area (uterine cervix, rectum, prostat,...), 55% were irradiated on the breast (breast cancer), 2 patients were irradiated on the extremities one on the elbow and the other on the thigh .

The staging of patients was done regarding the area of irradiation.

Radiodermatitis stage 1 were found in 20%. The predominent irradiated area in this stage was face and neck in 42% and breast in 27%.

Radiodermatitis stage 2 were seen in 40%. 41% in head and neck and 24% in the breast.

Radiodermatitis stage 3 were found in 23%. Radidermatitis STAGE 3 were seen only in 3 areas : perineal area (59%), face and neck (22%), breast (19%).

Radiodermatitis stage 4 in 17% seen only in 2 areas : perineal 72%, face and neck in 27%.

	FACE AND NECK	BREAST	prinee
GRADE 1	42%	27%	31%
GRADE 2	41%	24%	28%
GRADE 3	22%	19%	59%
GRADE 4	27%		72%

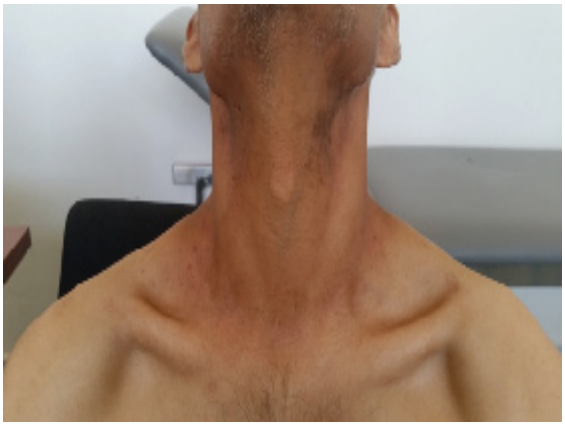

Fig. *rdd 1*

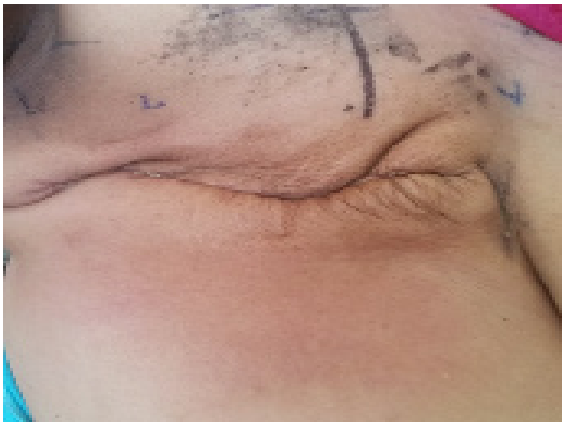

Fig. *rdd1.2*

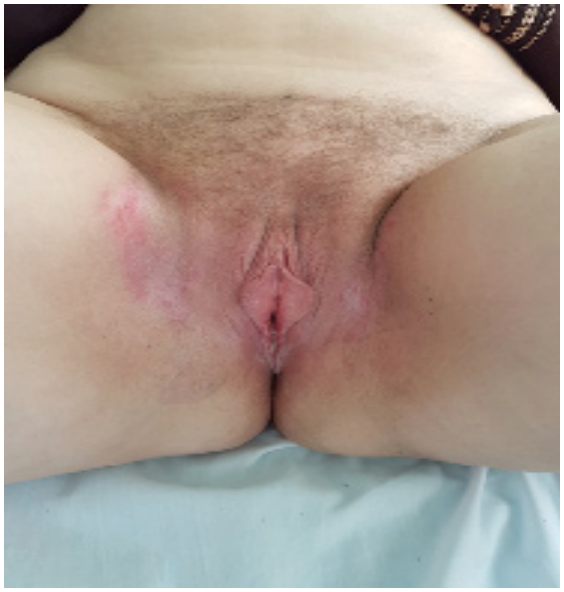

Fig. *rdd 2*

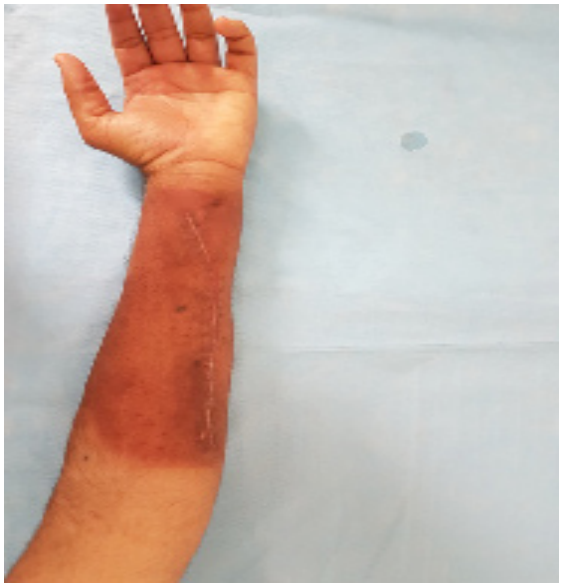

Fig. *rdd 2.2*

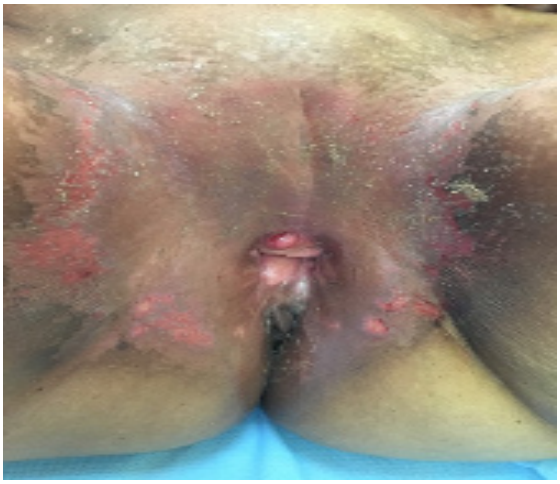

Fig. *rdd 3*

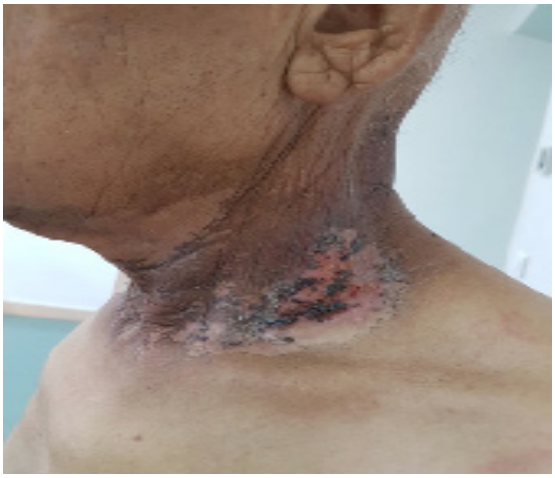

Fig. *rdd 3.2*

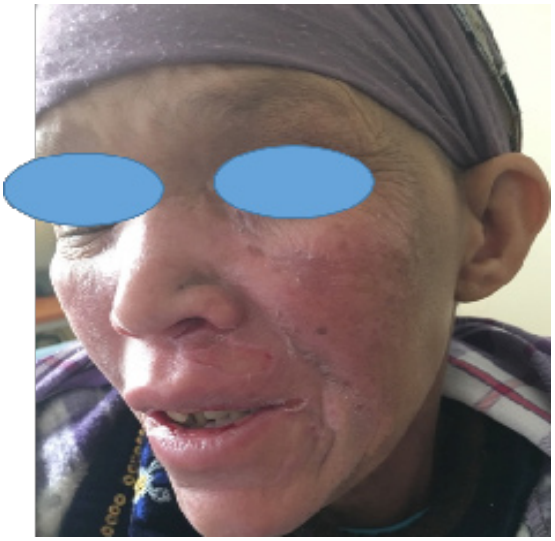

Fig. *rdd 4*

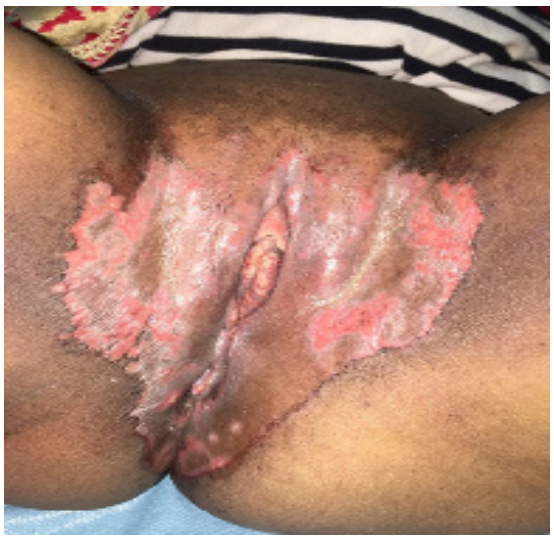

Fig. *rdd 4.2*

Discussion

Radiodermatitis is a usual side effect of ionizing radiation treatment. It can happen in different forms according to the grade : from mild erythema to more severe reactions of wet desquamation, ulceration and in some cases necrosis.(7)

A very large panel of factors have been reported to influence the severity of radiodermatitis in patients. Some factors are treatment related : number of treatment, doses, localisation. Some other factors are patient related. Such as age , which was found to be an increasing risk factor in many studies. (8). In our study, age was also found to be an increasing risk factor. Actually in elderly people, skin is thiner and subdermal fat is more reachable. Radiodermatitis was more frequent in female in many studies. (11) It was also confirmed in our study. Women have more subdermal fat than men. Obesity is also a very important factors reported. (8) In our study patient with BMI> 30 are more unluckily to develop radiodermatitis than others. It might be report to the predominent subdermal fat.

Smoking is another patient related factor. In our study, smokers developped more radiodermatitis than the rest. In this study smoking was identified as an independent risk factor for severe radiodermatitis. (9)

Severe radiodermatitis were predominantly seen in perineal area, it can be explained by the fact that in these areas there is a lot of liquids. Most studies are describing face and neck to be the most areas where severe radiodermatitis can be described. In our study, head and neck are in the second position to develop severe radiodermatitis. In this area, despite ionizing radiation, there is a UV radiation that can make the radiodermatitis more severe. (10)

As expected , a higher total Radiation dose (>40 Gy) was strongly associated with severe acute radiodermatitis. It was also reported by L.Sharp et al. (9)

In our study 70%, received chemotherapy, and all these patients developped radiodermatitis in different stages. So we couldn't really clear the impact of chemotherapy in developping radiodermatitis as reported by other studies. (9). The role of chemotherapy prior to RT as a risk factor for severe ARSR is unclear. There are indications that concurrent chemotherapy with anthracyclines increases the degree of ARSR significantly compared with CMF (11) but data for sequential treatment is missing. Also for taxanes, a high frequency of ARSR has been reported. (12) However, the data is limited to concurrent treatment and not based on randomized trials.

In summary, in our study the factors influencing radiodermatitis were age of the patient, sexe, obesity, smoking, perineal location, photoexposed areas, higher radiation doses.

Conclusion

Radiodermatitis is one of the most common side effects experienced by patients undergoing radiotherapy. Many factors can regulate the developpement of acute radiodermatitis. Recogniting these factors will allow as to make a strategy of prevention. Future research should be conducted in a more systematic manner and should strive for a more rigorous study design. These studies should incorporate current knowledge regarding the underlying pathophysiology of the condition and include objective and universal outcome measures. (1)

Acknowledgements

Authors' Contributions

All the authors contributed to: the interpretation of data for the work; drafting the work or revising it critically for important intellectual content; the final approval of the version to be published; and the agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethics Approval and Consent to Participate

The study has been approved by the ethics committee of Faculty of Medicine of Fez. An informed consent to participate in the study was obtained from the legal guardians.

Consent for Publication

Written informed consent was obtained from the patients' legal guardians for publication of this study and any accompanying images. A copy of the written consents is available for review by the Editor-in-Chief of this journal.

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