

Korean Academy of
Undersea and Hyperbaric Medicine

고압산소 치료 시 응급상황

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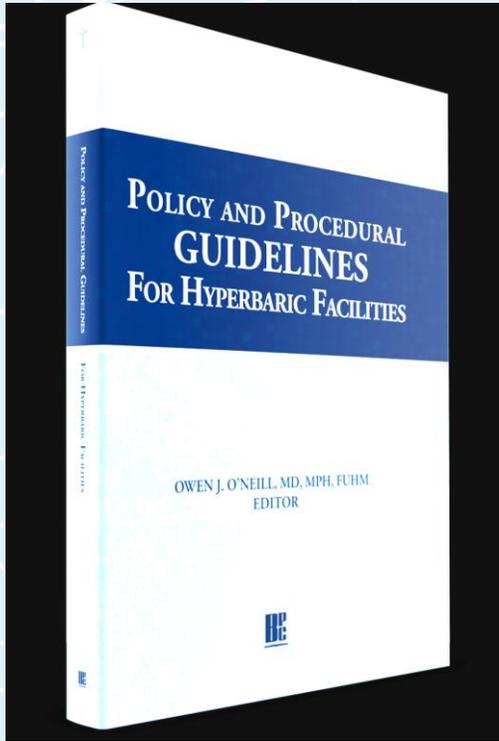
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I Barotrauma on compression

➤ Ear and Sinus Squeeze

- Risk factors include secondary causes of eustachian tube dysfunction:
 - Current cold or allergy
 - Ear infection
 - Blocked eustachian tube
 - Radiation to head/neck area
 - Trauma to head/neck area
 - Surgery to head/neck area
 - External ear canal packing
 - Endotracheal tube



I Barotrauma on compression

➤ Pretreatment Patient Assessment

- Screen patient for history of ear, sinus and tooth problems(dental caries).
- Screen for patient experiences with changes in pressure(flying, diving, mountain roads).
- Assess patient ear with attention to external auditory canal and the tympanic membrane.
- Instruct patient on modified Valsava maneuver and document movement of TM with equalization maneuvers.
- Assess tympanic membrane pre- and post-HBO2 treatment, recording per TEED or O'neil grading systems, noting level, if any, of barotrauma.



I Barotrauma on compression

➤ Prior to HBO₂ Treatment

- Per physician order, administer decongestant, if needed.
 - Recommend nasal spray or oral decongestant based on primary or secondary ETD
- Elevate the head(semisitting or sitting) during HBO₂ therapy to assist in equalization of middle ear
- Ensure chamber operator understands compression should stop when patient is unable to equalize ears due to pressure and should decompress until pain and/or pressure are relieved.
- Patient education of eustachian tube dysfunction and potential barotrauma prior to HBO₂ therapy:
 - Methods to equalize pressure in middle ear during compression
 - Patient demonstration of equalization techniques prior to every HBO₂ treatment
 - Instruct patient to notify chamber operator immediately when pressure or fullness is felt in ear, sinus or tooth.

➤ Changing the rate of compression of the hyperbaric chamber may allow for easier equalization of ear pressure

- Monitor patient closely for any signs of pain or discomfort during compression



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I Barotrauma on compression

➤ Action when patient is experiencing barotrauma during pressurization:

- Stop compression immediately.
- Notify hyperbaric physician (Class B chamber) or the chamber operator(Class A chamber), who will notify the hyperbaric physician.
- Reduce chamber pressure until pain is resolved.
- Have patient perform ear clearing techniques as instructed prior to ascent.
- If unable to clear ears, reduce pressure further.
- If pain had not resolved, abort treatment and notify physician.
- Assess ears when patient treatment is finished, reporting per TEED or O'Neil grading systems, noting level, if any of barotrauma.
- Notify physician of patient ear, sinus or tooth pain during treatment.
- Future patient treatment will be held until evaluated by the hyperbaric physician.
- An ENT consult may be required to examine and/or place PE(pressure equalizer) tube or perform a myringotomy if needed to continue with HBO2 treatments.
- If patient experiences tooth squeeze, refer patient to a dentist for evaluation.
- Patients who suffer barotrauma are not treated in the hyperbaric chamber until cleared by the hyperbaric physician.



II Claustrophobia/Confinement anxiety

- Talk with and console patient.
- Decompress at a normal rate and remove the patient from the chamber.
- Educate the patient.
- Notify hyperbaric physician as a prescription for antianxiety medication may be of benefit.
- Referral of the patient to a Class A multiplace chamber may be of benefit in those patients refusing treatment in a Class B monoplace chamber.
- Referral to a Class B monoplace chamber may benefit patients refusing to wear a BIBS mask or hood.



III Pneumothorax on ascent

➤ Risk factors

- Recent invasive procedures(Central lines, etc.)
- History of spontaneous pneumothorax(can mimic anxiety and cardiac distress)

➤ A pneumothorax will get worse upon ascent.

- Monitor patient and don't compress or decompress the chamber until ordered to do so by the hyperbaric physician.
- Preventive measure: Chest auscultation prior to every HBO2 treatment. Chest X-ray indicated for abnormal breath sounds, decreased or absent breath sounds or difficulty breathing.

➤ Signs and symptoms of pneumothorax(will see on ascent)

- Sudden shortness of breath
- Sudden chest pain
- Tracheal shift toward the affected side
- Asymmetrical chest movement or lack of chest movement on affected side
- Increase in respiratory distress with decompression and relief upon recompression



III Pneumothorax on ascent

➤ Action

- Notify hyperbaric physician immediately
 - HOLD pressure in chamber until physician arrives and a full management team is assembled. The decision to treat a pneumothorax inside the Class A chamber may be considered in extreme circumstances such as with a tension pneumothorax and unstable vital signs. This is a hyperbaric physician decision and will be left to his or her discretion.
 - Hyperbaric physician may choose to lock into the Class A chamber and treat the condition prior to ascent.
 - Have Code/Rapid Response Team available, or
 - Call 911 to have emergent responders available if located off-site of the hospital.
- Per physician order, may elect to recompress slightly to resolve symptoms.
- Prepare for emergent chest tube or needle placement when patient removed from the chamber by having the thoracentesis (chest tube) tray ready. (This will be performed inside Class A chamber prior to decompression.)
- Decompress chamber per hyperbaric physician order, usually taking no more than one minute
- Obtain STAT chest X-ray if time allows.



IV Grand mal seizure

➤ Oxygen toxicity - Central Nervous System

- Risk factors include:
 - Prior or current history of seizures
 - Elevated body temperature
 - Current therapeutic use of steroids
 - History of oxygen seizures
 - History of febrile seizures
 - Metabolic acidosis
- Premonitory signs and symptoms during the hyperbaric treatment may include, but are not limited to:
 - V Vision – Visual changes, blurred vision, visual hallucinations
 - E Ears – Auditory hallucinations, ringing in the ears
 - N Nausea – May include emesis
 - T Twitching – Restlessness, numbness, focal twitching (note time, duration and site)
 - I Irritability – Change in personality
 - D Dizziness – Vertigo
 - C Convulsions – Seizure activity
 - C Changes in mentation – Change in affect



IV Grand mal seizure

➤ Oxygen toxicity - Central Nervous System

• Actions

- Change the source of breathing from oxygen to air (Class A and Class B when available).
- Remove the patient's hood or BIBS mask (Class A).
- Ask the patient to put on air mask, if possible (Class B).
- Change chamber oxygen to air, if possible (Class B).
- Per physician order and if patient is breathing, decrease chamber pressure and abort current hyperbaric treatment (Class B).
- Remove the patient via the second lock, if available (Class A).
 - Once the seizure had resolved and patient back to baseline, wait 15 minutes and try treating with a lower oxygen dose.
 - If patient seizes a second time during an elective treatment, the hyperbaric physician may choose to abort therapy and search for secondary causes for oxygen toxicity
- Seizures occurring during prolonged treatment of Type II decompression sickness or air/gas embolism will be treated as directed by the hyperbaric physician (Class A and B)



IV Grand mal seizure

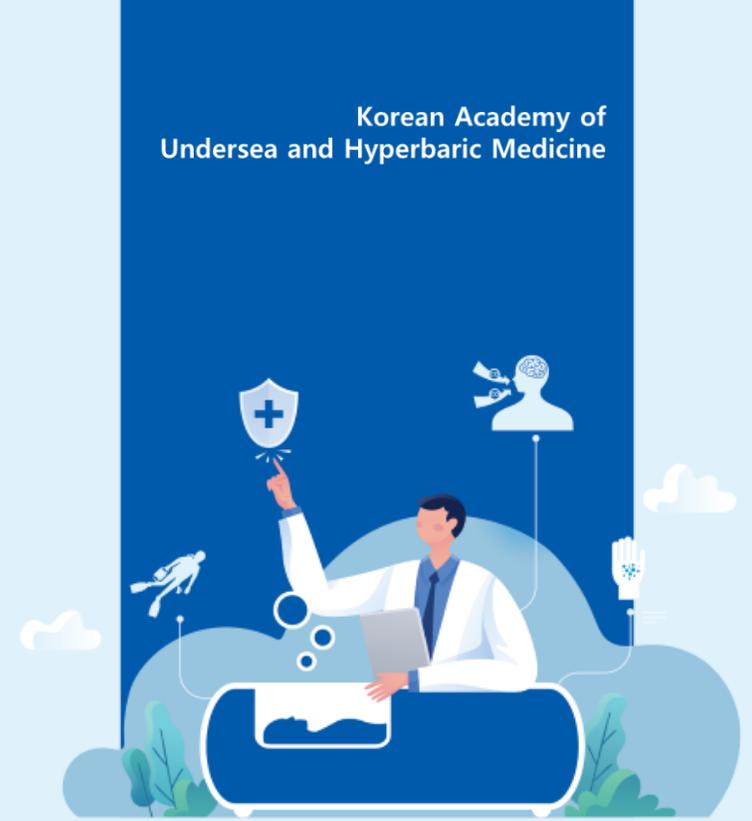
➤ Pulmonary Oxygen Toxicity

- ❖ HBO2 standard treatment tables decrease the potential that patients will experience pulmonary oxygen toxicity
- Risk factors may include, but are not limited to:
 - Intratracheal and bronchial irritation may develop with prolonged hyperbaric exposure.
 - Early changes are generally reversible
 - Prolonged hyperbaric exposure may result in ARDS
 - Symptoms include:
 - Substernal irritation or burning
 - Tightness in the chest
 - Dry cough
 - Dyspnea on exertion
- Notify the hyperbaric physician if signs and symptoms of pulmonary oxygen toxicity are suspected



V Cardiac/Respiratory arrest in the monoplace chamber

- Stop compression/decompression.
- Alert physician.
- Remove patient from chamber usually in less than a minute.
- Emergency button may be used.
- Remove patient from chamber – begin CPR.
- Remove patient from chamber side. (NOTE: Oxygen will spill out as chamber door is open.)
- Remove clothing and blankets to decrease chance of spark. (NOTE: It takes the oxygen 30-40 seconds to dissipate from around the patient.)
- Defibrillate after 60 seconds to decrease potential for fire



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Thank you



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