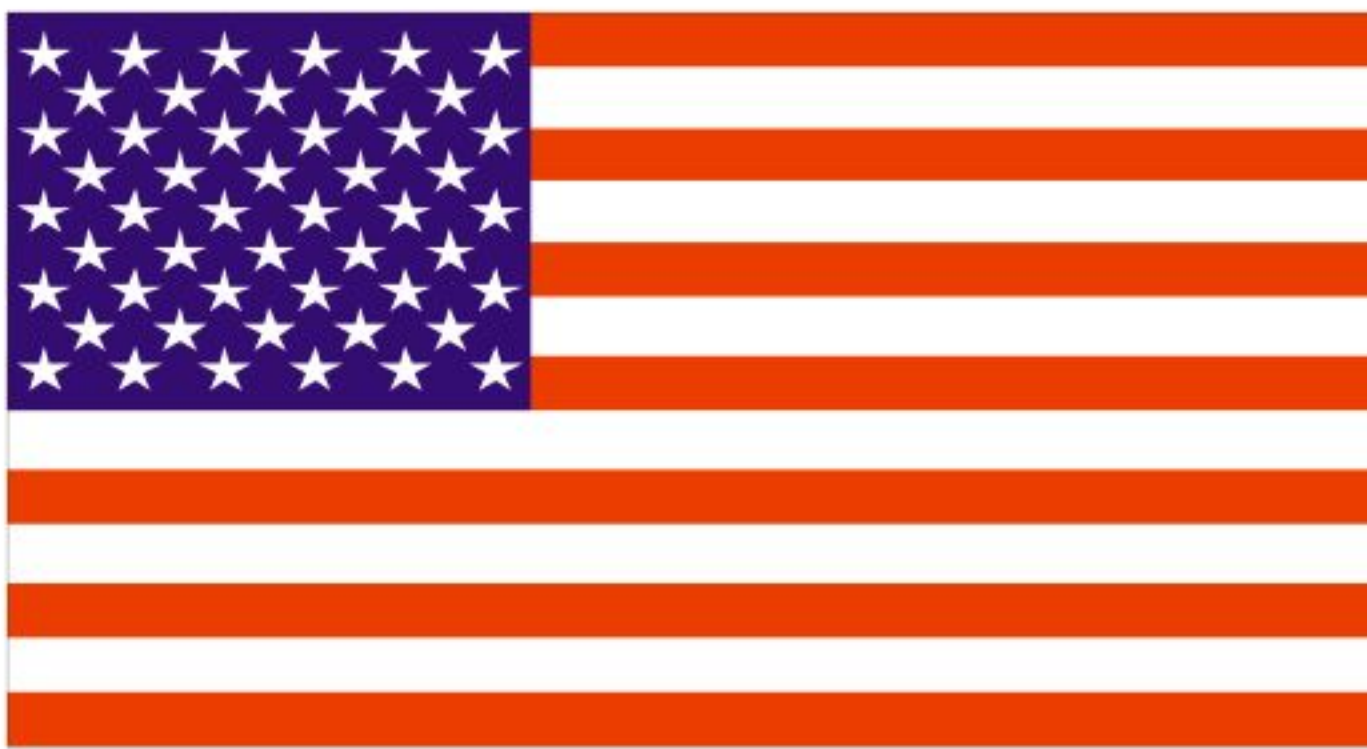




Return to Diving After Bleomycin Therapy

A Case Report



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INTRODUCTION

Bleomycin is a chemotherapeutic drug used to treat a variety of conditions including testicular cancer and Hodgkin’s lymphoma. The lungs of patients treated with bleomycin are thought to be more susceptible to injury from oxygen free radicals. Subsequent exposure to high percentages of inspired oxygen has been reported to increase the risk of pulmonary oxygen toxicity, possibly resulting in fatal pulmonary fibrosis.

Multiple case reports of this phenomenon occur in the anesthesia literature. This potential increased risk of pulmonary oxygen toxicity has been generalized to diving due to the exposure to high partial pressures of oxygen not only from the dive itself, but also from the possibility of divers needing hyperbaric oxygen therapy for treatment of decompression sickness. Multiple authors in the medical literature have expressed opinions that patients should not resume diving after bleomycin therapy.^{1–3}

Critical review of the literature suggests that this generalization may be too restrictive and that this phenomenon, like many in medicine and diving, is multifactorial.⁴ In fact, some cases of patients who have been exposed to hyperbaric oxygen therapy after receiving bleomycin treatment without adverse consequences have been reported.⁵

A career United States Navy diver desired to return to diving after treatment for Hodgkin’s lymphoma. He subsequently resumed diving and was treated for decompression sickness without evidence of pulmonary compromise.

HISTORY

In October 2004, a 36-year-old U.S. Navy diver was diagnosed with Stage 1A Hodgkin’s lymphoma, nodular sclerosing subtype. He subsequently underwent local resection of tumor mass, followed by chemotherapy and radiation therapy. The patient was treated with adriamycin, bleomycin, vincristine, and dacarbazine (ABVD) chemotherapeutic agents. Total dose of bleomycin administered was 160 milligrams. The patient completed chemotherapy in February 2005 and finished radiation therapy in June 2005. Prior to and upon completion of chemotherapy, he underwent baseline pulmonary function tests (PFTs) (Table 1).

HISTORY (cont.)

In January 2006 (>6 months after completion of Hodgkin’s treatment), the patient expressed a desire to resume his diving career. After extensive review of the literature was completed, a waiver of physical standards was applied for and granted, and the patient was returned to diving duty. Thereafter, the patient participated in multiple routine and experimental diving operations without any complaint of pulmonary symptoms.

While performing an experimental dive in December 2006, the patient experienced an episode of Type 2 Decompression Sickness necessitating treatment with hyperbaric oxygen therapy. He was treated on a U.S. Navy Treatment Table 6 with two extensions at 60 fsw (Figure 1) with complete resolution of symptoms. The patient reported no pulmonary symptoms during or after the treatment. PFTs taken immediately following treatment and one week later demonstrated no significant decrement in pulmonary function (Table 1). Since that time, the patient has continued to serve as an experimental diver and has to date not experienced any pulmonary symptoms.

Parameter	Predicted Value	Baseline	Post Bleomycin	Post TT6	1 Week post TT6
DLCO (ml/min/mmHg)	30.2	33.0	36.6	31.1	31.2
FVC (Liters)	5.08	5.52	5.96	5.90	6.07
FEV1 (Liters)	4.06	4.78	5.15	5.09	5.17
Date	N/A	November 2004	July 2005	December 2006	December 2006

Table 1. Pulmonary Function Tests to include Diffusing Capacity of the lung for Carbon Monoxide (DLCO), Forced Vital Capacity (FVC), and Forced Expiratory Volume in one second (FEV1)

CONCLUSIONS

A career diver was allowed to return to full diving duty after being treated with bleomycin therapy. This diver was subsequently exposed to hyperbaric oxygen for treatment of decompression sickness, with no evidence of pulmonary function decline. Under some circumstances, it may be reasonable to allow carefully selected patients to resume diving after bleomycin therapy.

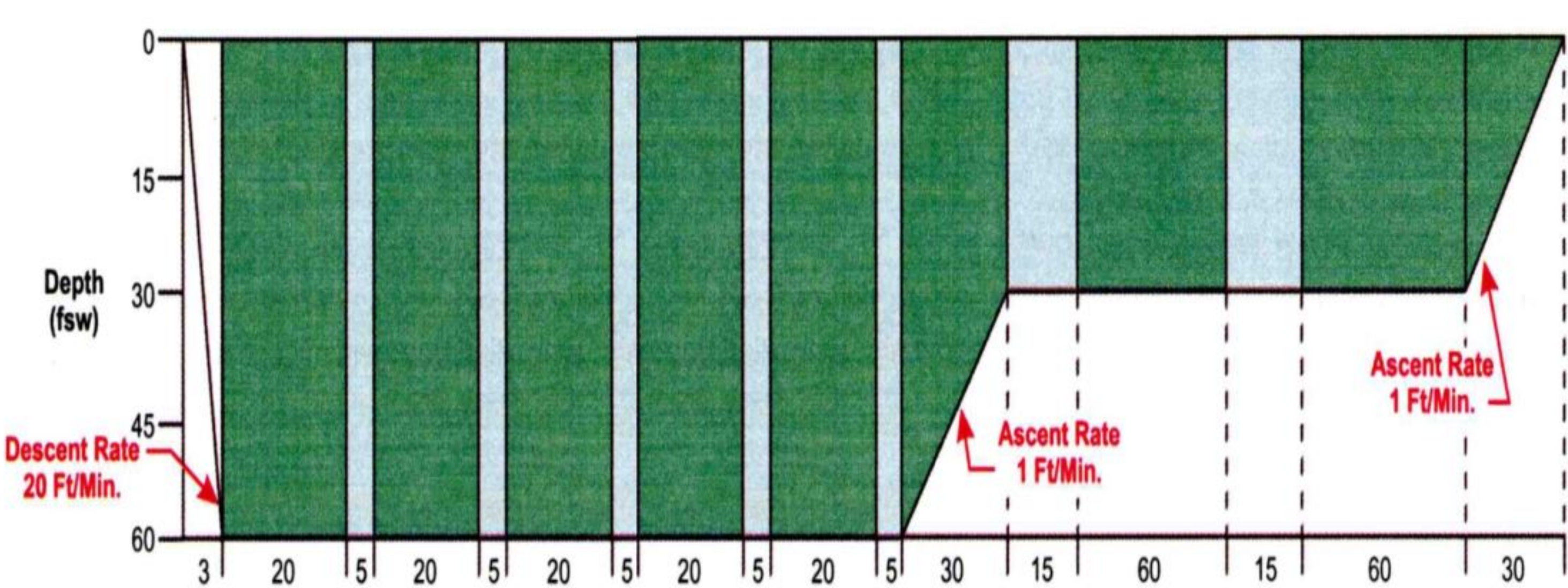


Figure 1. U.S. Navy Treatment Table 6 with two extensions at 60 fsw.⁶ Green-shaded areas indicate oxygen breathing periods. X-axis indicates time in minutes for each breathing period. Y-axis indicates depth in fsw.

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