

Xerostomia is a common and unpleasant complication of radiotherapy to the head and neck leading to a continually dry mouth that makes eating food and phonation difficult, often needing treatment throughout the day with artificial saliva.

Xerostomia, as well as being painful, often leads to retention of particulate matter between teeth resulting in dental caries and the subsequent need for tooth removal. In addition, patients often have reduced taste, often suffer from *Candida* mouth infections resulting in difficulty with both swallowing, (leading to nutritional problems) and sleeping. Overall, these symptoms result in a poor quality of life. Messmer et al have performed a long term observational study showing xerostomia symptoms do not reach a steady state even more than 5 years after radiotherapy and eating difficulties continued to worsen during the study period ⁽¹⁾.

Removal of teeth from an area that has been previously irradiated may cause poor healing of the tooth socket and occasionally leads to exposed bone that requires a major surgical procedure to fix. This complication is called osteoradionecrosis (ORN). The published incidence of ORN in patients requiring dental extraction through a previously irradiated field has been as high as 61.1% ⁽²⁾. This makes HBOT for prevention of ORN one of the most common reasons for referral in our unit.

HBOT is a recognised preventative treatment for patients who need removal of teeth in order to prevent ORN from occurring ⁽³⁾. The original work in ORN treated with HBOT, done by Marx et al described ORN as a tissue homeostatic deficiency resulting in a hypocellular, hypovascular and hypoxic state ⁽⁴⁾. HBOT is thought to reverse this and cause long term neovascularisation, osteogenesis and stimulation of collagen formation by fibroblasts. It was recently found that a significant increase occurs in the mobilisation of stem cells from the bone marrow during HBOT ⁽⁴⁾. Wound healing and recovery of normal tissue are the result. It has been demonstrated that HBOT reaches its optimum effect after 24-30 sessions for neo angiogenesis, and stem cell mobilisation is particularly prominent after 20 treatments ⁽⁵⁾. HBOT is therefore also used in the treatment of someone who has already developed ORN ⁽⁴⁾.

In recent reviews of the literature for treatment options for xerostomia it is apparent there is a lack of evidence based research in this area ^(6, 7, and 8). Teguh et al have published a trial using HBOT in Head and Neck cancer patients which showed patients randomized to HBOT after radiotherapy had better quality of life scores, less xerostomia, less pain and better swallowing ⁽⁹⁾. Cankar et al from Slovenia, has published a study which showed increased salivary flow and salivary pH in 16 study patients who has had HBOT for the treatment of Xerostomia ⁽¹⁰⁾.

Recently published work in rats shows some promise in the use of hyperbaric oxygen therapy early after radiotherapy to prevent xerostomia ⁽¹¹⁾. In this study, HBOT was given to mice 1 week after completion of high dose radiotherapy. The follow up period was 36 weeks. The results of this study indicate HBOT influenced reduction in the acute inflammatory response caused by radiotherapy.

We have no preliminary data for the use of HBOT in xerostomia since it is rare for an oncologist to refer for this condition alone. However the pilot study done by Forner et al ⁽¹²⁾ suggested a beneficial effect on saliva flow in their patients who were referred for prevention/treatment of ORN. It is a common observation that patients referred for these conditions to our unit self-report improvement in their xerostomia and

this has led to our hypothesis that HBOT may be beneficial in this group who have very limited options for treatment.

As previously stated, xerostomia is relatively common (around 80-90% of patients who have conventional radiotherapy to the Head and Neck) whereas ORN is of lower incidence (published studies around 2-8%) ⁽⁹⁾. Despite this, we receive many referrals for prevention and treatment of ORN, yet very few specifically for xerostomia. This means that a large number of patients are suffering in silence.

WCHM is currently underway conducting a retrospective data collection and prospective observational study to evaluate the effectiveness of HBOT to treat radiation induced xerostomia in order to demonstrate increased saliva flow, reduced symptoms and improved quality of life. Inclusion criteria is any patient experiencing xerostomia secondary to irradiation to the head & neck. Exclusion criteria includes having previously undergone hyperbaric oxygen therapy, untreated pneumothorax and severe congestive cardiac failure. If you have any patients who you think may be interested in participating in this trial please contact WCHM on 07 371 6033 or email reception@wesleyhyperbaric.com.au for more details.

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