
BRADY
TRANSITION SERIES
TOPICS FOR THE EMT
TOPIC 47
Diving Emergencies: Decompression Sickness and Arterial Embolism

Objectives

- Review statistics regarding diving and dive-related emergencies.
- Discuss laws of physics that contribute to dysbarism.
- Review assessment findings for dive-related emergencies.
- Discuss current treatment strategies.

Introduction

- Diving as a sport is very popular.
- Many people dive in shallow or deep water without incident.
- Small proportion will experience decompression injury or air emboli.

Epidemiology

- 1.5 to 3 million people scuba dive commercially or recreationally each year.
- 500,000 divers will take their first dive this year.
- Although rare, deaths from compressed air dives has a ratio of 1.3 deaths per 100,000 dives.
- Injury rates are on the rise.

Pathophysiology

- Dysbarism
  - Decompression sickness
  - Nitrogen bubbles from unsafe ascending techniques

Pathophysiology

- Dysbarism
  - Based upon four laws of physics:
    - Boyle
    - Dalton
    - Henry
    - Charles

Pathophysiology

- Arterial emboli
  - Severe cases of decompression sickness
  - Lung barotrauma leads to air entering pulmonary vein
  - Air emboli return to heart and are distributed throughout the body
  - Lodge in small vascular structures, impeding blood flow

Assessment Findings

- Important history considerations when evaluating patients with decompression sickness
  - What is their history with diving?
  - Was there use of compressed air?
  - What compressed air mixtures were used?

Assessment Findings

- Important history considerations when evaluating patients with decompression sickness
  - What was the depth of the dive?
  - Was there recent travel after diving?
  - Any complications during dive?

Assessment Findings

- Complicated diving injuries
  - Consider entire picture when dealing with diving injuries
  - Problem may be more than dysbarism
  - Rapid ascent escaping trouble, such as equipment malfunction, entanglement, etc.

Assessment Findings

- Two categories of dysbarism
  - Type I decompression sickness
    - Also known as “the bends”
    - Joints such as shoulder, knees
    - Nitrogen bubbles coming out of fluid

Assessment Findings

- Two categories of dysbarism
  - Type II decompression sickness
    - Respiratory system
    - Circulatory system
    - Nervous system

Assessment Findings

- Arterial embolism
  - Dyspnea, accessory muscle use, pallor, subcutaneous emphysema, bleeding from the ears, vertigo
- Pulmonary embolism
  - Preceding signs plus: chest pain, blood-tinged sputum, cardiac arrest

Assessment Findings

- Predisposing risk factors for dysbarism
  - Flying too soon following a dive (<12–24 hrs)
  - Not following safety procedures
  - Prolonged depths
  - Extreme depths
  - Manual work while diving
  - Cold water diving
  - Obesity, age, medical conditions

Emergency Medical Care

- Consider spinal precautions
  - Place patient in lateral position if not immobilized
- Assess and maintain the airway
- Determine breathing adequacy
  - High-flow via NRB with adequate breathing
  - High-flow via PPV @ 10-12/min if inadequate

Emergency Medical Care

- Assess circulatory components
  - Pulse check, skin characteristics
  - Control major bleeds if present from associated trauma
- Initiate appropriate transport
  - Type II decompression sickness needs a decompression chamber

Case Study

You are dispatched to a local airport for a male patient coming in on an arriving plane that is “short of breath.”

Case Study

- With this limited information, what global differentials could you consider?

Case Study

- Scene Size-Up
  - Standard precautions taken
  - Patient brought to you in wheelchair
  - No entry or egress problems
  - 31-year-old male, looks anxious and in pain
  - NOI is respiratory distress
  - No additional resources at this time needed

Case Study

- Primary Assessment Findings
  - Patient responsive to verbal questioning
  - Airway intact, maintained by self
  - Breathing tachypneic, accessory muscle use, breath sounds present bilaterally with slight crackles
  - Peripheral and central pulses present
  - No major bleeds or signs of struggle
  - Patient coughing, feels “sick”

Case Study

- Is this patient a high or low priority? Why?
- Are you able to narrow down the differentials any with primary findings?
- What interventions should be done initially?

Case Study

- Medical History
  - No medical conditions; however, just returning from weekend of recreational scuba diving and partying
- Medications
  - Patient took two acetaminophen while onboard the aircraft
- Allergies
  - Patient denies any

Case Study

- Pertinent Secondary Assessment Findings
  - Pupils reactive to light, membranes hydrated
  - Airway patent, maintained by patient
  - Crackles noted bilaterally, breathing still labored, SpO_2 97% on oxygen

Case Study

- Pertinent Secondary Assessment Findings
  - Central and peripheral pulses present
  - Patient felt fine getting on plane, but after 45 minutes, started having pain in arms, shoulders, and back; then dyspnea started
  - No other findings contributory to this patient

Case Study

- Does this information help refine your field impression?
- Are there other specific questions you'd like to ask?
- Is there any need to change your treatment interventions?

Case Study

- What is causing the joint pain?
- Could this patient deteriorate even further?

Case Study

- Care provided:
  - Patient placed in left lateral position
  - High-flow oxygen via nonrebreather mask @ 15 lpm
  - Pulse oximetery and BGL monitoring
  - ALS notified for intercept while en route to the hospital

Summary

- Decompression sickness could be encountered by the EMT whether or not you work near bodies of water
- The history is very important in arriving at the correct field impression.
- Dysbarism patients need to remain well oxygenated, and consider transport to facility with compression chamber