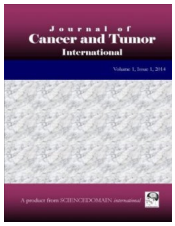

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Radiation - Induced Sarcoma: A Case Report

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Objective: Study the epidemiology, histology, time to onset, treatment and prognosis of radiation induced sarcomas.
Observation: We report a case of sarcomas occurring in irradiated area, in a patient treated by external radiotherapy for left orbit cancer
Discussion: Few series of induced radiation sarcoma of the cervical and facial region have been published these over the last twenty last years. Their prevalence is low; several factors are recognized in their carcinogenesis. Genetic predisposition; chemotherapy and radiotherapy.
Conclusion: Radiation therapy can induce cancer after a latency period of several years. The risk is low but increases proportionately a longer period of treatment. These radiation induced sarcomas have generally an unfavorable prognosis and their treatment is primarily with surgery.

Keywords: Sarcoma; radiotherapy; orbit cancer.

1. INTRODUCTION

Radiation therapy is a local-regional treatment of tumors, especially malignant (95%), performed by ionizing radiation; it is estimated to be used in about half of all cases of cancer, either with surgery and/or chemotherapy. Complications are sometimes observed and, the most serious is the

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radiation-induced sarcoma. Radiation-induced sarcomas occur in or on the edge of the radiation field and; the histology tends to be different from the initial lesion, occurring at least five years after the initial lesion (Criterion of Cahan et al. in 1948) [1]. These secondary cancers are generally higher grade and of poor prognosis [2]. Most publications on radiation-induced sarcomas have described tumors that occur after the treatment of breast cancer. The first case of parietal osteosarcoma after breast radiotherapy was described by Beck in 1922 [3]. Chauveinc L et al. described the cases of radiation induced leiomyosarcoma of the chest wall [4]. Important series have been published but the majority are cases reports, often with little detail. This makes difficult to assess the prevalence of this tumor. From a case of radiation-induced sarcoma in a patient treated for cancer of the left orbit at the National Institute of Oncology in Rabat Morocco in 1993 and a literature review we discuss epidemiology, histology, mean interval, treatment and prognosis of these secondary tumors.

2. PATIENT AND METHODS

2.1 Observation 1

In 1993, a patient of 32 years old, without personal or family antecedents, presented to use for a nodule of the lower left eyelid.

The clinical examination had objectified a bulky budding tumor of the left orbit. The lesion is extended on the cheek, the left temple and the eyeball was totally destroyed. Cervical palpation did not objectify adenopathy and the loco-regional assessment was normal. The biopsy revealed a pigmented basal cell carcinoma. A complete excision of the tumor was made and the resection limits were healthy. Anatomopathology revealed basal cell epithelioma. The patient received external radiotherapy with Cobalt 1.25 MeV in the total dose of 30Gy in 10 fractions and a complement with electrons of 10.5 MeV, to a total dose of 24Gy in 8 fractions for a total duration of 38 days. He stayed in good local and regional control until 1995. He presented with a recurrence of the left orbit extending to the cheek. The patient was reoperated with total resection. The anatomopathology revealed basal cell epithelioma. Then the patient was lost to follow-up from 1996 to 2010, returning at that point in time for a mass of the left cheek.

A facial and cervical tomodensitometry has identified a heterogeneous tumor process encompassing the entire left maxillary sinus of measuring 47 mm x 57 mm x 77 mm, with lysis of the anterior wall of the sinus and extension to its soft parts. Lysis of the floor of the orbit with intra orbital extension, invasion of the left nasal fossa resulting in nasal septum swelling, and congestion left frontal sinus. The biopsy was performed; and histopathology with immunohistochemistry has revealed leiomyosarcoma. At last visit the patient was refusing for surgery because of the extent of the lesions. Though he received an analgesic radiotherapy at the dose of 8 Gy in one session; we report the death of the patient two months after palliative radiotherapy.

3. DISCUSSION

Few series of radiation induced sarcoma of the cervical and facial region have been published over the last twenty years [5]. The improvement of efficacy of anti-cancer treatments has increased patient survival and in parallel the incidence of radiation induced sarcomas [5]. Their prevalence is low; 0.14 to 0.20% with a relative risk (RR) between 1 and 5 [5]. Several factors are recognized in carcinogenesis including. Genetic predisposition, chemotherapy, and radiotherapy.

3.1 Role of Genetic Predispositions

The frequency of radiation induced sarcoma is greater in patients with underlying genopathy, such as bilateral retinoblastoma, the peripheral Recklinghausen disease, ataxia telangiectasia, and Li-Fraumeni syndrome [6]. For patients with unilateral retinoblastoma, the risk of second cancer is not significantly increased after irradiation. On the other hand, for those with bilateral retinoblastoma, the risk of developing a sarcoma of the soft tissue is zero without irradiation and reached 880 after radiotherapy. The risk of bone sarcoma as for him is 270 without irradiation and 630 after irradiation [7].

3.2 Role of Radiotherapy and Chemotherapy

Treatments combining radiotherapy with chemotherapy increases the risk of a second cancer, such as leukemias [5]. The delivered dose also plays a role; for instance, the relative risk of developing soft tissue sarcoma at ten years from irradiation is 0.5 for doses less than 10 Gy, while it is 2.8 for doses greater than 10

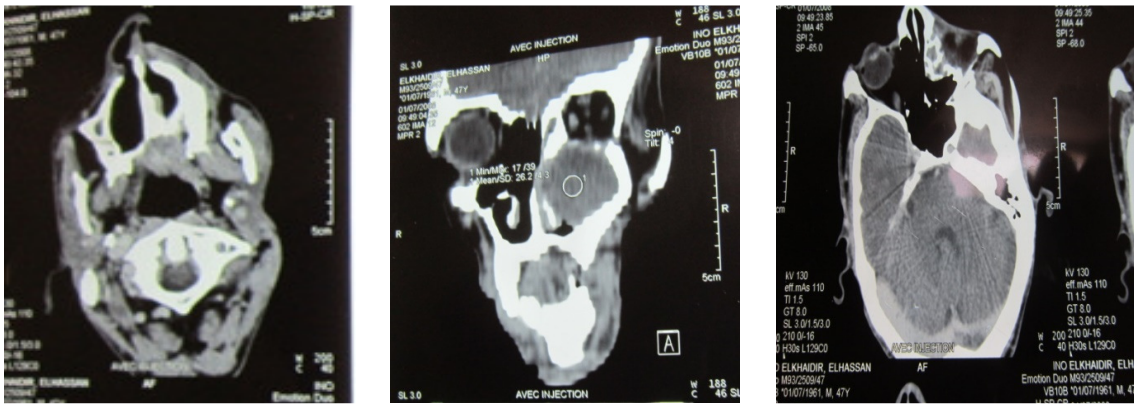

Fig. 1. Tomodensitometry showing heterogeneous tumor process encompassing the entire left maxillary sinus with lysis of the anterior wall of the sinus and extension to soft parts, lysis of the floor of the orbit with intraorbital extension

Gy [4]. Prescribed radiotherapy for cancers of the cervical and facial region is 60 to 75 Gy and the type of radiation could play a role. The use of neutrons could pose problems of secondary cancers. A study was conducted by MacDougall and al. of 620 patients treated with neutrons for different tumors between 1977 and 1984 [8]. During long-term follow-up, they observed three cases of sarcomas in the irradiated volume. It was a high-grade fibrosarcoma and two high-grade leiomyosarcomas respectively, six, 16 and 20 years after the initial treatment. The incidence was 111 times that of the normal population and, 15 times that of a comparable population treated by photons. Finally neutrons in place of photons would significantly increase the incidence [5].

3.3 Histological Type

All radiation-induced sarcomas should be proved histologically. In the majority of cases, they are not well differentiated, are high-grade, and most commonly occur as osteosarcomas followed by fibrosarcomas [9]. On the other hand, in a large series from the Institut Curie, the histological types were dominated by angiosarcomas in 48% of cases [9] and in a retrospective study of 67 patients among which 34 beforehand treated by radiotherapy for breast cancer, leiomyosarcoma was the most frequent histological type [10].

3.4 The Latency Period

Is the time between irradiation and the occurrence of radiation induced sarcoma, varies in the literature from 3 months to 50 years, with an average between 9 and 20 years. The minimum latency admitted to evoke the diagnosis of radiation-induced sarcoma is 3 years [5]. In our study, the latency period is 17 years.

3.5 Treatment

The curative treatment of this cancer is based wide-excision surgery. This surgery is often difficult to achieve, because of the location, size, and extension [5]. Chemotherapy has not shown encouraging results, though it can be used alone but with a low response rate [9]. Many combinaisons have been used such as CYVADIC (cyclophosphamide, vincristine, adriamycine, déticène) and, MAID (mesna, adriamycine, ifosfamide and deticène). Radiotherapy has not been studied extensively, and its place in treating this particular tumor is currently limited [11].

3.6 Prognosis

The prognosis of this condition is poor with an estimated five years survival in 36% of cases [9] and a mean survival estimate around 33.1 months [2]. Recurrences were observed in 77% of cases, and after a median interval of 12.8 months [12]. This poor prognosis is linked to the delay in diagnosistic delay according to Patel; et al; due to the proximity of the tumors to neurovascular structures, complicating their surgical, the limiting the use of adjuvant treatments as a resulting of their (toxic and inefficiency). Other factors include the biologically aggressive characteristics of the sarcoma, the state of immunosuppression induced by the primary tumor and its treatment, the size of the tumor, incomplete surgical resection and the presence of metastases [5].

The most predictive factor of recurrences remains the size of the sarcomatous tumor at the time of diagnosis [4]; the histological type does not seem to affect; neither the rate of recurrence, neither survival [5].

4. CONCLUSION

Radiation therapy can induce cancer after a latency period of several years. The risk is low but increases proportionately with the patient's log life long life. The radiation induced sarcomas generally have unfavorable prognosis and their treatment is primarily surgical requiring long-term monitoring of patients to enable early diagnosis and complete excision. The diagnosis is often late and therapeutic options are also reduced.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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