

Introduction

Pyoderma gangrenosum is a rare neutrophilic dermatosis characterized by rapidly developing, painful ulcerative lesions. It exhibits pathergy, occurring at sites of skin trauma. Treatment of these lesions involves a combination of both corticosteroids and immunosuppression but even with effective therapy, overall management of pyoderma gangrenosum is challenging, and wound healing times can be prolonged. The development of pyoderma gangrenosum after breast cancer surgery is rare, and its presence complicates the treatment of patients who require additional oncologic therapy. In particular, the effect of radiation on these lesions is not well documented. Given the known skin toxicities of radiation therapy and the negative impact of radiation on wound healing, employment of adjuvant breast radiation raises significant concerns.

Patient Presentation

Our patient is a 66-year-old female with a past medical history significant for uncomplicated bilateral metachronous ductal carcinoma in situ (DCIS) treated with lumpectomy and adjuvant radiation on the right 16 years prior and lumpectomy alone on the left 14 years prior. Annual surveillance mammograms were benign until many years after her prior DCIS treatments, when suspicious calcifications were noted in the patient's posterior left breast. After appropriate work up and surgical management with lumpectomy and sentinel lymph node biopsy, the patient was diagnosed with a left breast invasive ductal carcinoma.

Her disease was grade III, pT2(m)N0(sn)M, Stage IIB, ER 1-10%/PR negative/HER2 negative with an Oncotype of 58. She has a strong family history for breast cancer, and genetic testing revealed a BARD1 mutation.

Six days after surgery the patient presented with gangrenous changes of the skin and erythema surrounding the breast incision (Fig 1). Despite initiation of broad-spectrum antibiotics and appropriate wound care, her breast and axillary wounds became more necrotic, prompting additional debridement. Pathology showed a dense neutrophilic abscess involving the dermis and subcutis with scattered foreign-body-type giant cell granulomas (Fig 2). Four days after the initial debridement, when cultures did not demonstrate bacterial growth, a diagnosis of pyoderma gangrenosum was made. The patient was started on cyclosporine and methylprednisolone with good response.



Figure 1

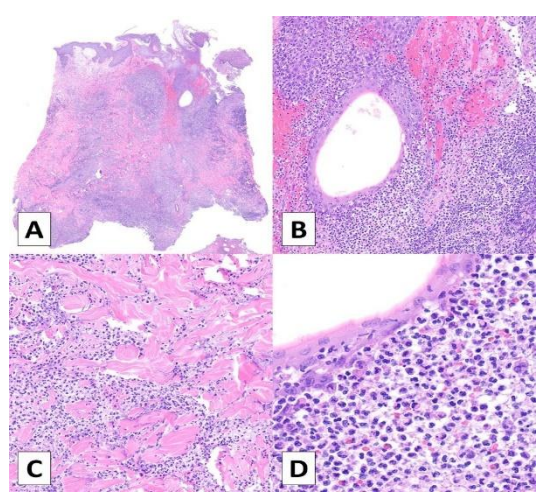


Figure 2

Response to Treatment

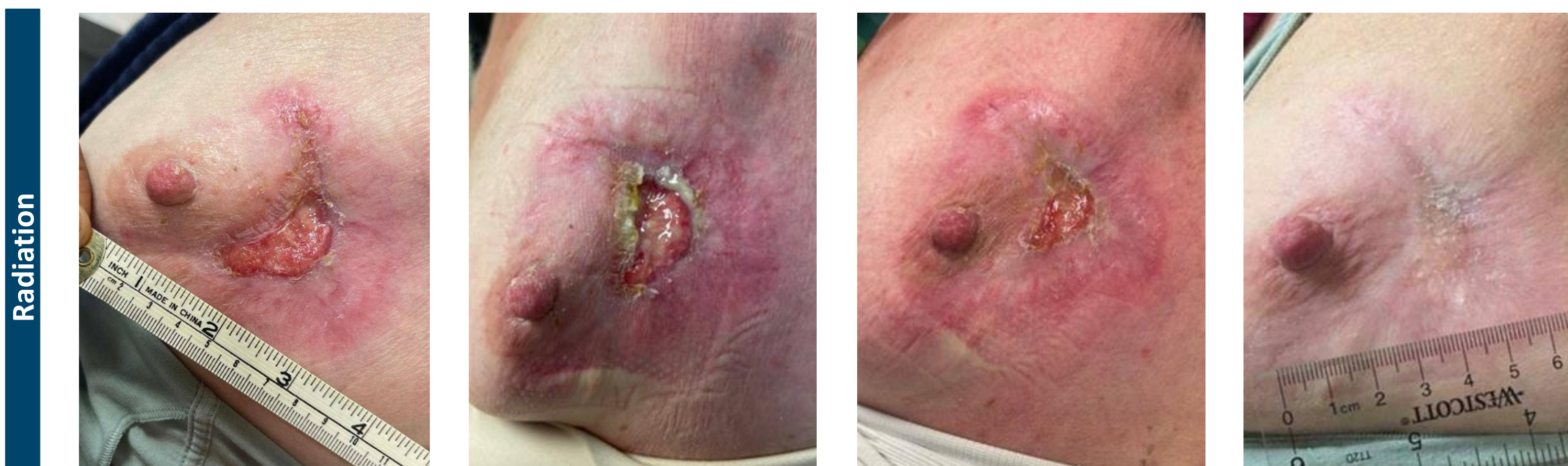


3 weeks after last debridement

After cycle 1 of cyclophosphamide and doxorubicin

After completion of ddAC-T, delivered over 8 cycles

10 weeks following completion of CHT



First on treatment visit with radiation oncology, 13.3Gy delivered.

Second on treatment visit, 26.6Gy delivered.

Final on treatment visit, 39.9Gy delivered.

One month post radiotherapy, 42.56Gy delivered.

Treatment Details

Day, Cycle	Cyclophosphamide (Cytoxan)	Doxorubicin (Adriamycin)
4/11/2023 Day 1, Cycle 1	600 mg/m ² /dose	60 mg/m ² /dose
4/27/2023 Day 1, Cycle 2	480 mg/m ² /dose	48 mg/m ² /dose
5/10/2023 Day 1, Cycle 3	480 mg/m ² /dose	48 mg/m ² /dose
5/23/2023 Day 1, Cycle 4	480 mg/m ² /dose	48 mg/m ² /dose

Day, Cycle	Paclitaxel (Taxol) IV
6/9/2023 Day 1, Cycle 5	175 mg/m ² /dose
6/21/2023 Day 1, Cycle 6	175 mg/m ² /dose
7/5/2023 Day 1, Cycle 7	175 mg/m ² /dose
7/19/2023 Day 1, Cycle 8	140 mg/m ² /dose

Table 1: The patient was treated with four cycles of cyclophosphamide and doxorubicin (AC) followed by four cycles of paclitaxel (T) over a period of 14 weeks.

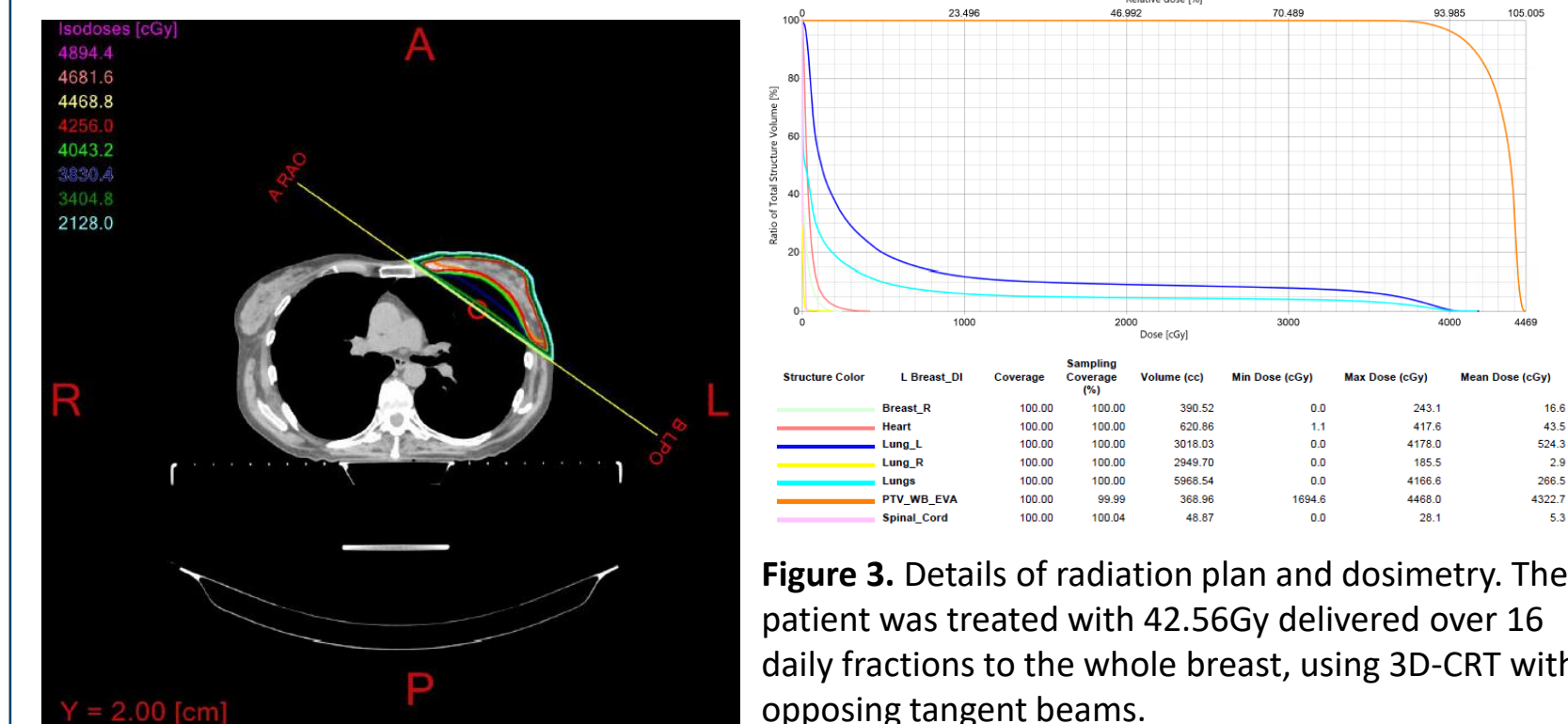


Figure 3. Details of radiation plan and dosimetry. The patient was treated with 42.56Gy delivered over 16 daily fractions to the whole breast, using 3D-CRT with opposing tangent beams.

Discussion and Conclusions

While the pathophysiology of PG is poorly understood, it is believed to be a multifactorial combination of neutrophil dysfunction, immune system and cytokine dysregulation, and genetic predispositions.^{1,2} Chua *et al* proposed a model for neutrophil dysfunction in PG in which uninhibited production of reactive oxygen species promoted sustained angiogenesis.³ We can relate these to our hypotheses on how adjuvant breast cancer therapy may have promoted additional healing in this case. Cyclophosphamide, for instance, is a potent immunosuppressive agent, which most likely contributed to healing that took place during adjuvant systemic therapy. Given that angiogenesis results in the amplification of dysfunctional neutrophils in PG, damage to the microvascular endothelium provided by radiation therapy could have facilitated dramatic healing through disruption of further neutrophil recruitment. The literature on the direct application of radiation in PG is limited, but at minimum, our case provides evidence for the safety of radiation therapy in oncologic cases complicated by pyoderma gangrenosum. In addition to receiving the benefit of adjuvant therapy for Stage IIB invasive ductal carcinoma, our patient demonstrated an improvement in her postoperative PG with no adverse skin effects.

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References

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