SerenaGroup Newsletter

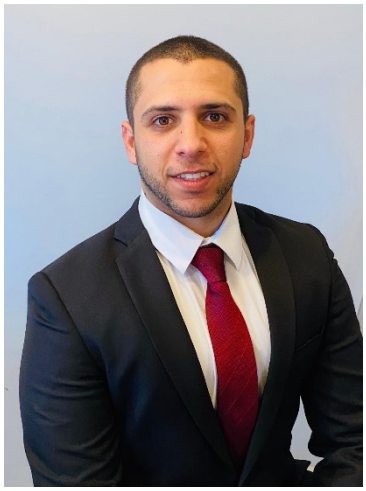
May 2020

SERENAGROUP MONTHLY UPDATE

ISSUE 27

Welcome Dr. Omar Jalodi, Natrox Wound Research Fellow

Dr. Omar Jalodi, MD was born and raised in Amman, Jordan. Although his primary interest is pursuing a career in medicine, he was also captain of the soccer team at his alma mater and was a part of his country's Taekwondo team where he competed internationally.



Dr. Jalodi received his medical degree from Jordan University of Science and Technology. He attended the University of Toledo Medical Center in an exchange program where he served on the vascular surgery and emergency medicine teams. After graduating, Dr. Jalodi was a surgical intern at Istiklal Hospital in Amman, Jordan with a focus on vascular surgery. He is currently a postdoctoral research fellow at SerenaGroup, treating patients with complex wound injuries and ulcers including arterial, venous and diabetic foot ulcers. His clinical research includes techniques such as vacuum suctioning, hyperbaric oxygen therapy, MolecuLight and other measures that enhance healing.

Nick Duquette

May Blue Star Winner

"Nick is a valuable team player in SerenaGroup. Not only does he lead the Akron General Wound Care Program, but he continues to work hard on leading the Education Committee with SG to ensure safety as a priority. He is always encouraging and gives a helping hand when needed."

SerenaGroup Centers are encouraged to recognize those around them that go above and beyond their job description. Recognizing hard work is a priority for SerenaGroup and we sincerely thank those who continue to be compassionate in their work in healing wound care and hyperbaric medicine patients.

HYPERBARIC COURSE

Due to COVID-19; all classes are on HOLD until further notice

September 18-21, 2020
Austin, TX

November 6-9, 2020
West Palm Beach, FL

Registration is Required

Please contact:
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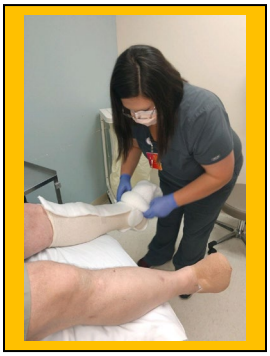
HAPPY NURSE'S WEEK!

"SerenaGroup nurses form the backbone of our organization. We celebrate your hard work and dedication during nurse's week, but I appreciate everything you do every day. Our nurses believe in the importance of wound healing. During the COVID crisis SerenaGroup centers remained open while others shuttered around us. I humbly thank you for making our mission a reality. I thank you for sharing our vision to bring healing to those who suffer from wounds. You're the best. Happy Nurses week." - Dr. Serena



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SerenaGroup is excited to announce our Newly Redesigned Website and Social Media sites:

www.serenagroupinc.com
Facebook: SerenaGroup
Twitter: SerenaGroup4
LinkedIn: SerenaGroup Advanced Wound Care & Hyperbaric Medicine

Follow our sites to keep up to date on Advanced Wound Care & Hyperbaric Medicine

That Other Pandemic and the Birth of Hyperbaric Oxygenation

Dick Clarke, President
National Board of Diving & Hyperbaric Medical Technology

The current pandemic brings to mind that last great pandemic (1918-1920) and the actions of one physician who became the first to employ a hyperbaric chamber specifically to drive additional oxygen into tissues. Today we call this process hyperbaric oxygen (HBO) therapy and its first patients were Spanish Influenza victims.

Orval J. Cunningham 1880-1937

Early Hyperbaric Chamber Use

Until this period, the singular therapeutic basis for hyperbaric chamber use was that of the inverse relationship between pressure and volume, namely Boyle's Law. Workers exposed to compressed air during bridge construction and mass transit tunneling projects were at risk for "caisson disease", now referred as decompression sickness. This condition resulted from formation of embolic gas secondary to inadequate decompression. Re-exposing injured workers to elevated air pressures within a hyperbaric chamber reduced/eliminated offending gas, frequently affecting cure. By the turn of the 20th century, "recompression" chambers were increasingly commonplace at civil engineering worksites incorporating compressed air. Naval and civilian divers, likewise at risk of decompression sickness, were soon to benefit in a similar manner.

Oxygen as Therapy

The discovery of oxygen occurred some 150 years earlier. However, it had remained more of a research curiosity until 1922 and the publication of Haldane's seminal work "Respiration" before it finally entered mainstream medical therapeutics. Although Haldane proposed its clinical use several years earlier, "Respiration" clearly got everyone's attention. Unfortunately, the outbreak of Spanish Influenza pre-dated this advancement, leaving its victims struggling to breathe with nothing more forthcoming than the oxygen concentration in normal atmospheric air. For a great many this proved woefully inadequate.

HBO's First Patients

Enter Orval J. Cunningham, Associate Professor of Surgery and Chair of the Department of Anesthesia at the University of Kansas Medical Center. Cunningham was considered a remarkably keen clinical observer. In one example, he had noted that patients with lung diseases appeared to improve when traveling from Colorado to Kansas. Another example, and more critical at the time, was that the pandemic's morbidity and mortality was greater in areas of high elevation, such as Colorado, compared to coastal regions. As an anesthesiologist, Cunningham was understanding of Dalton's Law and its effect on gas pressures. He rightly considered that the only significant variable was an increase in oxygen pressure as altitude decreased. He sought to determine if further increases in ambient air pressure beyond normal atmospheric pressure could produce a clinically meaningful effect. To investigate this he borrowed a small hyperbaric chamber from a local diving contractor and arranged for its installation at the university medical center. In it, he treated several profoundly cyanotic and moribund influenza patients and met with "instant success". "Patients whose lips bore the blue-black livid stamp of the kiss of death and were deeply unconscious, but if not too far from the brink, in a matter of minutes were brought back to normal color and return to consciousness". **Importantly, Cunningham had no access to oxygen**. He had managed to accomplish these marked clinical improvements by the simple act of increasing chamber pressure with air, letting Dalton's Law do the rest. History should acknowledge, then, Dr. Orval J. Cunningham as the first hyperbaric oxygen practitioner. It would be another 15 years before oxygen breathing under hyperbaric conditions was introduced, thereby forming the basis for the modern practice of hyperbaric medicine.

By late 1918, the second and more deadly wave of the pandemic had started to subside, so too the number of its victims treated by Cunningham. With additional and much larger chambers under consideration and a diminishing influenza caseload, he sought out other conditions that he thought might benefit from increased oxygen delivery afforded by elevated air pressure. This journey eventually resulted in him condemned by the American Medical Association and his legacy forever tarnished.

Oxygenation of Today's Pandemic Victims

Fortunately, today's influenza sufferers have ready access to unlimited supplies of oxygen. Delivered at normal atmospheric pressure within the ED and ICU, it results in higher doses than those achievable within Cunningham's compressed air chamber. Mechanical ventilation, when indicated, further enhances oxygen's therapeutic effect.

References available upon request.

HYPERBARIC MEDICINE

Tim Mayhugh, National Safety Officer

Patients with diabetes are particularly prone to foot-related issues caused by neuropathy, which can result in sensation loss and impede blood flow, hindering the healing process. According to the American Podiatric Medical Association, diabetes is the leading cause of non-traumatic lower extremity amputations in the US. The association also notes that approximately 14-24 percent of patients with diabetes who develop a foot ulcer will require an amputation.

Diabetic foot ulcers, infections and traumatic injuries often result in unnecessary amputations, requiring ICU supported measures such as Ventilators, specially trained staff and physician time. Your SerenaGroup outpatient Wound Care Center with our team of trained wound care physicians and staff applies specialized skills to heal lower extremity wounds to achieve our ultimate goal of preventing amputation and preserving limb function.

In a January of 2019 researchers at UT Southwestern Medical Center in Dallas and the Analysis Group in Boston conducted a review of Medicare billing records for Hyperbaric Oxygen (HBO) Therapy to determine if HBOT can reduce the rate of major amputations among Medicare patients suffering from diabetic foot ulcers.

Researchers Dr. J. Bradford Rice and Dr. Lawrence Lavery divided patients into two groups to study the difference in the amputation rate of: (1) patients receiving HBO therapy and (2) patients receiving advanced wound care such as cellular and tissue-based products or negative pressure wound therapy.

The sample consisted of 1868 patients, 65 or older, with continuous, non-HMO enrollment in Medicare Parts A and B. Before the study began, participants were matched through a scoring system that took into account demographic differences and wound characteristics prior to treatment.

Rice and Lavery found that the HBO group had approximately 33 percent fewer major amputations than the advanced wound care group. A major amputation is defined as the loss of the limb above or below the knee. Of significance is the finding that the HBO group suffered from diabetic foot ulcers for a longer duration prior to treatment, which resulted in more severe ulcers.

The importance of this study is that it analyzed Medicare's own data and found that HBO therapy seems to reduce the risk of major amputation when used on patients with non-healing wounds such as those resulting from diabetic complications and thereby resulting in fewer hospitalizations—a significant factor at a time when all of our hospitals are overextended.

Why Hyperbaric Oxygen, what's the evidence?

The following is a excerpt from: Hyperbaric oxygen treatment Rationale and effectiveness in the non-healing diabetic foot ulcer patient. By Peter HJ Mueller MD and Robert A Warriner III MD,

Regardless of the primary cause of problem wounds, a basic pathway to non-healing is the interplay between tissue hypoperfusion, resulting hypoxia, and infection. A large body of evidence exists which demonstrates that intermittent oxygenation of hypo perfused wound beds, a process only achievable in selected patients by exposing them to hyperbaric oxygen treatment, mitigates many of these impediments and sets in motion a cascade of events that leads to wound healing. Hyperbaric oxygenation is only achieved when a patient breathes 100% oxygen at an elevated atmospheric pressure. Physiologically, this produces a directly proportional increase in the plasma volume fraction of transported oxygen that is readily available for cellular metabolism. Arterial PO_2 elevations to 1500 mmHg or greater are achieved with 2 to 2.5 atm abs with soft tissue and muscle PO_2 levels elevated correspondingly. Oxygen diffusion varies in a direct linear relationship to the increased partial pressure of oxygen present in the circulating plasma caused by hyperbaric oxygen therapy. This significant level of hyperoxygenation allows for the reversal of localized tissue hypoxia, which may be secondary to ischemia or to other local factors within the compromised limb.

In the hypoxic wound, hyperbaric oxygen therapy acutely corrects the pathophysiology related to oxygen deficiency and impaired wound healing. A key factor in hyperbaric oxygen therapy's enhancement of the hypoxic wound environment is its ability to establish adequate oxygen availability in the vascularized connective tissue compartment that surrounds the wound. Proper oxygenation of the vascularized connective tissue compartment is crucial to the efficient initiation of the wound repair process and becomes an

important rate-limiting factor for the cellular functions associated with several aspects of wound healing. Neutrophils, fibroblasts, macrophages, and osteoclasts are all dependent upon an environment in which oxygen is not deficient in order to carry out their specific inflammatory or repair functions. Two groups of induced responses occur:

1) Improved leukocyte function of bacterial killing, antibiotic potentiation, and enhanced collagen synthesis occur during periods of elevated tissue PO2.

2) Suppression of bacterial toxin synthesis, blunting of systemic inflammatory responses, and prevention of leukocyte activation and adhesion following ischemic reperfusion are effects that may persist even after completion of hyperbaric oxygen treatment.

In addition, vascular endothelial growth factor (VEGF) release is stimulated and platelet derived growth factor (PDGF) receptor appearance is also induced. The net result of serial hyperbaric oxygen exposures is improved local host immune response, clearance of infection, enhanced tissue growth and angiogenesis with progressive improvement in local tissue oxygenation and epithelialization of hypoxic wounds.

Since 1999 there have been eight published, independent evidence-based reviews that have addressed the effectiveness of hyperbaric oxygen treatment in problem, chronic wounds. These reviews have evaluated the results of:

1) Four randomized controlled clinical trials of hyperbaric oxygen treatment in diabetic lower extremity wounds,

2) Two randomized controlled trials in non-diabetic leg ulcers or where wound healing was not the outcome indicator,

3) Two non-randomised controlled trials in diabetic lower extremity wounds,

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4) One prospective case series of hyperbaric oxygen treatment and infra popliteal angioplasty in diabetic lower extremity wounds,

5) Eight prospective or retrospective uncontrolled case series in diabetic lower extremity wounds.

In the controlled trials, 334 patients were included in the hyperbaric oxygen treatment arms and 582 patients in the control arms. In the case series, 1590 patients were reported. There are additional small retrospective series.

In summary, the available evidence supports classifying the use of adjunctive hyperbaric oxygen treatment for diabetic foot ulcers and meets the requirements for AHA Class I. This is definitely recommended based on Level A evidence of positive randomized controlled trials with statistically positive results. In the broader category of hypoxic wounds, based on the absence of trials using measured tissue hypoxia as a patient inclusion criterion, adjunctive hyperbaric oxygen treatment meets the requirements for AHA Class IIb. Further it is acceptable and useful with fair to good evidence supported by limited level clinical trial data but with substantial level B non-randomized retrospective case studies.