

BRIEF NOTES ON 16 CASES TREATED AT THE UNIVERSITY OF MICHIGAN HYPERBARIC UNIT
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In Michigan we average 3 to 5 Scuba diving deaths a year and many non-fatal accidents are reported, often by hearsay rather than by written reports. The following cases presented at our chamber for treatment over a two year period. I will briefly outline the circumstances and my own interpretations, based on available information. There were 7 cases of Air Embolism and 7 of decompression sickness among these non-fatal diving incidents.

A. Air Embolism and Pulmonary Barotrauma

CASE 1 46 year old male making a controlled free-ascent in a quarry at the correct speed, with an instructor in attendance. He was a 3 pack-a-day smoker and had bronchitis. He suffered pulmonary barotrauma with subcutaneous emphysema. No treatment was required beyond a period of observation.

CASE 2 46 year old male, surfacing correctly from 80 feet in a large lake, became suddenly paralysed and had loss of vision. He was treated 6 hours later with complete recovery. He had a repeat experience one year later, with the same symptoms. This suggests either a small ischaemic area in the brain or a repeat air embolism. Second treatment also was successful.

CASE 3 27 year old man suffered chest pain and obtundation after making a struggling ascent from 15 feet in a swamp. He did not exhale while being hauled to the surface, it was stated. Chamber treatment was successful.

CASE 4 31 year old male performing ditch-and-don manoeuvre in a pool. He suddenly surfaced with subsequent pupil dilatation and taxia. Treatment in the hyperbaric chamber was successful.

CASE 5 32 year old male was doing a "NAUI-bailout". This involves jumping into a pool with all equipment in one's arms and donning it underwater. He developed extreme headache and decreased visual acuity. The provisional diagnosis was of air embolism but subsequently I felt that he had suffered a sphenoidal sinus squeeze. Symptoms resolved when he was pressurised.

CASE 6 This 15 year old scuba student reported substernal chest pain and dyspnoea following a pool scuba lesson. Chest X-Ray revealed pneumo mediastinum. This resolved without necessity for treatment. The diagnosis was made not by the primary physician but by the later X-ray.

CASE 7 This 27 year old advanced scuba student, practicing buoyant emergency ascents while buddy breathing, had an episode of panic and separated from his buddy. He ascended rapidly without exhaling. Subsequently, severe headache, substernal chest pain and shortness of breath occurred. He presented 5 days later, improved. No treatment was then required. The impression was gained that this quarry diving incident had caused a cerebral air embolism in association with pneumo mediastinum and a minimal pneumothorax.

CASE 8 This 27 year old male was an advanced diver practicing free ascents in a lake. On the first attempt from 60 feet he surfaced exhaling but on the surface he convulsed and became comatose. He had fixed dilated pupils on admission and suffered cardiac and respiratory arrest on arrival. He had been betting beers on who could surface with least speed and least "popping out of the water". He lost! He was pressurised 1.5 hours later and had an excellent recovery. He had suffered cerebral air embolism, pneumo-mediastinum, bilateral pneumothoraces and subcutaneous emphysema. Incidentally,

he was a 1-1.5 pack per day smoker with a chronic 2 year productive cough.

CASE 9 This boy of 18 took "PCP" (a horse tranquilliser), put on a scuba tank and made a solo dive in a 110 feet deep lake. He exited the water on the opposite side, fell off the dock backwards and plunged into the water. On recovery he had unequal pupils, nystagmus, and reflex asymmetry in knee-jerk testing. Recovery was complete after recompression (which was very eventful). Diagnosis was not clear since "PCP" causes many of the same symptoms and signs as observed here.

B. Decompression Sickness Cases

CASE 10 This 31 year old wreck diver did not follow decompression tables on two successive dives to 150 feet for 20 minutes. He thought that breathing oxygen on the surface was enough protection. Spinal cord decompression illness resulted: recovery was complete after recompression and three months of physical therapy.

CASE 11 This 26 year old female diver made successive decompression dives on a wreck. Although she followed the tables religiously she was maximally exerting herself and the US Navy Tables are designed for males at intermediate levels of exercise. She suffered wrist pains (in a previously injured joint) and progressed to shoulder pains. Recurrence of symptoms during "ascent" in the chamber necessitated an extension of treatment.

CASES 12 AND 13 were two wreck divers with joint pains on surfacing from 110 feet. The first diver had spent 20 minutes at this depth on each of two dives.

CASE 14 Caisson worker, aged 35, presented with pain after working a double shift and then decanting out without decompression.

CASE 15 This 31 year old wreck diver ran out of air and did a buddy breathing ascent to 60 feet, then a free ascent to the surface. This followed a 20 minutes bottom time. He developed paresthesias and numbness of both arms which cleared on recompression therapy.

CASE 16 A "hard-hat" diver developed severe pulmonary symptoms and elbow pain after surfacing from 110 feet following a bottom time of 70 minutes. He had severe skin, joint and cardiovascular symptoms which required recompression and extreme supportive measures.

In summary, these cases are of diverse aetiology and probably represent only about one quarter of the cases that occur. The following comments are offered:

- a. Inexperience or lack of training, including poor judgement, is a factor despite all these divers being certified.
- b. Poor physical health may be present, eg. heavy smoking and chronic bronchitis was noted in two cases.
- c. In one case a female followed a dive profile not suitable for females.
- d. Drug intoxication with "PCP". Many had alcohol within the preceding 24 hours.
- e. Open water "free ascents" are inherently dangerous.

Our divers dive in deep, poorly illuminated, cold waters. Excessive cigarette smoking alcohol and drug intoxication are serious problems and further reduce the safety margin.