

Scientific rationale of hyperbaric oxygen therapy for osteoradionecrosis of the jaw

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Hyperbaric oxygen (HBO₂) has been established as a primary, adjunctive or prophylactic therapy for treating diseases. In the U.S., it is approved as adjunctive therapy for a variety of compromised microcirculatory conditions including osteoradionecrosis (ORN), a delayed radiation complication of radiation therapy. Dental care for patients with radiation-injured jaw is challenges for dental professionals as teeth or denture wearing depend on healthy mandible and maxilla. Adjunctive HBO₂ therapy offers an additional approach for treating ORN. Delayed radiation injury typically appears after a latent period of months or years. Surgery in or around the irradiated area hastens its occurrence. Injuries appear as diffuse abnormalities in cellular functions, endarteritis leading to fewer vessels, hypoxia, and fibrosis. This hypovascular-hypocellular-hypoxic condition is prone to infection. Under such conditions, tissue breakdown exceeds new tissue formation. Tissue repair slows or stops altogether. Hyperbaric oxygen therapy improves tissue oxygenation by diffusion to microcirculatory-compromised area. Evidence shows increased vascular density and new bone formation following repeated HBO₂ therapy. As a consequence, tissue repair and wound healing occur. The case reported here demonstrates the effectiveness of HBO₂ in treating ORN even after a 15-year delay. Clinical experience unequivocally supports the use of HBO₂ for the treatment of bone necrosis, including that of the jaw. In addition, a growing body of literature confirms the use of HBO₂ as a preventive measure for ORN prior to and after surgery around the irradiated area. The beneficial effect of prior HBO₂ therapy before tooth extraction is one such example. However, the efficacy of HBO₂ therapy for ORN lacks supporting evidence from randomized controlled trials. Instead, the justification is based primarily on case reports, case series, retrospective reviews, or poorly run prospective studies. This paper reviews the effectiveness of HBO₂ for treating ORN of the jaw. The most convincing rationale for the use of HBO₂ is the increased diffusion distance of O₂ in tissue of the compromised vascular beds. The authors recommend institution of HBO₂ therapy as soon as practically applicable following a radiation therapy, as the increased O₂ delivery by diffusion improves the wound environment, resists infection, and enhances wound repair. (*Chin Dent J*, 24(1) : 1-14, 2005)

Key words: Osteoradionecrosis, hyperbaric oxygen therapy, radiation-induced injury, compromised vascular beds, O₂ transport by diffusion.

The effectiveness of hyperbaric oxygen (HBO₂) therapy has been well established and approved in the

United State for air embolism, carbon monoxide poisoning, gas gangrene, decompression sickness, refractory osteomyelitis, compromised microvascular beds (crush injury, compartment syndrome, skin grafts and flaps, problem wounds, thermal burns), and radiation injury to soft tissue and bone¹. Clinical experience unequivocally supports the use of HBO₂ for the treatment of bone necrosis, including that of the jaw. Furthermore, a growing body of literature

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