Title: Oxygen concentration in and around a monoplace hyperbaric chamber after emergency decompression and defibrillation safety.

PRESENTERS:

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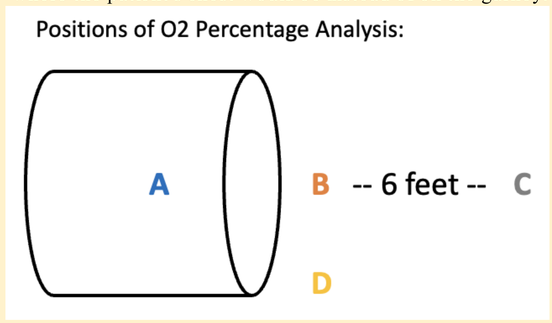
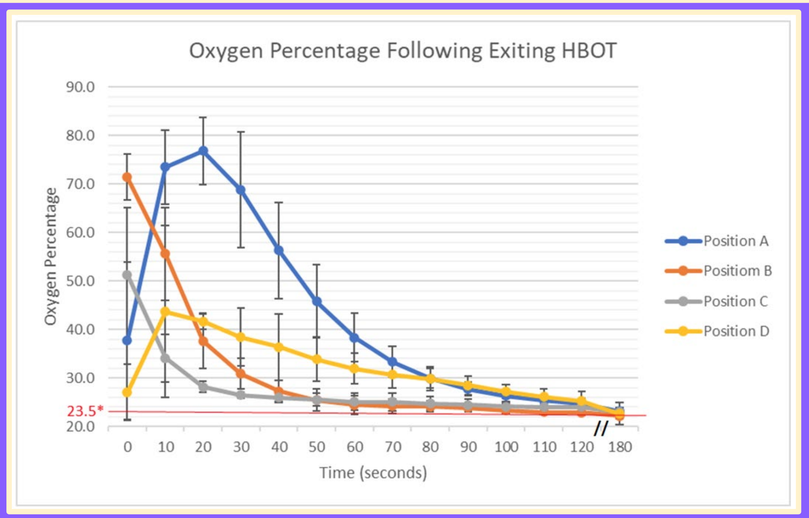
Defibrillation could be safe 2 minutes after emergency decompression and opening of a monoplace hyperbaric chamber

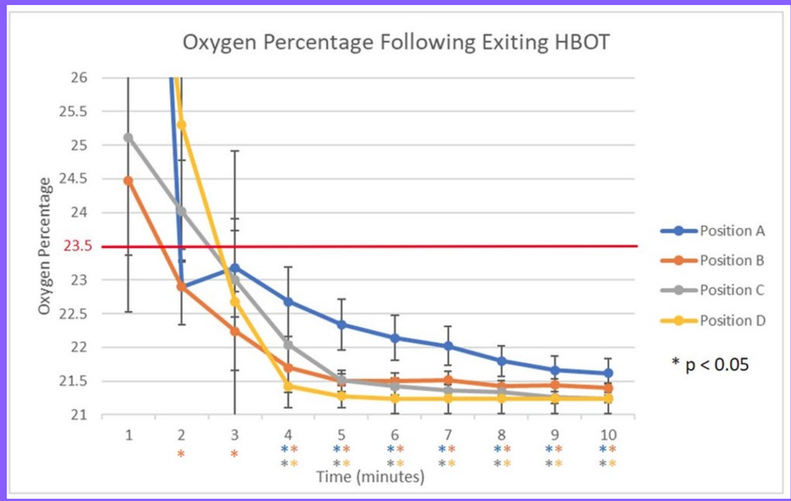
BACKGROUND: Published data on ambient atmospheric oxygen concentration after emergency decompression and opening of a monoplace hyperbaric chamber (MHC) pressurized with 100% Oxygen (O2) is, to our knowledge, non-existent. This information is critical to assess defibrillation safety after emergent decompression and opening of a MHC.

METHODS

1. An MHC was pressurized with 100% O2 to 3 ATA with a gurney inside the chamber with mattress, bedding and a blanket folded in thirds in the center of the gurney representing the patient's clothing.
2. The chamber was held at pressure at 3 ATA for 15 minutes
3. During pressurization, an oxygen analyzer was calibrated to 20.9% O2 on ambient room air.
4. The chamber was then rapidly depressurized to 0.5psig and opened. After opening, the O2 analyzer was placed in the center of the gurney where the chest of the patient would be, and the gurney was placed into one of four positions where O2 percentages were recorded every 10 seconds for 18minutes or until the O2 analyzer dropped back to 20.9%.
5. Five data sets were recorded for each position: Position A - gurney inside the chamber; Position B – gurney outside the chamber left attached to the guide rails; Position C - gurney removed from the chamber and moved 6ft away; Position D - gurney outside the chamber left attached to the guide rails, similar to position B, but O2 sensor placed on the ground directly below where the patient's chest would be instead of on the gurney.







RESULTS

- Position B achieved a statistically significant O2 concentration less than 23.5% the fastest [22.9% at 2 minutes after opening (P=0.037)].
- Positions A, C and D all achieved statistically significant O2 concentrations less than 23.5% by the 4-minute mark after opening [22.7% (P=0.012), 22.04% (P=0.003), and 21.42% (P=0.000) respectively].

CONCLUSIONS

- Ambient O2 concentrations take 2 to 4 minutes to drop below 23.5% after opening of a MHC depending on the position measured. More research is needed to determine effects of air turbulence from movement of equipment and medical personnel on oxygen concentrations in and around a MHC after emergency decompression and opening during a code simulation to determine optimal timing and positioning for safe defibrillation.

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