UNIVERSITY *of* CALIFORNIA, SAN DIEGO

MEDICAL CENTER HYPERBARIC DEPARTMENT

Seizure in a 100% Oxygen Rebreather Diver: Revisiting the "Off Oxygen Effect"

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Introduction:

○ Generalized seizures are a known effect of breathing oxygen in a hyperbaric environment.

○ Convulsions may occur suddenly without warning.

○ The effect is dose-dependent, related to both depth and duration of exposure.

○ Convulsions have been observed shortly after termination of hyperoxic exposure in experimental subjects.

Case report:

○ A 20 year-old male commercial diver breathing 100% oxygen on a rebreather had a profile of 20 feet for 25 minutes.

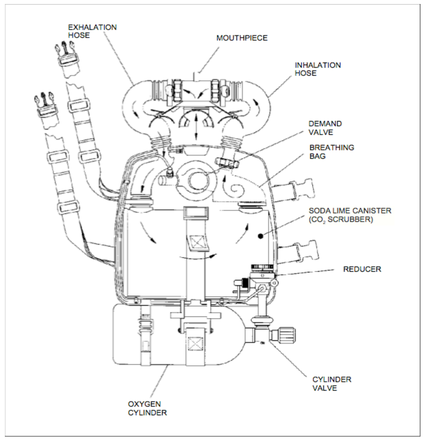
○ The dIver made one excursion to 45 feet for 2 minutes.

○ He reported being asymptomatic during the dive and made a controlled ascent to the surface.

○ Within seconds of surfacing, he experienced a witnessed tonic-clonic seizure with a post-ictal period lasting 30 minutes.

○ Upon arrival to the emergency department, he complained only of a headache and his neurologic exam was normal.

100% Oxygen Rebreather Device



100% Oxygen Rebreather Schematic

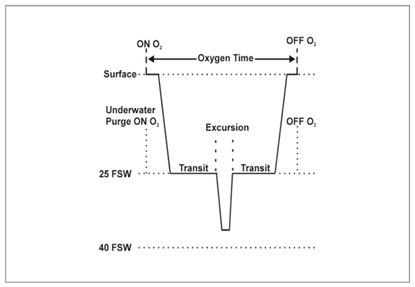


Figure 19-4. Example of Transit with Excursion.

US Navy Dive Manual, Revision 6

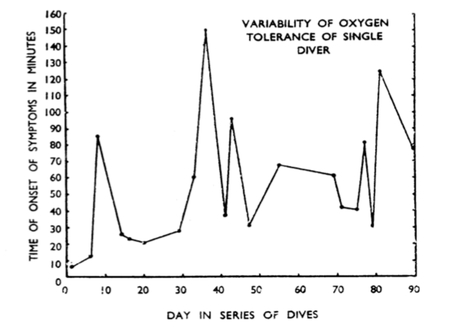


FIG. 5.—Time of exposure causing toxic symptoms in same diver as Table II under sea-water at 70 ft. (65° F.) plotted over a period of 90 days. No work performed.

Donald KW. Oxygen Poisoning in Man. Br Med J. 1947, May 17; 1:667

Treatment and Outcome:

○ The patient was treated in a hyperbaric chamber on a Navy Treatment Table 6 without extensions.

○ He reported no change in symptoms during or after treatment and continued to have a mild headache the next day.

○ Upon re-evaluation one week later, he was asymptomatic and was allowed to return to diving duty without restrictions.

Discussion:

○ This diver had a presentation that was consistent with an oxygen-induced seizure.

○ Interestingly, convulsions occurred after surfacing and without any symptoms during the dive.

○ The "off oxygen" effect was first described during experiments from 1947 and is cited in the US Navy Dive Manual as a potential cause of seizure in a diver upon surfacing.

○ We treated this patient with hyperbaric oxygen as AGE could not be completely ruled out.

○ A single oxygen-induced seizure does not predict future risk of CNS oxygen toxicity during subsequent chamber treatments.