Hyperbaric, uses for the Spine

2017 Castellvi Spine

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Disclosures

- Former Special Operations Officer
  USN (Income)
- Special committee for ABS (Building Undersea Vehicles and Hyperbaric Systems)
- BOD IBUM (Income)
- Poseidon Project 100 Day Undersea Mission
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What is it?

- Hyperbaric Oxygen therapy (HBOT) is the administration of pure oxygen at greater than normal partial pressure in order to help a patient with certain conditions.
- HBOT’s main advantage is that it provides an alternate path for oxygen delivery.
What is it?

- **General Gas Law:** The factors of temperature, volume and pressure are so closely related that a change in one must have a corresponding change in one or both of the other.

\[
\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}
\]

- **Dalton's Law:** The total pressure exerted by a mixture of gases is equal to the sum of the pressures of each of the different gases making up the mixture, with each gas acting as if it alone was present and occupied the total volume.

What is it?

- If a patient is exposed to greater than 1.0 PPO2, blood plasma and cerebrospinal fluid begin to transport oxygen.

Types of chambers
UHMS approved indications

1. AGE
2. Carbon monoxide poisoning
3. Crush Injury / compartment syndrome
4. Gas gangrene
5. DCS
6. Arterial insufficiencies
7. Severe anemia
8. Intercranial abscess
9. Osteomyelitis
10. Necrotizing soft tissue infections
11. Delayed radiation injury
12. Compromised flaps and grafts
13. Acute thermal burn injury
14. Idiopathic sudden sensorineural hearing loss

MOAs

1. Hyperoxgenation
2. Decrease bubble size
3. Reduces lipid peroxidation
4. Vasoconstriction
5. Reduces intravascular leukocyte adherence
6. Toxin inhibition
7. Promotes leukocyte oxidative killing
8. Antibiotic synergy
9. Angiogenesis
10. Fibroblast proliferation / collagen synthesis

A few papers about spine

- Role of HBOT in treatment of bacterial spinal Osteomyelitis – Applied Neurosurgery Spine (June 09 Vol 10 P 16-20)
  HBOT enabled infection cure in 5 of 6 pts w / OM

  HBOT ...is safe and efficient as an adjunctive therapy in treatment of infections. ...effective in prevention of revision procedures and instrumentation failures in iatrogenic osteomyelitis cases...
A few papers about spine

- Bone healing and spinal fusion – Neurosurgery focus 2002 13(6) [Medscape]
  …hyperbaric oxygen treatment has been found to enhance bone healing.

  Appears to have efficacy in recovery of sports injuries…researchers need to add to the base of clinical trials

Conclusions

- No specific approved indication relating to spine save Osteomyelitis.

- Few studies are performed.

- We intend to work past that.

THANK YOU – Questions?

- Discussion?