Don't Overlook Non-Diagnosed Radiation Injury

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Introduction

Radiation therapy is often an adjunctive component of cancer treatment. Unfortunately, unintentional injury occurs to the targeted and surrounding skin, contributing to poor wound healing in areas that are radiated. Hyperbaric oxygen therapy (HBO) is used to help reverse cellular injury and to heal wounds [1-6]. Clinicians across all disciplines should receive the training needed to recognize the areas that have been affected by the radiation to properly identify eligibility for HBO and offer the modality to the patient. The following case study presents a wound that was initially felt not to be affected by the patient's previous radiation. After a considerable amount of time receiving wound care treatment, the patients' medical history, including field of radiation, was reevaluated. It was then acknowledged that the wound bed, while initially surgical in etiology, was adjacent to the previous field of radiation.

Methods

Pleasant patient presented to the wound center with a dehisced surgical wound on the right anterior distal shoulder following resection of osteomyelitis of the humerus. She had no signs of persistent osteomyelitis and was treated with standard wound care modalities including debridement, negative pressure wound therapy and multiple topical wound dressings for 24 weeks. Minimal improvement had occurred. She was reevaluated and with the review of her past medical history, it was revealed that she had radiation to the upper outer quadrant of the right breast for breast cancer several years prior. The wound was adjacent to this part of her anatomy. Hyperbaric Oxygen Therapy was then requested and after having to go through a peer review, she was started on HBO.







References

- 016-0120-у
- https://doi.org/10.1111/j.1742-481x.2008.00436.x
- *Surgery Global Open, 11*(6), e5043–e5043. https://doi.org/10.1097/gox.0000000000005043
- 105. https://doi.org/10.1016/j.jpra.2017.04.001

Case Study

1. Bray, F. N., Simmons, B. J., Wolfson, A. H., & Nouri, K. (2016). Acute and Chronic Cutaneous Reactions to Ionizing Radiation Therapy. *Dermatology and Therapy, 6*(2), 185–206. https://doi.org/10.1007/s13555-

2. Ryu, H., Kyung Hwan Shin, Ji Hyun Chang, & Jang, B.-S. (2024). A nationwide study of breast reconstruction after mastectomy in patients with breast cancer receiving postmastectomy radiotherapy: comparison of complications according to radiotherapy fractionation and reconstruction procedures. British Journal of Cancer. https://doi.org/10.1038/s41416-024-02741-4 3. Olascoaga, A., Vilar-Compte, D., Poitevin-Chacón, A., & Contreras-Ruiz, J. (2008). Wound healing in radiated skin: pathophysiology and treatment options. International Wound Journal, 5(2), 246–257.

4. Simman, R., Bach, K., Abbas, F., Klomparens, K., & Bradley Joseph Brickman. (2023). Management of Radiation-induced Tissue Injuries: A Review of Current Treatment Strategies. Plastic and Reconstructive

5.Jacobson, L. K., Johnson, M. B., Dedhia, R. D., Niknam-Bienia, S., & Wong, A. K. (2017). Impaired wound healing after radiation therapy: A systematic review of pathogenesis and treatment. JPRAS Open, 13, 92–

6. Anderson, D. W. (2003). Using hyperbaric oxygen therapy to heal radiation wounds. Nursing, 33(9), 50–53. https://doi.org/10.1097/00152193-200309000-00040

7/31/2023: 12 weeks in treatment, 16.7% reduction in area, 70.2% reduction in volume. Visible proximal humerus.

11/14/2023: 27 weeks in treatment, 7 HBO treatments completed. 79.2% reduction in area, 99.1% reduction in volume.

1/16/2024: Treatment week 36. Wound Healed.

Results

Following eight weeks of hyperbaric oxygen therapy in combination with standard wound care the patient's wound completely healed.

This chart captures the healing rate of the patients wound in weeks 0-25 while receiving standard wound care versus weeks 25-33 while receiving Hyperbaric Oxygen Treatments.



Conclusion

Ionizing radiation is used with surgical resection and chemotherapy in the treatment of multiple solid tumors. Tissues with high cyst–cell turnover, including skin are most frequently affected. Late radiation injuries include tissue atrophy, necrosis, vascular damage and chronic ulcerations. [5]. Wound complications have been reported in up to 67% of cases with radiation [3]. HBO makes the oxygen gradient severely steep so that the body recognizes and supports angiogenesis and areas that are ischemic [3,6]. HBO improves fibroblast growth, collagen formation, neovascularization, epithelialization and leukocyte bacterial activity reduce tissue edema. All these contribute to a more rapid wound healing in ischemic tissue [3]. We presented a successful treatment of an irradiated wound that was initially not identified to have been irradiated. A thorough evaluation of the proximity of any wounds, to areas which have had radiation treatments, should be done to prevent missing the indication for HBO, which will benefit your patients.



