HYOX

HYPERBARIC MEDICINE HEALS.

HYPERBARIC OXYGEN THERAPY FOR ORTHOPEDIC SURGERY

HyOx treats the following approved and covered conditions:

- **Compromised skin grafts and flaps**
  - ***Referral Protocol:***
    - Immediately, when post-surgical site shows signs of dehiscence, necrosis, blistering, erythema, and/or infection
    - Immediately, post trauma to avoid irreversible damage from tissue ischemia and possibly major limb amputation; manifests with visible damage to tissue, injury at the cellular level (with edema, interstitial bleeding, sluggish flow, stasis, rouleau formation, and obstruction) and biochemical alterations
    - Post-fasciotomy as an adjunct to wound management if ischemic muscle, threatened flaps, unclear demarcation between viable and non-viable muscle, edema, and residual neuropathy remain
    - When viable soft tissue and bone are needed prior to surgeries (such as total knee replacement)
- **Necrotizing soft tissue infections** (**necrotizing fasciitis, gas gangrene**)
  - ***Referral Protocol:*** Immediately, upon diagnosis
- **Chronic refractory osteomyelitis**
  - ***Referral Protocol:*** When osteomyelitis fails to respond to definitive surgical debridement and four to six weeks of antibiotic therapy
- **Crush injuries and skeletal muscle-compartment syndromes**
  - ***Referral Protocol:***
    - Post trauma manifesting signs of tissue hypoxia preferably within four to six hours of injury
    - To prevent progression of skeletal muscle-compartment syndrome at the impending stage to the established stage with increasing serial pressure measurements and pain, hypesthesias, muscle weakness, discomfort with passive stretch and tenseness of muscle compartment
- **Professional sports-related injuries** (**tendon / ligament partial tears and postoperative repairs**)
  - ***Referral Protocol:*** Immediately, post injury (may be covered by Workers' Comp. insurance)

- **Delayed effects of radiation therapy (soft tissue and bone necrosis)**
  - ***Referral Protocol:***
    - Immediately, upon symptom manifestation of the effects of radiation injury including persistent edema, bleeding and pain
    - Pre- and post-surgery in a previously radiated area

Benefits of Hyperbaric Oxygen Therapy:

- Improves outcomes of crush injury fractures and other traumatic ischemias (**1**)
- Reduces edema and/or bleeding within fascial envelope thereby reducing pressure within skeletal muscle-compartment (**2**)
- Salvages tissue and, in some cases, limbs, by supplementing oxygen availability to hypoxic tissue with inadequate perfusion
- Reduces the complications prior to and following surgeries in a previously radiated area
- Promotes angiogenesis in damaged vasculature/hypoxic tissue
- Increases oxygen tensions at sufficient levels keeping tissues alive by supersaturating the plasma without need for hemoglobin-borne oxygen (**3**)
- Enhances osteogenesis by remodeling bone by osteoclasts – an oxygen dependent function
- Helps resolve infections combined with antibiotic and surgical strategy/debridement by helping augment the transport of certain antibiotics across bacterial cell walls (antibiotic transport does not occur if oxygen tension levels are below 20 to 30 mmHg) (**4**)
- Enhances the proliferation of osteoclasts' function of removing necrotic bone (microscopic surgical debridement) - an oxygen-dependent function. (**5**) (**6**)

REFERENCES:
(**1**) Bouachour G, DH Nordstr, et al. Effects of hyperbaric oxygen in the management of crush injury: A randomized double-blind, placebo-controlled clinical trial. J Trauma (1996). 41: 333-339.
(**2**) Skylar MJ, AR Hargens, et al. Hyperbaric oxygen reduces edema and necrosis of skeletal muscle in compartment syndromes associated with hemorrhagic hypotension. J Bone Joint Surg (1986). 68A:1218-1224. Strauss MB, AR Hargens, et al. Delayed use of hyperbaric oxygen for treatment of a modal compartment syndrome. J Bone Joint Surg (1983). 60A-656-662.
(**3**) Boerma I, NJ Meijne, et al. Life without blood. A Study of the influence of high atmosphere pressure and hypothermia on dilution of the blood. J Cardiovascular Surgery (1960). 1:133-146.
(**4**) Waldvogel FA, G Medoff and MN Swartz. Osteomyelitis: A review of clinical features, therapeutic considerations and unusual aspects (second of three parts). N Engl J Med 1970. 282(5): p. 260-261.
(**5**) Mader JT, et al. Hyperbaric oxygen as adjunct therapy for osteomyelitis. Infect Dis Clin North Am, 1990. 4(3): 433-40.
(**6**) Undersea & Hyperbaric Medical Society Committee Report: Chronic refractory osteomyelitis. Brett B. Hart. 2003.