Dive (SCUBA) Injury or Accidents

Aliases

Barotrauma, bends, squeeze

Patient Care Goals

1. Rapid assessment and management of life-threatening injuries
2. Rescue from the water-based environment
3. Transport of patients suffering from self-contained underwater breathing apparatus (SCUBA) diving injury or illness for hospital evaluation and consideration of repressurization or hyperbaric oxygen therapy (HBOT)

Patient Presentation

Inclusion Criteria

Patients with history of recent (within 48 hours) SCUBA diving activity who are exhibiting potential signs and/or symptoms of dive related illness or injury, regardless of dive table compliance

Note: SCUBA-related complications may occur anywhere, particularly when divers travel by air within 24-hours of diving.

Exclusion Criteria

Patients without history of recent (within 48 hours) SCUBA diving exposure

Patient Management

Assessment

1. Follow Universal Care guideline.
2. Obtain patient history: It should include circumstances leading to the complaint; details of mechanism of injury; time under water; depth of dive; compliance with dive tables and decompression stops, gas mixture used, and water temperature (if available).
3. Be alert for signs of barotrauma (pulmonary barotrauma; arterial gas embolism; pneumothorax; ear, sinus, or dental barotrauma etc.); and/or decompression sickness (joint pain, mental status change, other neurologic symptoms including paralysis) or nitrogen narcosis (confusion, intoxication).
4. Assess for other associated injury such as injury to the head or spine (if mechanism and symptoms suggest); marine envenomation; hypothermia; or other injury.

Treatment and Interventions

1. Consider interventions for drowning or near-drowning, if a SCUBA accident includes this context [see Drowning guideline].
2. Manage airway as indicated.
3. If air embolism suspected, place in left lateral recumbent position (patient lying with the left side down, knees drawn upward, and flat).
4. Monitor vital signs including oxygen saturations and cardiac rhythm (if possible).
    a. Administer oxygen as appropriate for dyspnea or distress with a target of achieving greater than 93% saturation for most acutely ill patients.
    b. Use positive pressure ventilation carefully in patients for whom pulmonary barotrauma is a consideration [see Airway Management guideline].
5. Place patients with symptoms suggesting decompression illness on supplemental oxygen, regardless of saturations, to enhance washout of inert gases.
6. Assess for hypothermia, treat per Hypothermia/Cold Exposure guideline.
7. Consider contacting on-line medical control and discussing need for hyperbaric treatment and primary transport to facility with HBOT capability. Include discussion regarding factors such as

submersion time, greatest depth achieved, ascent rate, and gas mix.
8. Establish IV access ***[AEMT].***
9. Consider isotonic IV/IO fluid bolus 20 ml/kg***[AEMT]***

Patient Safety Considerations

1. If the patient is still in the water, seek safest and most rapid means of removal (within your scope of training) while minimizing risk of further injury.
2. Seek assistance early for special rescue, extrication, and transportation needs.
3. Check for multiple patients (e.g. group dive table calculation error(s) or contaminated dive gases).

Notes and Educational Pearls Key Considerations

- Rescue efforts should be coordinated between all responding agencies to ensure that the patient is rapidly accessed and safely removed from the water if the diver is unable to do so themselves.
- If air medical transport is necessary, the patient should be transported with the cabin pressurized to lowest possible altitude. If an unpressurized aircraft is used (e.g. most helicopter [HEMS] services), patient should be flown at the lowest safe altitude possible.
    - HEMS flight altitude in WI of minimal concern
- Decompression illness may have a variety of presentations depending on system affected (e.g. skin, joint(s), pulmonary, neurologic),
- SCUBA accidents or incidents can result in a variety of issues, including barotrauma, air embolism and decompression illness.

Pertinent Assessment Findings

- Vital signs findings
- Neurologic status assessment findings
- Respiratory assessment findings (e.g. oxygen saturation, respiratory rate)
- Subcutaneous emphysema findings

Quality Improvement

Associated NEMSIS Protocol(s) (eProtocol.01)

- 9914211—Injury-SCUBA Injury/Accidents
- 9914091—Injury-Diving Emergencies

Key Documentation Elements

- Water temperature, if available
- Dive history
    - Number of dives in recent history (days)
    - "Bottom time" in dives
    - Dive profiles
    - Maximum depth
    - Rate of ascent
    - Safety stops utilized, if any
    - Dive gas (e.g. air vs. mixed gases such as Nitrox, Heliox or Trimix)
- Timing of onset of symptoms
- History of altitude exposure after diving (air travel)
- Any associated injuries or exposures

Performance Measures

- Recognition and appropriate care of pulmonary or respiratory complaints
- Transport of patient to nearest appropriate facility (HBOT if available and indicated)
- Need for HBOT recognized and communicated to receiving facility if indicated

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