

## Radiation Induced Angiosarcoma of the Breast: A Case Report

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### Abstract

### Case Report

The incidence of women who receive radiotherapy after breast conserving surgery due to breast cancer is increasing and these patients have a longer life as a cure. Radiation treatment may cause second primary cancer within radiation field areas. Angiosarcoma is the secondary most common cancer in the field of radiotherapy after breast radiotherapy. Radiation-induced angiosarcoma (RIAS) of the breast is a rare, poor prognosis disease and usually occurs as non-specific skin lesions within the radiotherapy field. RIAS, known as radiation-induced cancer, occurs approximately 7 years after radiation therapy and diagnosis of this disease is made by skin biopsy. This review aims to report a case of RIAS developed within irradiated field of breast cancer after radiotherapy 6.5 years later.

**Keywords:** Breast cancer, radiotherapy, radiation-induced angiosarcoma.

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## INTRODUCTION

Breast conservation surgery, followed by adjuvant irradiation of breast has been used as a standard treatment for breast cancer (Barthelink H *et al.*, 2007). Breast cancer has become a survivable disease with a large population of long-term survivors. Therefore, the incidence of radiation-induced secondary cancer in the World rises. Angiosarcoma (AS) arising in the irradiated breast after breast-conserving therapy is being reported in the literature with increasing frequency (Huang J *et al.*, 2001). The prognosis for patients with radiation-induced angiosarcoma of the breast (RIAS) remains poor, with 5-year overall survival rates ranging from 27 to 48% (Steth G *et al.*, 2012). For RIAS treatment, in the form of wide excision or mastectomy, is a main stay of management in localized disease.

In our study, here we report a case of radiotherapy-induced secondary angiosarcoma after treatment of breast cancer patient at our institution.

## CASE PRESENTATION

Our patient is a 54-year-old female with a past medical history of T2N1M0 (2011, stage IIB, grade 3), ER positive, PR positive, HER2/NEU negative, infiltrating ductal carcinoma of a right breast cancer

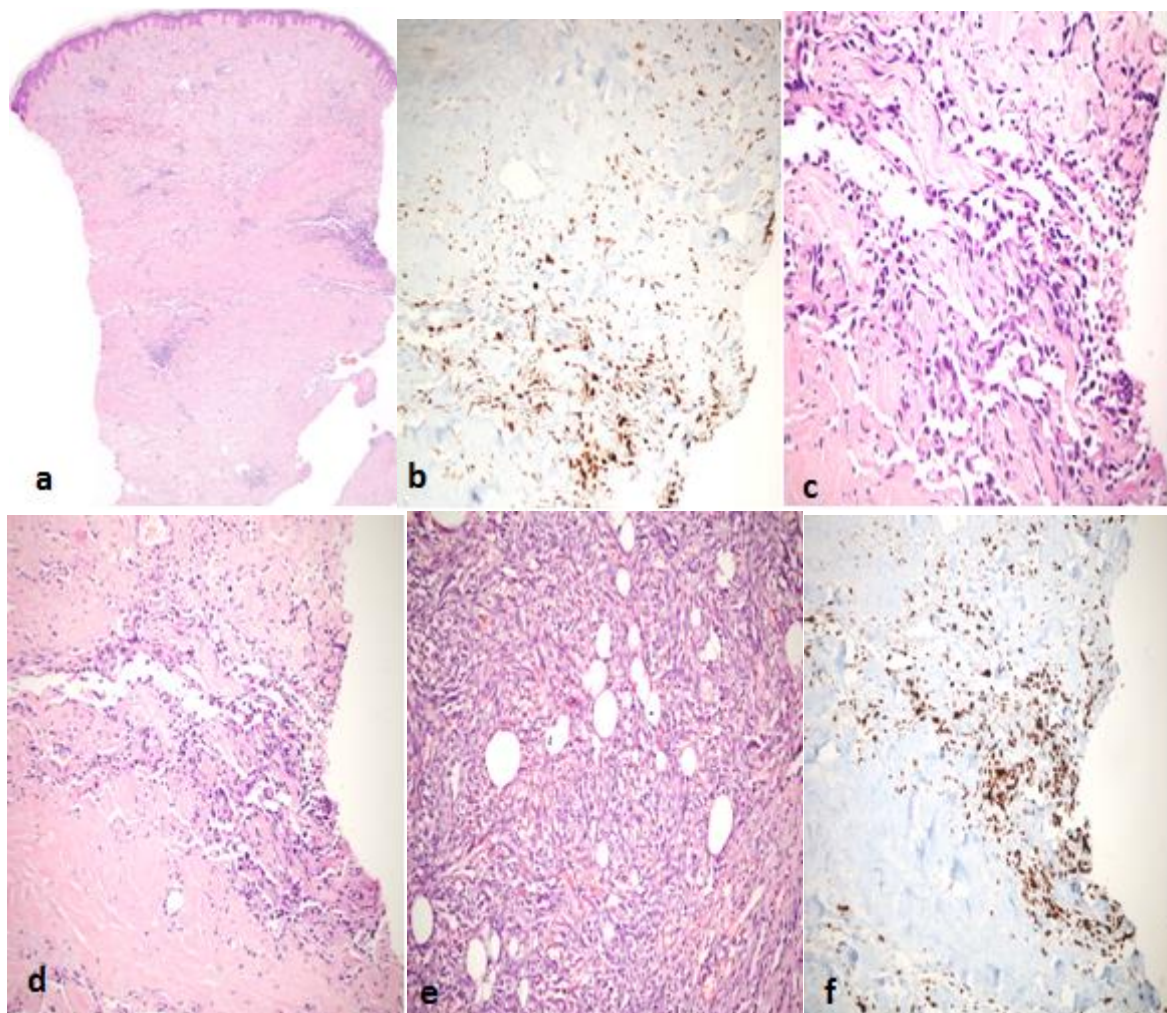
patient. Following surgical therapy (lumpectomy and axillary dissection), she received doxorubicin and cyclophosphamide followed by paclitaxel. In addition, she received whole breast+supra+axilla level 1-2-3 radiotherapy (50Gy) + boost treatment (10Gy) and hormonal treatment (anastrozole) for 5 years.

She remained well, and under regular clinical follow-up. Regular follow-up visits were performed with annual bilateral mammography and breast ultrasound. In October 2018, a big, purple skin lesion of 5cm in diameter was noted in the inner-upper quadrant of the right breast (Figure-1).

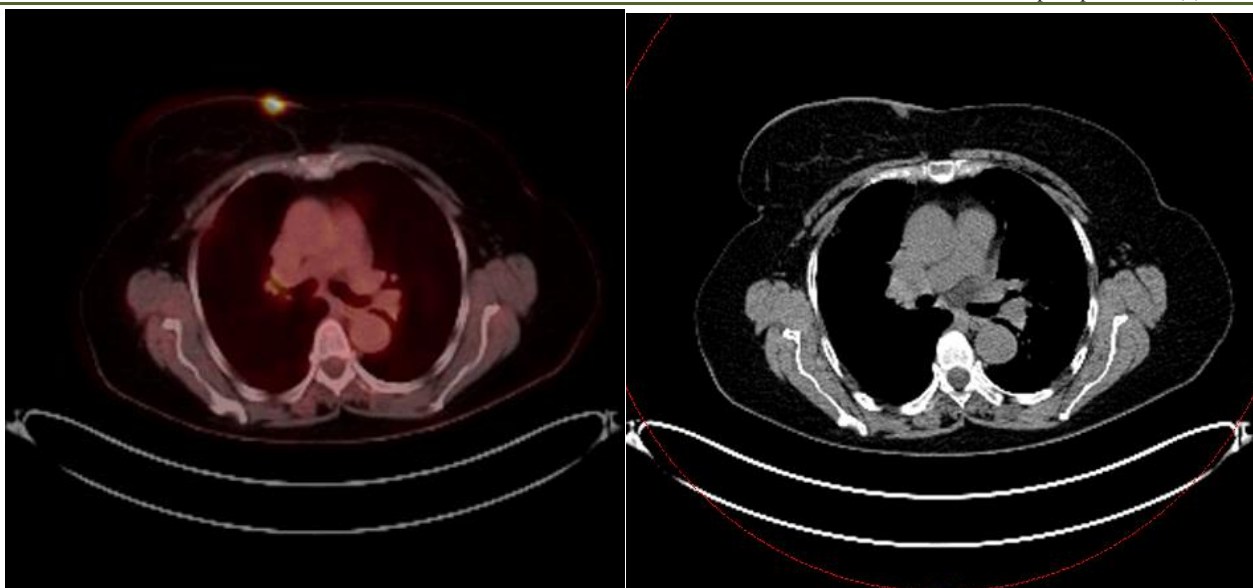
RIAS was diagnosed by punch biopsy. The histology revealed that deep dermis was occupied by a tumor which was composed of irregular dissecting vascular channels (Figure-2). In immunohistochemical study, tumoral cells were positive for CD31 and c-myc, whereas negative for HHV-8. Ki67 proliferation index was high (%40). These findings supported RIAS. She underwent a magnetic-resonance imaging (MRI) of both breasts which revealed a 60x40 mm enhancing lesion with skin and infiltration in to breast tissue. She also underwent a staging 18-Fluorodeoxyglucose Positron Emission Tomography (F-18 FDG PET/CT) suggesting no evidence of metastatic spread (Figure-3).



**Figure-1: Skin lesions in patient**



**Figure-2: (a) There is very extensive vascular proliferation. (b) Complex growth pattern of vascular channels with dissection of dermal collagen bundles (c) Endothelial tumor cells contain enlarged and hyperchromatic nuclei. (d) Subcutaneous fat tissue is infiltrated by spindle shaped neoplastic cells. (e) Tumoral cells are positive for c-myc immunohistochemistry. (f) Ki-67 proliferation index is high.**



**Figure-3: Fusion axial F-18 FDG PET-CT image and CT image with skin lesion of increased FDG uptake in upper-lower quadrant of right breast in radiation field area.**

The patient's case was discussed at the local MDT (multidisciplinary team). The patient proceeded to have a radical mastectomy with plastic reconstruction with a pedicled flap. Histology of the mastectomy specimen showed a tumor within the located dermis and invading superficial tissue. A number of mitoses per 10 high powerfield 21. Tumor size was 9.5x5cm, histological grade 3, and lymphovascular invasion negative. Surgical margins were clear. She was taken adjuvant chemotherapy. She treated with doxorubicin based chemotherapy. After chemotherapy, distant metastasis occurred. Her treatment continuous and she remain well.

Informed consent was obtained from the patient.

## DISCUSSION

RIAS is typically a late complication following radiation therapy in women receiving conservative therapy for breast cancer treatment (Toro JR *et al.*, 2006, Stokkel MP *et al.*, 1992) RIAS of the breast is very rare, and it is very little in the literature. RIAS always present with nonspecific clinical findings, such as skin thickening and discoloration, fibrosis, telangiectasia (Wijnmaalen A *et al.*, 1993). The prognosis of RIAS is directly related to histology (Shah J *et al.*, 2016). Advantage stage RIAS, the poor prognosis of most patients. There is no established standard treatment. Mastectomy is the mainstay of treatment. Adjuvant chemotherapy to reduce the risk of recurrence (Glazebrook KN *et al.*, 2008).

In recent years there have been technological advances in imaging and new radiotherapy techniques. Imaging generally has poor specificity for detecting RIAS. Most useful imaging tools is MRI. Kikawa *et al.*, Showed that might be specific for angiosarcomas, including marked hyperintensity on T2-weighted image

(Kikawa Y *et al.*, 2006). Another imaging tool is Fluorine-18-Fluorodeoxyglucose Positron Emission Tomography (F-18 FDG PET/CT).

PET/CT. F-18 FDG-PET/CT has been shown to improve both sensitivity and specificity for detecting loco-regional occurrence and recurrence (Al-Ibraheem A *et al.*, 2013).

Conventional breast radiotherapy generally in the form of whole breast irradiation (WBI) using external beam radiation delivered over several weeks. Accelerate partial breast irradiation (APBI) is a newer, localized alternative that delivers the effective radiation dose directly to the tissue at risk (Ye XP *et al.*, 2013). This technique may limit the late effect of breast radiotherapy such as RIAS.

We have reported one case of RIAS. The median latency period to presentation after radiotherapy from the literature was 6.13 years (Morgan EA *et al.*, 2012, Arora TK *et al.*, 2014, Yap J *et al.*, 2012). Our case had a latency period of 7.5 years after. This situation was similar to literature. Also, our case presented with rapidly growing painless lump and skin of purple discoloration in the inner quadrant of the right breast, away from the surgical site. Moreover, punch biopsy confirmed RIAS. After the mastectomy, we have given chemotherapy because tumor size was very large and high grade.

## CONCLUSION

RIAS are rare, aggressive soft-tissue lesions with limited treatment options and high rates of both local and systemic relapse. APBI may have a role in downsizing radiation-induced secondary cancer. However, APBI use is very limited in the breast. Patient education is essential. Also, routine physical

examination and imaging studies may be beneficial in earlier detection and treatment of this tumor.

**AUTHOR CONTRIBUTION:** All the authors were equally involved in the curation and development of this manuscript. All authors reviewed and approved the final version of the manuscript.

**CONFLICTS OF INTEREST:** No conflict of interest.

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