

Does Hyperbaric Oxygen Therapy Really Work for Ischemic And Non-Ischemic Wounds in Vascular Patients: Is There Proof and is It Worth the Cost

Robert B. McLafferty, M.D., M.B.A.
*Professor of Surgery
 Division of Vascular Surgery
 Medical Director – Wound & Hyperbaric Center
 Oregon Health and Sciences University
 Portland, Oregon*

Hyperbaric Oxygen Therapy and CLTI

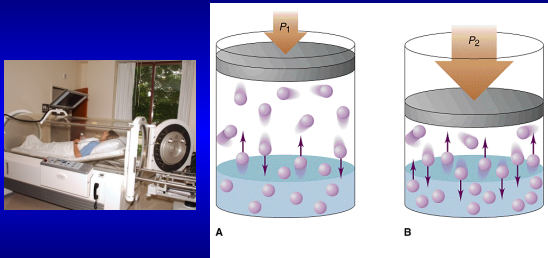

Disclosures

None





Hyperbaric Oxygen Therapy and CLTI

Boyle's Law

Hyperbaric Oxygen Therapy and CLTI


Additional O2 Carried by Plasma

Hyperbaric Oxygen Therapy and CLTI

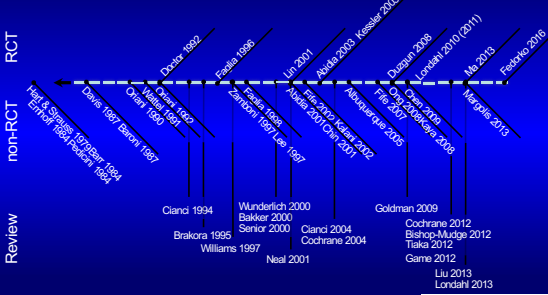

HBO Physiologic Changes

- Angiogenesis
- Stem cell mobilization
- Fibroblast proliferation/Collagen Synthesis
- Reduced leukocyte adhesion
- Reduced lipid peroxidation
- Edema reduction
- Enhanced leukocyte antimicrobial activity
- Antibiotic synergy
- Toxin inhibition



Hyperbaric Oxygen Therapy and CLTI

Abbreviated Timeline of Data

Hyperbaric Oxygen Therapy and CLTI

Ischemic Diabetic Foot Ulcers

Adjunctive systemic HBO therapy in treatment of severe ischemic diabetic foot ulcer. A randomized study. *Faglia, et al. Diabetes 1996;19:1338*

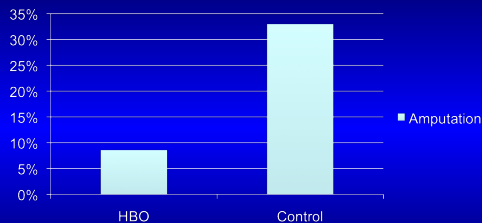
- 70 subjects enrolled, 68 completed protocol
- Wagner Grade III or >; Outcome: Major Amp
- Groups similar in demographics/variables
- All had multidisc wound therapy
 - with HBO (n=35)
 - without HBO (n=33)



Hyperbaric Oxygen Therapy and CLTI

Ischemic Diabetic Ulcers

Amputation



Multivariate analysis confirmed protective role of HBO: OR: 0.084, p = 0.03



Hyperbaric Oxygen Therapy and CLTI

Larger Randomized Trial

Hyperbaric oxygen therapy in the treatment of ischemic lower-extremity ulcers in patients with diabetes: Results of the DAMO(2)CLES multicenter randomized trial.

Santema KTB, et al. Diabetes Care 2018;41:112

- 120 patients randomized: SC vs. SC + HBO
- 35 dropped out of SC + HBO
- Intent to treat: no differences
- Exclude the 35 patients who dropped out HBO
 - Major amp in SC = 18 (22%)
 - Major amp in SC+HBO = 2 (5%) p<0.05



Hyperbaric Oxygen Therapy and CLTI

What about the cost?

The role of hyperbaric oxygen therapy in ischemic diabetic lower extremity ulcers: a double-blind randomized-controlled trial. *Abidia A, Eur J Vasc Endovasc Surg 2003;25:513*

- 18 patients randomized (1 withdrew in each group)
- End-stage with no revasc options
- 30 sessions of HBO in treatment group
- At 1 year follow-up
 - SC + HBO: 5 or 8 remained healed
 - SC: None were healed
- Cost???
 - +HBO = Average cost savings of £ 2960/patient/year



Hyperbaric Oxygen Therapy and CLTI

Research Continues...

Combined Treatment With Hyperbaric Oxygen Therapy and Endovascular Therapy for Patients With Chronic Limb-Threatening Ischemia - Study Protocol for the HOTFOOT Multicenter Randomized Controlled Trial

Sato, et al. Circ Rep, 2021;20:737-41

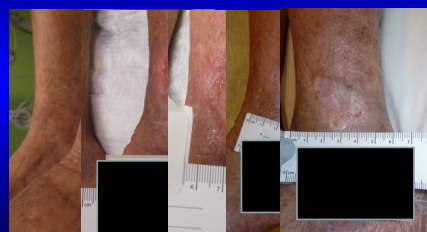
- Multicenter prospective randomized open blinded-endpoint trial: 10 centers
- Enroll 140 patients CLTI
- EVT + HBO (30 sessions) vs. EVT
- Primary: time to wound healing by 6 mo.
- Secondary: freedom major amp; amp free survival; freedom from target lesion reintervention



Hyperbaric Oxygen Therapy and CLTI

Case Study

88 year old woman with an ischemic ankle ulcer from minor trauma. Frail with multilevel PAD: 48 HBO treatments



Hyperbaric Oxygen Therapy and CLTI

Summary: HBO for CLTI

- Requires a big commitment
- Medicare: only acute peripheral ischemia
- Gray areas between acute and chronic
- Viable option when no other options
- For the right indications: HBO works in most patients
 - Heal wounds
 - Reduce pain
 - Prevents amputation
- Partner with your wound center

