



**Radiation induced carcinosarcoma of the skin - a case report**

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**Abstract :**

Sarcoma developing within the field of the radiation (Radiation induced sarcoma - RIS) is a late effect of ionising radiation. Multi-agent treatment including chemotherapy and radiation are being increasingly included in the treatment of cancer. RIS is an uncommon tumour with an incidence of less than 1 for patients with cancer who are treated with radiation and survive 5 years<sup>1</sup>. Little doubt exists that the benefits of ionizing radiation far outweigh the potential risks of developing sarcomas. Due to paucity of experience and literature of this rare tumor, the optimal management is not standardized and the role of adjuvant radiation and chemotherapy is not defined. However local, regional and distant recurrences have been seen and treatment seems best judged by the clinical presentation. This case has been presented for its rarity and for being the first documented case of a carcinosarcoma arising in previously radiated skin.

**Keyword :** Radiation induced sarcoma, carcinosarcoma of skin

Background Sarcoma developing within the field of the radiation (Radiation induced sarcoma - RIS) is a late effect of ionising radiation. Multi-agent treatment including chemotherapy and radiation are being increasingly included in the treatment of cancer. RIS is an uncommon tumour with an incidence of less than 1% for patients with cancer who are treated with radiation and survive 5 years<sup>1</sup>. Little doubt exists that the benefits of ionizing radiation far outweigh the potential risks of developing sarcomas. In 1948 Cahan et al, described 11 cases of sarcomas arising from irradiated bones, and established 4 criteria for the development of RIS<sup>2</sup>.

1 Histological or radiological proof that there was no previous tumour in the involved bone

2 Development of sarcoma in an irradiated area

3 Latency period of at least 5 years or more  
Histological confirmation of the diagnosis. Orthovoltage radiation which was used largely prior to 1960 resulted in a higher dose being absorbed in the bone compared to the soft tissue and hence bone sarcomas occurred with a higher frequency<sup>3</sup>. With technological advances in radiation therapy this relation has changed and hence Cahan's criteria were revised by Murray et al. in 1999<sup>4</sup>.

4 Radiation must have been given previously and the RIS must have arisen in the area included in the 5% isodense line.

5 There must be no evidence that the sarcoma was present before the onset of irradiation.

There must be a latency period to differentiate a RIS from a second primary because no accurate molecular or pathological markers exist. Case report A 62 year old lady with history of Carcinoma Cervix stage IIIB( SCC – LCNK , grade 2 -3) , treated by 66 Gy EBRT using 4 – fields in Nov 1998 presented with complaints of a swelling in the upper aspect of the natal cleft of 3 months duration in October 2010. It was in the portal of radiation. She had presented after a latent period of 12 yrs. On clinical evaluation, she was in performance status 1, with no evidence of local or distant recurrence of cervical cancer. The swelling was 4 \* 3 cm with a nodular appearance on the skin over the sacral region. Inguinal nodes were not palpable. of



Fig 1. Clinical photograph of the RIS over the skin on the sacral region. PET – CT was done which showed a SUV of 15.9 in the lesion and there was no other area of metabolically active uptake.

Fig 2. MRI of the pelvis showing the RIS on the skin over the sacral region. She underwent wide excision with resection of distal sacrum (S4 and S5) and coccyx for deeper clearance. Reconstruction was done by bilateral gluteal advancement flaps. Her postoperative period was uneventful.



Fig 3. Post resection defect

Post-operative histopathology was reported as 5 \* 4 \* 3 cm lesion consistent with carcinosarcoma. All around margins were free varying from 1.5 to 4 cm. The epithelial component was in the form of nests, sheets and glands. Sarcomatous component was in the form of spindled cells with scanty cytoplasm. IHC was done to better delineate the sarcomatous ( vimentin positive ) and the carcinomatous ( keratin positive ) elements. She is on regular follow-up.



Fig 4. Reconstruction done by using local advancement flaps ( Bilateral gluteal flaps )

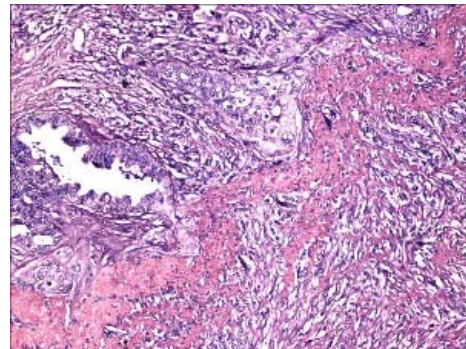


Fig 6. Microscopic appearance of the resected specimen (10 X )



Fig 5. Resected specimen

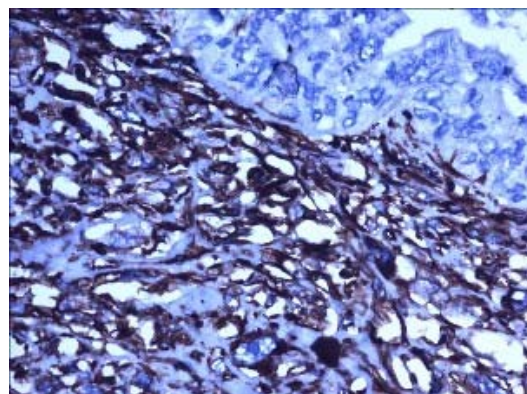
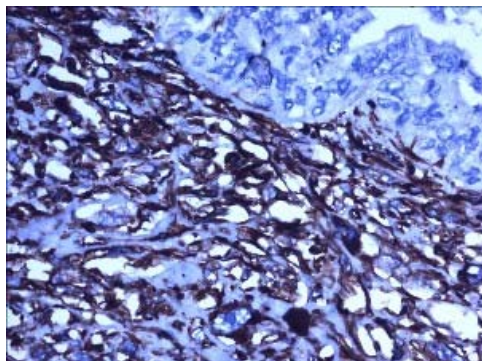




Fig 7. 40 X microscopic view of vimentin IHC study Fig 8. 40 X microscopic view of keratin IHC study



## DISCUSSION:

The overall incidence of RIS in patients who survive longer than 5 years following radiation therapy is about 0.1%<sup>1</sup>. In one large series; the incidence was reported to be 0.11% following orthovoltage radiation therapy and 0.09% following megavoltage radiation therapy.<sup>1</sup> In earlier published studies, many patients had received radiation therapy for benign bone and soft-tissue conditions. In contrast, other reports have shown larger numbers of patients who have received [radiation therapy for malignancies such as breast cancer, lymphoma, and Ewing sarcoma.](#)<sup>12,13</sup> In a large retrospective study from the Mayo Clinic spread over several years (1933-1992), benign bone conditions were found to be the single largest group of index lesions in patients with RIS, followed by genitourinary malignancies (especially cervical cancers).<sup>1</sup>

In a study of 130 patients with RIS of bone and soft tissue from the Mayo Clinic, osteosarcoma was the most common type, constituting 61.5% of all cases<sup>1</sup>. This was followed by fibrosarcoma (23.7%), malignant fibrous histiocytoma (MFH, 9.6%), chondrosarcoma (3.7%), and rare cases of angiosarcoma and Ewing sarcoma. No difference in histologic type

of RIS was demonstrated between the orthovoltage and megavoltage groups.

Bjerkehagen et al studied the prevalence and outcome of radiation-induced sarcomas (RIS) in 90 sarcoma patients. RIS represented 3% of the sarcomas; median latency time from radiotherapy of the primary tumor to diagnosis of RIS was 13.6 years (range, 2.5-57.8 years). Gynecologic, breast, and testicular cancers were the most common primary diagnoses. For the RISs, 13 histologic types were identified, including 25 malignant fibrous histiocytomas (28% of all cases) and 22 osteosarcomas (24% of all cases). The sarcoma-related 5-year crude survival was 33%, and unfavorable prognostic factors were metastases at presentation, incomplete surgery, and presence of tumor necrosis. Complete surgical resection is mandatory for cure<sup>11</sup>.

In 1865, Virchow named the rare malignant tumour of squamous cell and sarcomatous cell types "carcinosarcoma". It has also been called pseudosarcoma, spindle cell carcinoma and sarcomatoid carcinoma. This mixed tumour has been found in the cancers of the uterus, vagina, lungs, oral cavity, larynx, thyroid, urinary tract and oesophagus. It is a biphasic tumor composed of intimately admixed epithelial and mesenchymal elements, both of which are malignant<sup>5</sup>. Two main theories exist on the origin of carcinomatosis<sup>5</sup>.

1. Metaplastic theory which is the more accepted one. It postulates that there is a common ancestor cell, and through metaplasia of the original squamous cell carcinoma the sarcomatous component arises. A transitional zone emerges when the two components intermingle.

2 Collision theory states that both the components arise from different individual stem cells. Primary cutaneous involvement by carcinosarcoma is extremely rare<sup>6</sup>. To date about 38 cases have been reported in literature<sup>7</sup>. Most cases have no predisposing factor. To our knowledge, this has been the first reported case of a carcinosarcoma arising in irradiated skin.

The carcinomatous elements can be either of skin epidermal origin or glandular origin from the skin appendages<sup>7</sup>. Due to rarity of such cases the clinical courses of these lesions have not been well defined. Some have thought that in contrast to carcinosarcomas arising from other sites, those arising in skin have a relatively better outlook<sup>8</sup>. However, there are contradictory reports attesting to the aggressive behaviour of these tumors<sup>7</sup>. An interesting observation has been that the clinical course is dictated by the epithelial component of the tumor and this has led to the suggestion of addressing the regional nodal basin by surgery<sup>9</sup>. Based on analysis of the reported cases, a high risk group has been identified for these tumors. Age less than 65 years, recent growth, long-standing skin tumor, and tumor size greater than 2 cm significantly correlated with poor outcome<sup>7</sup>. Due to paucity of experience and literature of this rare tumor, the optimal management is not standardized and the role of adjuvant radiation and chemotherapy is not defined. However local, regional and distant recurrences have been seen and treatment seems best judged by the clinical presentation.

This case has been presented for its rarity and for being the first documented case of a carcinosarcoma arising in previously radiated skin.

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