Adjunct HBO2 Therapy: An Essential Tool For The Care DFUs?

Both these studies have significant shortcomings:

- Inclusion of Wagner grade 2 DFUs in 46 out of 103 (45%) subjects available for end point adjudication.\(^1\)
- Margolis cohort study\(^2\) included Wagner 2 DFUs in 54.3% of the HBO2 group that also showed no benefit of HBO2.
- Including a substantial cohort of patients with Wagner grade 2 DFUs that do not even meet the indications set by the Undersea & Hyperbaric Medical Society unavoidably biases the study’s conclusion toward the absence of benefit from HBO2 therapy.

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Adjunct HBO2 Therapy: An Essential Tool For The Care DFUs?

Other significant shortcomings:

- Study’s use of photographic adjudication whether a limb “met the criteria for amputation” rather than the use of actual amputation rates as an outcome measure.¹
- The fact that there may be patients who “met the criteria for major amputation” but who went on to heal undermines the conclusions of this study.


Elements of GRADE

- Clear separation between quality of evidence and strength of recommendations
- Explicit evaluation of the importance of outcomes
- Explicit and comprehensive criteria for downgrading and upgrading the quality of evidence rating
- Transparent system of moving from evidence to recommendations
Diabetic Foot Infections: Treatment

Algorithm for the use of HBO₂

Wagner Grading System:

A. Grade 1: Superficial Diabetic Ulcer
B. Grade 2: Ulcer with deep structures involved:
   - Ligament, tendon, joint capsule or fascia
   - No active infection (abcess or osteomyelitis)
C. Grade 3: Ulcer with deep structures involved:
   - Ligament, tendon, joint capsule or fascia
   - + Evidence of infection (abcess or osteomyelitis)
D. Grade 4: Gangrene to portion of forefoot
E. Grade 5: Extensive gangrene of foot

Osteomyelitis

Infected bone is hypoxic*

- **Normal Oxygen Tension** (21% O₂ at sea level)
  - Healthy Bone = 45 mmHg
  - Infected Bone = 21 mmHg

- **Hyperbaric Oxygen Tension** (100% O₂ at 2 ATA)
  - Healthy Bone = 321 mmHg
  - Infected Bone = 104 mmHg

Rabbit animal model

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**HBO₂ & Antibiotics with Osteomyelitis in Rats**

**Control**

**HBO**

**Cefazolin**

**Cefazolin + HBO**

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**Limb Preservation**

**Treatment Network**

**Wound Care**

- Infectious Disease
- Nutrition
- Radiology
- Lymphedema
- Endocrine
- Home Care
- Surgery
- Vascular
- Podiatric Care
- TeleHealth

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Benefits of HBO

- Tissue oxygen tension restored to > 30 mmHg required by Neutrophils to destroy bacteria by oxidative killing mechanisms (1,2)
- Direct suppressive effect on anaerobic pathogens (3,4)
- Augments transport of certain antibiotics across bacterial cell walls active transport of antibiotics (e.g. gentamicin, tobramycin, amikacin) across bacterial cell walls does not occur if tissue oxygen tensions are below 20 to 30 mmHg (5)
- Enhances osteogenesis (6)
- Reduces tissue edema (7)
- Prevents polymorphonuclear leukocytes from adhering to damaged blood vessel linings decreases the degree of inflammation which may accompany the surgical treatment of refractory osteomyelitis
- Can reduce treatment costs of complicated refractory osteomyelitis by approximately 5xs
- 1987 estimated per case costs reduced from $115,000 to $20,000 (9)

References