

Radiation Proctitis/Enteritis and Hyperbaric Oxygen

Chronic radiation proctitis/enteritis is a debilitating complication of radiation therapy of the pelvic region for many urologic, gastrointestinal, and gynecologic cancers. It occurs in up to 10% of post-radiation patients despite advances in administration technique and delivery. It can continue from acute phase or begin after a variable latent period of at least 90 days, although years may pass before symptoms become apparent. The underlying pathology consists of submucosal injury and endarteritis with associated fibrosis, ischemia and ulceration.

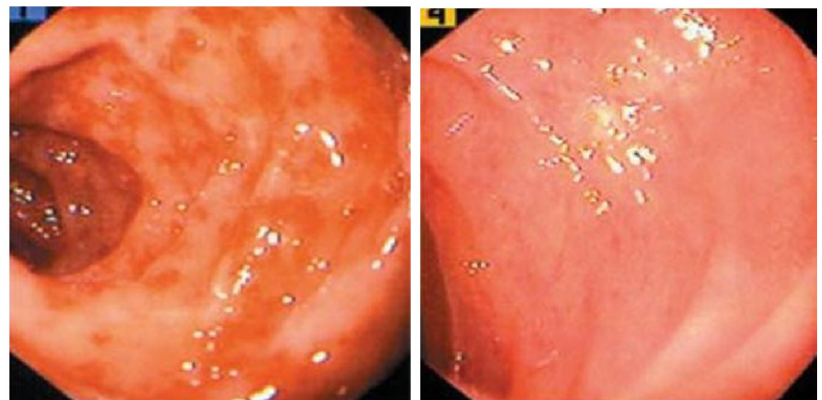
Hyperbaric oxygen therapy is the only intervention that has been proven to increase the number of blood vessels in irradiated tissue.

Hyperbaric oxygen (HBO) therapy is typically administered daily, Monday through Friday. The intermittent hyperbaric oxygenation allows for periods of hypoxia between daily treatments. During these hypoxic periods angiogenesis factors are released from macrophages, which causes capillary budding. New capillaries, however, cannot advance unless they are surrounded by a collagen matrix. HBO raises the oxygen tension in tissue sufficiently for collagen formation to take place at greater distances from damaged/functioning capillaries.

A minimum of 20 mmHg partial pressure of oxygen is required for fibroblast proliferation and collagen production to occur. Irradiated tissue is often far below this level. In normal tissue at atmospheric pressure, this tension of oxygen exists up to 30 microns away from the capillary wall. Under hyperbaric conditions this tension can be maintained up to 280 microns away. This rich collagen matrix allows capillary buds to invade rapidly and form a new advancing vascular system that returns perfusion to within normal limits, thus allowing the irradiated tissue to heal.

Benefits of HBO include:

- Increased collagen and extracellular matrix protein deposition
- Increased oxygen diffusion distance from the capillaries
- Improved leukocyte-bacterial-killing
- Improved local tissue oxygenation
- Decreased local tissue edema
- Increased angiogenesis
- Reduced inflammation



Endoscopy shows severe radiation proctitis (left) and its reversal (right) following hyperbaric oxygen therapy

References

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