



# Hyperbaric Oxygen Therapy to Improve Common Sequela for Uncommon Cancer

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## Introduction

Vaginal and other female genital cancers account for 1-2% of female genital tract cancers, and less than 1% of all cancers (ACS, 2021; Siegel et al., 2023). The American Cancer Society Cancer Statistics Center estimates that for the calendar year 2023, vagina and other female genital cancers will account for 8,470 of the 1,958,310 total new cancer cases (Siegel et al., 2023). The American Cancer Society separately estimates vulva, ovary, cervix, uterine corpus, and vagina/other female genital cancers. Common treatments for vaginal and other cancers include radiotherapy that can have complications including soft tissue radionecrosis (STRN) to affected and surrounding structures.

Persistent changes to irradiated tissue can include decreased vascularity, impaired cellular proliferation, and local hypoxia (Mechem & Manaker, 2022). If further manipulated or traumatized, this damaged tissue can display edema, ulceration, and poor wound healing (Mechem & Manaker, 2022). Hyperbaric oxygen therapy (HBOT) is used as adjunctive treatment for STRN or delayed radiation injury (UHMS, 2023).

A Cochrane Review indicates that the application of hyperbaric oxygen therapy for late radiation tissue injury improves outcomes for the soft tissues of the head, neck, anus, and rectum; and may have further benefits for select patients and select tissues (Bennett, 2016). A more recent systematic review by Geldof et al. (2022) asserts that HBOT is beneficial for late radiation-induced tissue toxicity (LRITT) related to gynecological malignancies, with greatest benefit to patients having wounds in the vaginal, vulvar, and rectovaginal areas vs. other LRITT effects.

## Case History

A 61-year-old female with a history of vaginal squamous cell carcinoma presented to the wound center in July 2022 for left vagina/labia ulcerations present for almost 2 months. She completed pelvic radiation treatment of 4500 cGY 25 fractions with brachytherapy boost in June 2021. Home treatments prior to wound center admission included silver sulfadiazine 1% and topical analgesics with minimal pain relief.

## Methods

This patient was evaluated for HBOT treatments for STRN and began her 40-treatment course in September 2022. Topical wound treatments without any covering dressings included silver sulfadiazine 1%/prilocaine 5% compound applied BID PRN. These topical medications were removed by the patient each day prior to HBOT for chamber safety and reapplied by the patient upon completion of each treatment. This patient found additional pain relief by utilizing a commercially available infant nursing/positioning pillow as a seat cushion to offload the vulvar area when seated.

## Results

- After the first six HBOT treatments, her pain was significantly decreased and a lower overall pain level was maintained throughout HBOT. This patient had increased pain if she forgot to use her seat cushion throughout the day or for multiple days during her sedentary job duties or while resting at home.
- Labial edema significantly decreased by the final hyperbaric oxygen treatment.
- The initial wound on the left labia healed two weeks after the final hyperbaric oxygen treatment. Additional wounds to the right labia and central perineal area appeared during HBOT. The patient began to have difficulty attending weekly wound care appointments related to employment issues. As of this writing, the right labial wound remained open, but was appreciably smaller at her last completed wound care appointment in March 2023.



During week #7 of HBOT



16 weeks post HBOT

## Discussion

Noteworthy components of this case include:

- Rarity of vaginal cancer
- STRN sequela of radiation treatments
- Marked reduction of labial edema during HBOT and maintained thereafter
- Patient report of lower overall pain levels
- Absence of soft tissue injury to surrounding structures in close proximity (bladder, uterus)
- Healing of initial wound two weeks after final HBOT treatment

This patient was thought to have delayed radiation injury limited to the vagina/labia, sparing surrounding close-proximity structures. Information gathered at wound care appointments subsequent to HBOT revealed two days with rectal bleeding. The exact etiology of her bleeding is questionable as rectal vs. vaginal as the patient is not consistently compliant with vaginal dilator use.

## Conclusions

- This patient experienced healing both cosmetically and systemically.
- Hyperbaric oxygen therapy is a safe and effective treatment modality for late tissue radionecrosis even in certain uncommon cancer.
- Hyperbaric oxygen therapy should be considered as a treatment modality for external tissue radionecrosis complications.

## References

American Cancer Society (ACS). (2021). *Key statistics of vaginal cancer*. <https://www.cancer.org/cancer/vaginal-cancer/about/key-statistics.html>

Bennett, M. H., Feldmeier, J., Hampson, N. B., Smee, R., Milross, C., & Bennett, M. H. (2016). Hyperbaric oxygen therapy for late radiation tissue injury. *Cochrane Database of Systematic Reviews*, 2018(11), CD005005. <https://doi.org/10.1002/14651858.CD005005.pub4>

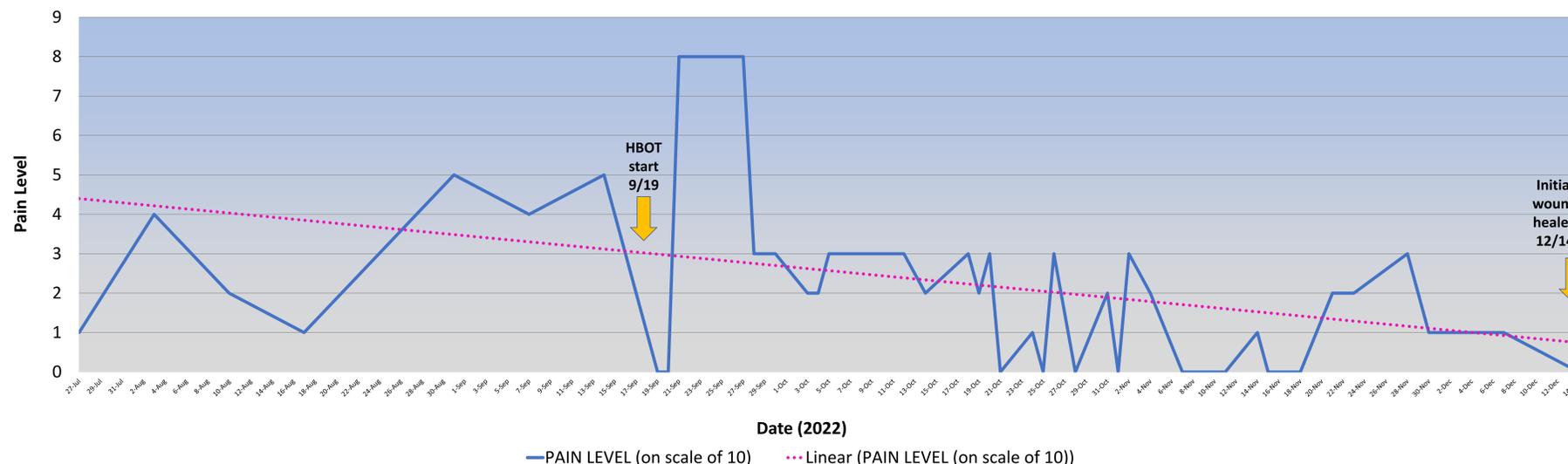
Geldof, N. I., van Hulst, R. A., Ridderikhof, M. L., & Teguh, D. N. (2022). Hyperbaric oxygen treatment for late radiation-induced tissue toxicity in treated gynaecological cancer patients: a systematic review. *Radiation Oncology (London, England)*, 17(1), 1-164. 10.1186/s13014-022-02067-6

Mechem, C., & Manaker, S. (2022). Hyperbaric oxygen therapy. *UpToDate*. Retrieved January 6, 2022, from [https://www.uptodate.com/contents/hyperbaric-oxygen-therapy?search=hyperbaric%20oxygen%20therapy&source=search\\_result&selectedTitle=1~125&usage\\_type=default&display\\_rank=1](https://www.uptodate.com/contents/hyperbaric-oxygen-therapy?search=hyperbaric%20oxygen%20therapy&source=search_result&selectedTitle=1~125&usage_type=default&display_rank=1)

Siegel, R.L., Miller, K.D., Wagle, N.S., Jemal, A. (2023). Cancer statistics, 2023. *CA Cancer J Clin*, 73(1), 17- 48. doi:10.3322/caac.21763

Undersea & Hyperbaric Medical Society (UHMS). (2023). *Indications for hyperbaric oxygen therapy*. <https://www.uhms.org/resources/hbo-indications.html>

Patient-Statement Pain Level at Wound Care & Hyperbaric Visits



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