En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Covid-19 och HBO

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige. Karolinska Sjukhuset/ Karolinska Institutet, Försvaret och Region Blekinge skall starta 140 kPa, 90 minuter. I Kina har man provat 160 kPa i 120 minuter. Andra föreslår 200 kPa i 90 minuter.

Sammanställning av några aktuella länkar. Om du inte vill titta på länkarna kan du bara scrolla ner i detta dokument så finns här ett sammandrag av länktexterna.

https://www.biobarica.com/en/covid-19-hbot-in-the-treatment-of-pulmonary-hypoxia/

https://clinicaltrials.gov/ct2/show/NCT04327505?term=hbo&cond=COVID&draw=2&rank=1

https://www.ihausa.org/covid19-hyperbaric-therapy/

https://clinicaltrials.gov/ct2/show/NCT04332081

http://www.medgasres.com/preprintarticle.asp?id=282177

https://www.kalb.com/content/news/Louisiana-hospital-using-Hyperbaric-Oxygen-Therapy-to-treat-extreme-cases-of-COVID-19-569868541.html

https://hbot.com/hyperbaric-application-to-covid-19-pulmonary-infection/

https://www.ncbi.nlm.nih.gov/pubmed/32344310

https://clinicaltrials.gov/ct2/show/NCT04327505?term=hbo&cond=COVID&draw=2&rank=1

Safety and Efficacy of Hyperbaric Oxygen for ARDS in Patients With COVID-19 (COVID-19-HBO)

ClinicalTrials.gov Identifier: NCT04327505

Recruitment Status : Not yet recruiting
First Posted : March 31, 2020
Last Update Posted : April 28, 2020
See **Contacts and Locations**

Sponsor:
Karolinska Institutet

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Collaborators:
Karolinska Trial Alliance
University of California, San Diego
Blekinge County Council Hospital
JK Biostatistics AB
The Swedish Research Council
Information provided by (Responsible Party):
Anders Kjellberg, MD, Karolinska Institutet

Study Description

Brief Summary:
COVID-19 may cause severe pneumonitis that require ventilatory support in some patients, the ICU mortality is as high as 62%. Hospitals do not have enough ICU beds to handle the demand and to date there is no effective cure.
We explore a treatment administered in a randomized clinical trial that could prevent ICU admission and reduce mortality.
The overall hypothesis to be evaluated is that **HBO** reduce mortality, increase hypoxia tolerance and prevent organ failure in patients with COVID19 pneumonitis by attenuating the inflammatory response.

Condition or disease

SARS (Severe Acute Respiratory Syndrome)Cytokine StormARDS, Human**COVID-**19**Sars-CoV2**Acute Respiratory Failure

Detailed Description:
Main objective: To evaluate if HBO reduce the number of ICU admissions compared to Best practice for COVID-19
Secondary objectives:
Main secondary objectives:
To evaluate if HBO:
reduces mortality in severe cases of COVID-19.
reduces morbidity associated with COVID-19.
reduce the load on ICU resources in COVID-19.
mitigate the inflammatory reaction in COVID-19.
Other secondary objectives (in selection):
To evaluate if HBO is safe for SARS-CoV-2 positive patients and staff.
Study design: Randomized, controlled, phase II, open label, multicentre
Study population: Adult patients with SARS-CoV-2 infection, with at least two risk factor for increased mortality, likely to develop ARDS criteria and need intubation within 7 days of admission to hospital.
Number of subjects: 200 (20+180)
Investigational product: Hyperbaric oxygen (HBO) compared with best practice treatment HBO: HBO 1.6-2.4 ATA for 30-60 min, maximum 5 treatments first 7 days Control: Best practice treatment for COVID-19

Study Design

Study Type :	Interventional (Clinical Trial)
Estimated Enrollment :	200 participants

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Allocation:	Randomized
Intervention Model:	Parallel Assignment
Intervention Model Description:	Randomized controlled, open label, multi-centre clinical trial
Masking:	None (Open Label)
Primary Purpose:	Treatment
Official Title:	A Randomized, Controlled, Open Label, Multicentre Clinical Trial to Explore Adult Patients With **COVID-**19
Estimated Study Start Date :	May 8, 2020
Estimated Primary Completion Date :	November 30, 2021
Estimated Study Completion Date :	December 31, 2022

Resource links provided by the National Library of Medicine

MedlinePlus related topics: Oxygen Therapy
Genetic and Rare Diseases Information
Center resources: Severe Acute Respiratory Syndrome Respiratory Distress Syndrome, Infant
Acute Respiratory Distress Syndrome
U.S. FDA Resources

Arms and Interventions

Arm
Experimental: Hyperbaric oxygen Hyperbaric oxygen 1,6-2.4 Bar for 30-60 minutes (compression/decompression time, according to local routines) in additi
No Intervention: Control Best practice

Outcome Measures

Primary Outcome Measures :

ICU admission [Time Frame: Through study completion 30 days]

The proportion of subjects admitted to ICU from day 1 to day 30, based on at least one of the following criteria:

i) Rapid progression over hours ii) Lack of improvement on high flow oxygen >40L/min or non invasive ventilation with fraction of inspired oxygen (FiO2) > 0.6 iii) Evolving Hypercapnia or increased work of breathing not responding to increased oxygen despite maximum standard of care available outside ICU iv) Hemodynamic instability or multi organ failure with maximum standard of care available outside ICU

Secondary Outcome Measures :

30-day mortality [Time Frame: Through study completion 30 days]

Proportion of subjects with 30-day mortality, all cause Mortality, from day 1 to day 30.

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Time-to-intubation [Time Frame: Through study completion 30 days]
Time-to-Intubation, i.e. cumulative days free of invasive mechanical ventilation, from day 1 to day 30

Time-to-ICU [Time Frame: Through study completion 30 days]
Time-to-ICU, i.e. cumulative ICU free days, derived as the number of days from day 1 to ICU, where all ICU free subjects are censored at day 30.

Inflammatory response [Time Frame: Through study completion 30 days]
Mean change in inflammatory response from day 1 to day 30.
White cell count + differentiation
Procalcitonin
C-Reactive protein
Cytokines (IL-6) (if available at local laboratory)
Ferritin
D-Dimer
LDH

Overall survival [Time Frame: Through study completion 30 days]
Overall survival (Kaplan-Meier)

Other Outcome Measures:
Hospital mortality [Time Frame: Through study completion 30 days]
Hospital mortality of any cause, proportion of subjects, from day 1 to day 30.

ICU mortality [Time Frame: From ICU admission to study completion 30 days]
Proportion of subjects with ICU mortality, Mortality of any cause in ICU, from day 1 to day 30.

Time in Invasive Ventilation [Time Frame: From ICU admission to study completion 30 days]
Time-to-stop of intubation/invasive mechanical ventilation, from ICU admission to day 30.

NEWS [Time Frame: Through study completion 30 days]
Mean daily NEWS from day 1 to day 30.

PaO2/FiO2 (PFI) [Time Frame: Through study completion 30 days]
Mean change in PaO2/FiO2 (PFI), from day 1 to day 2, … to day 30.

HBO Compliance [Time Frame: Day 1 to day 7]
Proportion of **HBO** treatments given vs planned.
Proportion of subjects with **HBO** treatment administered within 24h after enrolment.

Hospital discharge [Time Frame: Through study completion 30 days]
Time-to-discharge from hospital

Oxygen dose [Time Frame: Through study completion 30 days]

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Mean oxygen dose per day including **HBO** and cumulative pulmonary oxygen toxicity expressed as Units of oxygen pulmonary toxicity dose (UPTD) and Cumulative pulmonary toxicity dose (CPTD) from day 1 to day 30.

HBO dose [Time Frame: Day 1 to day 7]
Median number of **HBO** treatments and dose of **HBO** given, from day 1 to day 7

Micro RNA [Time Frame: Through study completion 30 days]
Change in expression of Micro RNA in plasma from day 1 to day 30

Hypoxic response [Time Frame: Through study completion 30 days]
Change in gene expression and Micro RNA interactions in Peripheral Blood Mononuclear Cells (PBMC) (20 Subjects) from day 1 to day 30

Immunological response [Time Frame: Through study completion 30 days]
Immunological response (20 subjects) from day 1 to day 30 in the following.
Cytokines extended including (IL-1β, IL-2, IL-6, IL33 and TNFα)
Lymphocyte profile
Flowcytometry with identification of monocyte/lymphocyte subsets including but not limited to CD3+/CD4+/CD8+ and CD4+/CD8+ ratio
FITMaN panel/Flow cytometry, Interleukins (IL-1β, IL-2, IL-6, IL33 and TNFα),
T-reg cells (CD3+/CD4+/CD25+/CD127+)
Monocyte proliferation markers, Ex vivo monocyte function

Multi organ dysfunction [Time Frame: Through study completion 30 days]
Mean change in routine biomarkers for organ dysfunction, from day 1to day 30.

Viral load [Time Frame: Through study completion 30 days]
Viral load, review of records from day 1 to day 30.

Secondary infections [Time Frame: Through study completion 30 days]
Number of secondary infections, review of records, number of events and patients from day 1 to day 30.

Pulmonary embolism [Time Frame: Through study completion 30 days]
Diagnosed PE needing treatment, review of records, number of events and patients from day 1 to day 30.

Pulmonary CT [Time Frame: Through study completion 30 days]
Changes on Pulmonary CT, review of records from day 1 to day 30.

Chest X-ray [Time Frame: Through study completion 30 days]
Changes on Chest X-ray, review of records from day 1 to day 30.

Lung ultrasound [Time Frame: Through study completion 30 days]
Changes in Lung ultrasound, review of records from day 1 to day 30.

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Eligibility Criteria

Ages Eligible for Study:	18 Years to 90 Years (Adult, Older Adult)
Sexes Eligible for Study:	All
Gender Based Eligibility:	Yes
Gender Eligibility Description:	Adults, all genders
Accepts Healthy Volunteers:	No

Criteria

Inclusion criteria:
Aged 18-90 years
PaO2/FiO2 (PFI) below 200 mmHg (26.7 kPa)
Suspected or verified SARS-CoV-2 infection
At least two risk factors for increased morbidity/mortality
Age above 50 years
Hypertension
Cardiovascular disease
Diabetes or pre-diabetes
Active or cured cancer
Asthma/COPD
Smoking
D-Dimer > 1.0
Auto-immune disease
Documented informed consent according to ICH-GCP and national regulations
Exclusion Criteria:
ARDS/pneumonia caused by other viral infections (positive for other virus)
ARDS/pneumonia caused by other non-viral infections or trauma
Known pregnancy or positive pregnancy test in women of childbearing age
Patients with previous lung fibrosis more than 10%
CT- or Spirometry-verified severe COPD with Emphysema
Contraindication for HBO according to local guidelines
Not likely to need ICU admission < 7 days of screening (Subjective criteria that may exclude any patients that fulfil the other inclusion criteria but where the treating physician suspect a spontaneous recovery)
Mental inability, reluctance or language difficulties that result in difficulty understanding the meaning of study participation
Prisoner (Exclusion criteria according to IRB at UCSD)

Contacts and Locations

Contacts

Contact: Anders Kjellberg, MD	+46812375212	anders.kjellberg@ki.se
Contact: Peter Lindholm, MD, PhD	+16508230735	peter.lindholm@health.ucsd.edu

Sponsors and Collaborators

Karolinska Institutet
Karolinska Trial Alliance

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

University of California, San Diego
Blekinge County Council Hospital
JK Biostatistics AB
The Swedish Research Council
Investigators

Principal Investigator:	Anders Kjellberg, MD	Karolinska Institutet
Study Chair:	Peter Lindholm, MD, PhD	Karolinska Institutet
Study Chair:	Kenny Rodriguez-Wallberg, MD, PhD	Karolinska Institutet

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https://www.biobarica.com/en/covid-19-hbot-in-the-treatment-of-pulmonary-hypoxia/

In the midst of the coronavirus pandemic and in the dilemma if hyperbaric oxygen can reverse pulmonary hypoxia (cause of death in patients with COVID-19), 5 severe cases of COVID-19 were treated in Wuhan by Dr. Zhong Yianling with hyperbaric oxygenation therapy (HBOT) at 1.6 ATA and sessions of 120 minutes.

Dr. Yianling promotes the use of HBOT as a therapy for critically ill patients with COVID-19 since it would generate greater efficiency in treatment, reduce pressure on health personnel, diminish the risk of infection, and decrease the mortality rate of critic patients.

As evidence, it presents the successful treatment of five patients, of which two presented critical symptoms and three were severe. It was observed:

1. Quick relief of hypoxia symptoms: after the first session, dyspnea and chest pain were reduced. After the second session, symptoms basically decreased, the respiratory rate decreased, and difficulty breathing eased more slowly.
2. Quick correction of hypoxemia: A blood sample from each patient was analyzed at the beginning of the session. They all showed low oxygen saturation. At the end of the session, the low saturation was immediately reversed. From the 5th day session, oxygen saturation was greater than 95% in all patients. At the end of the treatment, saturation was greater than 93%, and even arterial values recovered significantly.

This health professional suggests that HBOT is better than mechanical ventilation, with which they already have previous experience. That is because it has a higher oxygenation index and greater access to cells to reduce inflammation since oxygen is diluted in plasma.

By inhaling oxygen at high pressures, a greater range of gas diffusion and a higher concentration is obtained. This allows the thickening of the tissue to be overcome, due to inflammation and fibrosis of the lung tissue. HBOT is safe at the lung level and is evidenced in this study.

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

It reports a significant reduction in pulmonary hypoxia from the start, with marked improvement at 5 days of treatment as seen in pulmonary computed tomography images. It should be considered that many authors report a progressive worsening of pulmonary hypoxia with its maximum peak at 10 days, even in patients who were cured of COVID-19 (Pan, 2020).

In conclusion, the author considers HBOT in the treatment of pulmonary hypoxia as a safe and clearly superior treatment compared to other methods such as mechanical ventilation and extracorporeal membrane oxygenation (ECMO) for pulmonary oxygenation. In conjunction with other pharmacological and non-pharmacological therapeutic lines, this treatment could reduce the rate of infection and mortality in the COVID-19 pandemic.

Source

Pan F et al. Time Course of Lung Changes On Chest CT During Recovery From 2019 Novel Coronavirus (COVID-19) Pneumonia. Radiology. 2020 13: 200370.

Link: https://www.ihausa.org/covid19-hyperbaric-therapy/

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https://clinicaltrials.gov/ct2/show/NCT04332081

Detailed Description:
This is a single center prospective pilot cohort study to evaluate the safety and efficacy of hyperbaric oxygen therapy (HBOT) as an emergency investigational device for treating patients with a novel coronavirus, disease, COVID-19. Patients that meet inclusion criteria will be consented by the hyperbaric physician. They will then be transported from the ED or other unit to the hyperbaric unit maintaining airborne precautions based on the most current hospital protocol. All study personnel will have proper PPE at all times. The patient will then be placed into the monoplace chamber and when the chamber door is closed the patient will remove any respiratory filter/mask that was placed. The patient will receive 90 minutes of hyperbaric oxygen at 2.0 ATA with or without airbreaks per the hyperbaric physician. Upon completion of the treatment the patient will then return to the medical unit and continue all standard of care. Additional treatments (up to 5) can be given if warranted and agreed upon by the patient and all members of the team caring for the patient. After the intervention portion of this study, a chart review will be performed to compare the outcomes of intervention patients versus patients who received standard of care.

Study Type :	Interventional (Clinical Trial)
Estimated Enrollment :	40 participants
Allocation:	Non-Randomized
Intervention Model:	Single Group Assignment
Intervention Model Description:	prospective pilot cohort study
Masking:	None (Open Label)
Primary Purpose:	Treatment
Official Title:	Open Label Single-Center Study of Emergency Hyperbaric Oxygen for Re
Actual Study Start Date :	April 6, 2020
Estimated Primary Completion Date :	July 2020

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Estimated Study Completion Date : July 2020

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http://www.medgasres.com/preprintarticle.asp?id=282177

COMMENTARY

Ahead of print publication

Hyperbaric oxygen treatment of novel coronavirus (COVID-19) respiratory failure

Paul G Harch
Department of Medicine, Section of Emergency and Hyperbaric Medicine, Louisiana State University Health Sciences Center, New Orleans, LA, USA

Date of Submission	31-Mar-2020
Date of Acceptance	01-Apr-2020
Date of Web Publication	13-Apr-2020

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Login to access the email ID

Source of Support: None, **Conflict of Interest:** None

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Recently, two articles [1],[2] published in China featured the application of hyperbaric oxygen therapy in patients with novel coronavirus 19 (COVID-19) pneumonia. The first was a case report of a severely ill patient who was failing standard respiratory support (not intubated) and whose disease course was reversed with eight hyperbaric oxygen treatments (HBOTs) at 200 kPa/95 minutes total treatment time. The second was a more severely afflicted patient on a ventilator with acute respiratory distress syndrome (ARDS) whose life was saved by the application of five HBOTs. By direct voice and electronic communication with the authors/treating physicians this author has reviewed the data and treatment of four additional severely ill COVID-19 patients with bilateral ground glass opacities who were failing standard mask oxygen therapy, were treated with 3-5 HBOTs and discharged from the hospital to home. The authors reported that they have safely treated an additional 29 less severe patients with the same outcome. The five non-intubated patients had been on oxygen support for days to weeks with immediate pre-HBOT oxygen saturation levels as low as 70% on mask oxygen. With each once daily administration of HBOT the patients experienced sustained elevation of oxygen saturation and improvement in symptoms that persisted to the following morning [Figure 1]. With just 3-8 HBOTs the patients were bridged through the hypoxemic crisis phase of the infection and successfully

discharged from the hospital. The authors suggested that HBOT applied earlier in the disease process would prevent the deterioration that leads to the significant morbidity and mortality of COVID-19 infection.

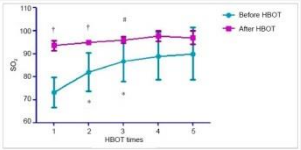

Figure 1: Daily mean blood oxygen saturation levels before and after each HBOT in five COVID-19 patients. Note: Data are expressed as mean ± SD. *P < 0.05, *vs*. pre-first HBOT; #P < 0.05, *vs*. post-first HBOT; †P < 0.05, *vs*. pre-HBOT for that day. Figure taken online from freely available document that was identical to data provided to this author by the Chinese authors. HBOT: Hyperbaric oxygen treatments; SO2: oxygen saturation.

Click here to view

The application of HBOT to COVID-19 pneumonia/hypoxemia is supported by sound physiology and Henry's Law. Henry's Law is the basis for the normal exchange of gases in our lungs. It states that the concentration in a liquid (pulmonary blood) of an interfacing gas (oxygen in the alveoli of the lungs) is proportional to the pressure of the interfacing gas. Final oxygen uptake and binding to hemoglobin in pulmonary capillary red blood cells is dependent on the diffusion of dissolved oxygen from alveolar wall→pulmonary interstitium→capillary wall→blood plasma→red blood cell membrane→red blood cell cytoplasm→hemoglobin. Interference with this process at any point results in decreased oxygen-hemoglobin binding. In COVID-19 pneumonia patients the barrier to diffusion is in the alveoli (inflammatory exudate-pneumonia) and inflamed interstitium. Standard therapy is to exploit Henry's Law by increasing the pressure of oxygen in the alveoli (increasing the fractional inspired oxygen concentration): nasal cannula→venti-mask→non-rebreather mask→endotracheal intubation. As the pneumonitis and hypoxemia progress standard therapy cannot penetrate the diffusion barriers in the lungs because they are limited by ambient pressure. In addition, it cannot treat the accumulating oxygen debt and intense pulmonary and systemic inflammatory reaction. The options are to bypass the lungs with extracorporeal membrane oxygenation (ECMO) or surmount the limits to dissolution of oxygen in tissue and the barriers to oxygen diffusion by further exploiting Henry's Law with HBOT and increased pressure above ambient pressure.

Through Henry's Law HBOT enhances multiple stages in the above process by increasing: 1) the dissolving of oxygen in the alveolar and inflammatory barrier, 2) the diffusion rate of oxygen, 3) the diffusion distance of oxygen, 4) the dissolution of oxygen in blood plasma, 5) the oxygen saturation of hemoglobin in red blood cells, and 6) the delivery of oxygen to the microcirculation and tissue. The net result is a reversal of the downward spiral of COVID-19 patients. The elevation of systemic levels of oxygen with HBOT has been traditionally misunderstood in terms of respiratory metabolite effects with a transient hyperoxemia that dissipates once the patient leaves the chamber. However, for 358 years, and especially in the modern era (1960 to present), permanent and later trophic effects of HBOT have been documented with both single and repetitive HBOT. [3] One of the mechanisms of action was recently elucidated as epigenetic modulation through direct effects of hydrostatic pressure and hyperoxia of gene expression/suppression of over 40% of the protein-coding genes in the human genome. The largest clusters of upregulated genes are the growth, repair, cell signaling, and anti-inflammatory genes, and the largest clusters of down-regulated genes are the pro-inflammatory genes and those that control programmed cell death. A single HBOT has been shown in multiple studies to have dramatic persisting effects on disease pathophysiology, especially inflammation, its ubiquitous acute form, reperfusion injury (e.g., carbon monoxide poisoning, necrotizing infection, resuscitation, and others), and extreme form ARDS,[4] and on reversing the lethal oxygen debt from cardiac arrest. [3] In the Chinese COVID-19 patients HBOT was likely treating pulmonary and systemic hypoxia, inflammation, other pulmonary pathophysiologic targets, reversing oxygen debt, and modulating gene expression both acutely and durably as evidenced by the patient's sustained improvement with each daily HBOT.

The strength of these five cases is reinforced by historical precedence. Unwittingly, the Chinese physicians replicated an historical experience with HBOT in a near identical pulmonary viral pandemic, the Spanish flu pandemic of 1918. Dr. Orval Cunningham of Kansas City, USA applied hyperbaric oxygen therapy (pressure and oxygen) to a moribund cyanotic Spanish flu patient with agonal breathing who experienced the same dramatic reversal of his disease that the Chinese physicians witnessed. He used the near-identical pressure, 1.6 ATA (1 ATA = 101.32 kPa), and number of treatments, but less oxygen [5].

While HBOT treatment of these patients was life-saving the authors carefully explained their infection control procedures for the hyperbaric department and chambers. None of their staff became infected with the treatment of 35 COVID-19 patients while healthcare worker transmission has accounted for significant numbers of hospitalized patients in both China and the USA. Strict infection control must be practiced to deliver this therapy or hyperbaric chambers will act as disease vectors and amplify the spread of coronavirus through cross-contamination of healthcare workers and other patients.

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

In conclusion, preliminary evidence from China strongly suggests that based on the immutable science of HBOT and recent clinical application to deteriorating severely hypoxemic COVID-19 pneumonia patients HBOT has significant potentialto impact the COVID-19 pandemic.

Dr. Harch has a consulting company that consults on hyperbaric medicine, renders expert opinions, and provides longterm care to his patients by installing hyperbaric chambers in his patients' homes.

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1. Zhong X, Tao X, Tang Y, Chen R. The outcomes of hyperbaric oxygen therapy to retrieve hypoxemia of severe novel coronavirus pneumonia: first case report. *Zhonghua Hanghai Yixue yu Gaoqiya Yixue Zazhi.* 2020. doi: 10.3760/cma.j.issn.1009-6906.2020.0001.
2. Zhong XL, Niu XQ, Tao XL, Chen RY, Liang Y, Tang YC. The first case of HBOT in critically ill endotracheal intubation patient with COVID-19. Beijing, China: Novel Coronavirus Pneumonia Research Network Sharing Platform of China Association for Science and Technology. 2020.
3. Jain KK. *Textbook of Hyperbaric Medicine*. 6th ed. Cham, Switzerland: Springer. 2017.
4. Rogatsky GG, Shifrin EG, Mayevsky A. Acute respiratory distress syndrome in patients after blunt thoracic trauma: the influence of hyperbaric oxygen therapy. *Adv Exp Med Biol.* 2003;540:77-85.
5. Sellers LM. The fallibility of the forrestian principle. "semper primus pervenio maxima cum VI". *Laryngoscope.* 1964;74:613-633.

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https://www.kalb.com/content/news/Louisiana-hospital-using-Hyperbaric-Oxygen-Therapy-to-treat-extreme-cases-of-COVID-19-569868541.html

By KAILEY MCCARTHY |
Posted: Wed 7:05 PM, Apr 22, 2020

ALEXANDRIA, La. (KALB) - Oxygen treatments can be an effective way to treat COVID-19 patients suffering from severe respiratory distress.

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Source: Opelousas General Health System

One hospital in Louisiana is using the treatment to prevent patients from being placed on a ventilator.

Opelousas General Health System is paving the way when it comes to COVID-19.

The hospital is offering a new treatment option for patients that are on high-flow oxygen and still breathing rapidly, unable to get enough oxygen to their system.

“Some of these patients, the ones who are really, severely ill, the virus somehow seems to affect their ability to carry oxygen effectively and also at the same time, there’s the damage to the lungs the virus causes," said Kerry Thibodeaux, M.D., F.A.C.S, Certified Wound Care Specialist Physician at Opelousas General.

They've begun using hyperbaric oxygen therapy, a type of treatment that's been around for several years but has never been used on COVID-19 patients.

“We place a patient inside a chamber of some sort and then enclosing, as it seals up then you pressurize it with 100% oxygen," said Thibodeaux.

The treatment delivers oxygen to the body without having to depend on the red blood cells.

“Once you get them in the chamber and pressurize it and they start to become saturated with oxygen, every patient’s respiratory rate slows down significantly and they actually start to feel a whole lot better," said Thibodeaux.

Earlier this month was when medical professionals at Opelousas General considered the use of hyperbaric therapy for patients who are on high-flow oxygen, still struggling to breathe.

“We were very optimistic that it would help them but nobody other than the Chinese have actually done hyperbaric therapy for the hypothesis related to COVID-19," said Thibodeaux.

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Now patients who are admitted to the hospital requiring high-flow oxygen are evaluated by the hyperbaric team.

They use oxygen therapy in what's known as an off-label situation which requires the consent of the patient.

So far, each patient that's received treatment has seen positive results.

“All six patients have responded very well to therapy, with some of them being discharged already," said Thibodeaux.

Thibodeaux says each patient showed a much slower respiratory rate and felt immediate symptomatic relief.

With this type of treatment, critically ill patients can avoid being placed on a ventilator. A procedure local M.D. David Kalantar says can have lasting effects.

“The high pressure used in the ventilator has done some damage so we’re just using it in the worst-case scenario," said Kalantar.

He recommends breathing exercises such as taking at least five deep breaths an hour to strengthen the lungs.

If you're sick at home with COVID-19, he says home remedies such as zinc and lemon juice are your best bet.

Kalantar adds it's crucial that if you've had the novel coronavirus to keep the plasma so that you can donate it to help find a vaccine for COVID-19.

#

https://hbot.com/hyperbaric-application-to-covid-19-pulmonary-infection/

Update 3/17/2020: Potential of HBOT Treatment for Coronavirus is Supported by New Evidence. However, Be Cautious of Opportunists!

In the last 24 hours, two new pieces of evidence have surfaced supporting Dr Harch’s original proposal of 3/3/2020 to consider HBOT for the treatment of coronavirus infection.

Today, the publication of a retrospective analysis of lung CT scans on 121 patients infected with coronavirus in four Chinese provinces was announced. The CT scans showed progressive air space disease that radiologically depicted the diffusion barrier to oxygen that Dr. Harch suggested was similar to the lung pathology in Spanish Flu victims of 1918.

En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Simultaneously, Dr. Harch's research assistant found evidence of successful treatment of a severe case of coronavirus infection in Wuhan, China. The patient was treated through the critical period with a similar number of daily hyperbaric treatments that Dr. Orval Cunningham used on his Spanish Flu cases in 1918. This Chinese patient managed to successfully traverse the critically ill period and was no longer in jeopardy.

This successful treatment, however, is a double-edged sword. Infection transmission is facilitated in hyperbaric chamber environments. Look no further than saturation diving conditions, where strict sanitation and infection control measures are industry standards. Coronavirus-infected patients should only be treated by medical professionals who are trained, experienced, and equipped to provide HBOT treatment under strict infection mitigated conditions.

Beware of clinics and opportunists advertising to "boost immunity" or treat coronavirus patients in portable chambers or other chambers in freestanding centers without qualified healthcare professionals trained, experienced and equipped to practice with strict infection control. This type of opportunism has beset the hyperbaric medicine field for centuries. Opportunists like this are responsible for the disparagement of hyperbaric therapy that has overshadowed the science and clinical wonder of this therapy. Hyperbaric clinics that are not equipped to treat coronavirus will act as vectors to amplify disease dissemination. Beware.

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Respiratory conditions in coronavirus disease 2019 (COVID-19): Important considerations regarding novel treatment strategies to reduce mortality.

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En sammanställning från webben 20200515 av HÖ med anledning av att man skall börja med HBO till Covid-19 patienter i Sverige.

Abstract

A novel virus named 2019 novel coronavirus (2019-nCoV/SARS-CoV-2) causes symptoms that are classified as coronavirus disease (COVID-19). Respiratory conditions are extensively described among more serious cases of COVID-19, and the onset of acute respiratory distress syndrome (ARDS) is one of the hallmark features of critical COVID-19 cases. ARDS can be directly life-threatening because it is associated with low blood oxygenation levels and can result in organ failure. There are no generally recognized effective treatments for COVID-19, but treatments are urgently needed. Anti-viral medications and vaccines are in the early developmental stages and may take many months or even years to fully develop. At present, management of COVID-19 with respiratory and ventilator support are standard therapeutic treatments, but unfortunately such treatments are associated with high mortality rates. Therefore, it is imperative to consider novel new therapeutic interventions to treat/ameliorate respiratory conditions associated with COVID-19. Alternate treatment strategies utilizing clinically available treatments such as hyperbaric oxygen therapy (HBOT), packed red blood cell (pRBC) transfusions, or erthropoiesis-stimulating agent (ESA) therapy were hypothesized to increase oxygenation of tissues by alternative means than standard respiratory and ventilator treatments. It was also revealed that alternative treatments currently being considered for COVID-19 such as chloroquine and hydroxychloroquine by increasing hemoglobin production and increasing hemoglobin availability for oxygen binding and acetazolamine (for the treatment of altitude sickness) by causing hyperventilation with associated increasing levels of oxygen and decreasing levels of carbon dioxide in the blood may significantly ameliorate COVID-19 respiratory symptoms. In conclusion, is recommend, given HBOT, pRBC, and ESA therapies are currently available and routinely utilized in the treatment of other conditions, that such therapies be tried among COVID-19 patients with serious respiratory conditions and that future controlled-clinical trials explore the potential usefulness of such treatments among COVID-19 patients with respiratory conditions.

KEYWORDS:

2019-nCoV; EPO; Pulmonary; SARS-CoV-2

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