Oxygen Reservoir Dressing Sustains Elevated Wound pO_2 After Hyperbaric Oxygen Treatment

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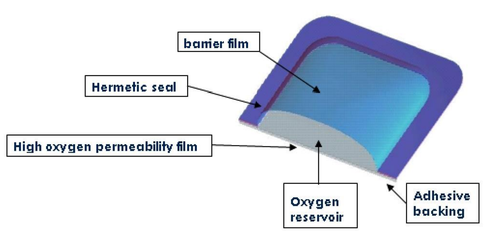
Introduction

The benefits of hyperbaric oxygen therapy (HBOT) for wound healing are well established and result from the oxidant effects of oxygen and biologic processes for which oxygen is a rate-limiting step. Although the major benefits of HBOT clearly result from systemic oxygen delivery, the potential benefits of topical oxygen are also of interest. We therefore evaluated an oxygen reservoir dressing (OxyBand™) for its ability to maintain elevated levels of dissolved oxygen (PO_2) in wounds after HBOT. The oxygen is stored in between an occlusive upper layer and a lower permeable film, which allows the dressing to supersaturate the wound fluid with regenerative oxygen for days at a time.



Methods

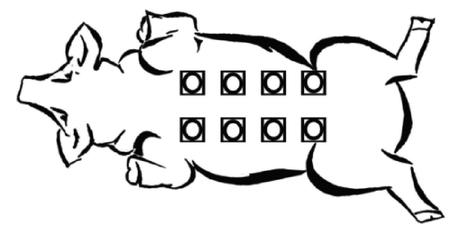
With IACUC approval, 8 standardized full thickness wounds were created on the back of 2 pigs (one normobaric control, one HBOT). The wounds were covered with either thin film (4 per pig) or OxyBand™ (4 per pig) dressings. Oxygen levels at 4+/-2mm depth within the wound exudate were measured 3, 8, 11.5, 14, and 16 hours after dressing placement and 15 min, 2, 6, and 12 hours after HBOT using polarographic microelectrodes.

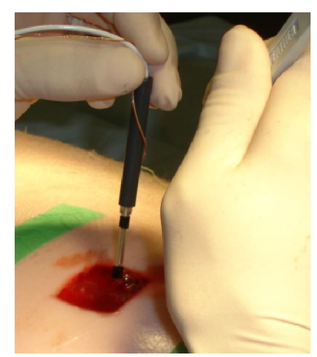
Results

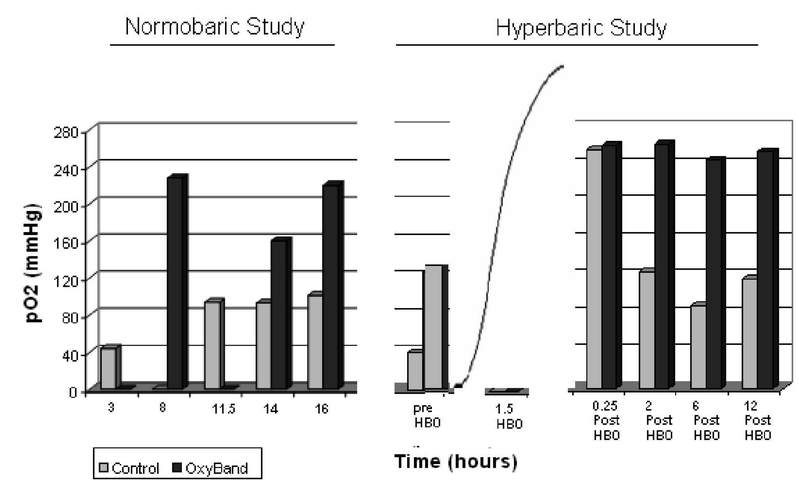
With the pigs intubated and anesthetized (FiO2 1.0), the PO2 ranged from 81-106 mmHg under the control dressing and 160-228 mm Hg under the test dressing. PO2 was 256-260 mmHg under both dressings 15 min after HBOT. At 2-12 hours after HBOT, PO2 was 89-125 mmHg under the control dressing and 245-263 mmHg under the test dressing.

Conclusions

The OxyBand™ reservoir dressing maintained elevated wound oxygen levels after HBOT, demonstrating that the dressing was able to replenish oxygen levels as it was consumed locally. Potential synergies of providing the systemic benefits of HBOT and extending the local benefits of hyperoxia using an on-demand oxygen reservoir dressing warrants further investigation.







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