

UNDERSEA MEDICINE

Session D

Treatment of DCS

D 1

Hyperbaric treatment deviations for Navy divers: Spinal DCS

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Introduction / Background: Spinal DCS is a danger to U.S. Navy divers. the US Navy developed and refined standardized tables to treat diving injuries. We describe detailed treatment account of a severe, delayed spinal DCS presentation in a US Navy diver with almost full neurologic recovery.

Materials and Methods: Clinical treatment and monitoring of patient outcome after severe spinal cord DCS.

Results: A U.S. Navy diver surfaced from dive two of three on a standard Navy 'no-D' air scuba dive (max depth 101 fsw utilizing a Navy dive computer) with mid-thoracic back pain, intense nausea, paresthesia with numbness of the feet and legs, and penile erection. He inadvertently completed an in-water recompression by making the final dive, which resolved symptoms. He presented for hyperbaric treatment 20 hours after surfacing and was diagnosed with spinal DCS with bowel and bladder involvement. Rather than following usual U.S. Navy protocols, his initial treatment was modified to an 8/12 Catalina table. Seven follow-up treatments were limited by pulmonary oxygen toxicity and consisted of three modified U.S. Navy Treatment Table 6's and four carbon monoxide tables. MRI of the spine four days after initial presentation showed a caudally extending 2.2cm central lesion at T4. Patient now has return of autonomic control, yet he suffers hyper-reflexic lower extremities, saddle anesthesia, and anergasmia.

Summary / Conclusion: The patient recovered significantly from his spinal DCS. The U.S. Navy created algorithmic approaches to DCS. Historical discussion of the development of U.S. Navy treatment tables is included with our rationale for deviation. Description of an atypical presenting symptom, as well as MRI findings are included in a debate of whether these are consistent with the clinical syndrome.

D 2

The case for emergent recompression; a case of Type III DCS in the Galapagos

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Introduction / Background: We discuss the case of a 36-year-old male who presented to an emergency department four days after a recreational diving injury in the Galapagos Islands, Ecuador. His clinical presentation was consistent with spinal cord decompression illness: paresthesias, limb weakness, and a neurogenic bladder. The patient underwent aggressive initial hyperbaric oxygen (HBO2) treatment in Galapagos, but had persistent symptoms. The decision was made to transport the patient to University of California San Diego for continued HBO2 therapy. This case highlights several difficult scenarios in the care of DCI patients:

1. if/when to transport to another facility from a remote locale; and
2. identifying the ideal point at which to stop HBO2 therapy.

Materials and Methods: We reviewed the dive profile, as well as the treatment of severe decompression illness. In addition, we reviewed the multiple errors made by this diver and the dive operator that led to avoidable injuries. Lastly, we had a six-month follow-up from the diver to describe the current state of his neurologic deficits.

Results: The patient underwent a U.S. Navy Treatment Table 6 with extensions within hours of his injury. Over the subsequent days he underwent four additional HBO₂ treatments before flying to the United States. After transportation to UC San Diego the patient was treated for 10 daily treatments (USN TT9), with interval improvement in symptoms. Identifying the appropriate point at which to stop HBO₂ therapy can be challenging, particularly when the patient reported daily improvement of symptoms. We reviewed the existing literature and recommendations regarding extensions of HBO₂ therapy in the treatment of DCI.

Summary / Conclusion: This case demonstrates a prototypical example of severe DCI and the appropriate response to HBO₂ therapy. Current guidelines for treatment cessation do not offer firm endpoints; thus the decision as to when to stop therapy can be challenging.

D 3

Is surgical treatment compulsory for a diver's pneumoperitoneum?

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Introduction / Background: Pneumoperitoneum usually indicates rupture of a hollow viscus and is considered a surgical emergency. Portal venous gases in divers have been reported frequently, but a report of pneumoperitoneum after diving is rare. We report a diver with pneumoperitoneum treated successfully with recompression only.

Materials and Methods: A 43-year-old diver presented to the emergency department (ED) with epigastric discomfort and shoulder pain after rapid ascent from 37 meters of sea water. He completed three dives in a day. On the fourth dive the diver made a rapid ascent due to an accidental stoppage in the air hose. Afterward he complained of headache, abdominal pain and shoulder pain.

Results: Upon his arrival to the ED, the diver's vital signs showed a blood pressure of 139/79, with a heart rate of 88 and a temperature of 36.4°C. There was no clinical evidence of neurological deficits. Abdominal examination showed mild and diffuse tenderness without rebound tenderness. Routine chest X-ray revealed free air on both subdiaphragmatic areas. Pneumoperitoneum, portal venous gases were visible but the abdominal CT scan showed no definitive perforated viscus. The patient was pressurized to 60 feet using a U.S. Navy Treatment Table 6. After another recompression using U.S. Navy Treatment Table 5 on the next day, he reported no symptoms and free air was not apparent on chest X-ray. He was discharged without further evaluation.

Summary / Conclusion: Pneumoperitoneum usually indicates rupture of a hollow viscus and considered a surgical emergency. Diving-related pneumoperitoneum and multiple venous gases can be treated with recompression and conservative treatment.

D 4

Dengue and the depths: Mosquito-borne viruses may mimic symptoms of decompression illness

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Introduction / Background: Symptoms that occur within 24 hours of diving are often attributed to decompression illness (DCI), but the differential diagnosis may be much more extensive. This case demonstrates how travel medicine consultation can be useful in the evaluation of patients with suspected DCI.

Case Report: A healthy 33-year-old male recreational scuba diver vacationed in Puerto Rico in the fall of 2019. He completed two dives on the second-to-last day of his trip: the first dive was to 85 feet of sea water (fsw) for 38 minutes; after an hourlong surface interval he made a dive to 70 fsw for 44 minutes. Both dives were completed on air and included a 40-minute decompression stop at 15 fsw. The patient felt well after the dives; he flew a commercial airline home 26 hours after the completion of his diving. As the aircraft descended, he noted the presence of severe fatigue, dyspnea, myalgias and arthralgias. A retro-orbital headache and photophobia developed over the next 24 hours. His primary care physician referred him for hyperbaric medical evaluation due to potential DCI. Although the patient's dive profile was provocative the timing of the patient's symptoms was not consistent with DCI, and the hyperbaric physician referred the patient for infectious disease/travel medicine evaluation. Assays for zika and chikungunya viruses were negative, but dengue IgG was mildly elevated.

Discussion: Zika, dengue and chikungunya viruses are endemic in Puerto Rico. Retro-orbital pain is a common clinical manifestation of these viruses and was an initial indicator of potential tropical mosquito-borne viral exposure in this case.

Summary / Conclusion: Mosquito-borne viruses may present with symptoms like those of DCI. For patients who present for evaluation of possible DCI, attention to other diseases endemic in the area of travel may provide insight into other potential diagnoses.

End Session D