

DTIC FILE COPY

2

DECOMPRESSION SICKNESS PRESENTING
AS A VIRAL SYNDROME

AD-A223 880

Author:

Frederick W. Rudge, M.D.
Major, USAF, MC, FS
United States Air Force School of Aerospace Medicine
Brooks Air Force Base, Texas

Mailing address:

Major Frederick W. Rudge
USAFSAM/HM
Brooks AFB, TX 78235-5301

DTIC
ELECTE
JUN 4 1990
S B D
Co

1989

Running head: DCS Presenting as a Viral Syndrome

DISTRIBUTION STATEMENT A

Approved for public release:
Distribution Unlimited

00 05 01 080

ABSTRACT OF:

Decompression sickness presenting as a viral syndrome

Author: Frederick W. Rudge, Major, USAF, MC

Decompression sickness (DCS) is a well-known hazard of exposure to significant variations in ambient pressure. The diagnosis and management of DCS is frequently a source of confusion. Although the majority of cases are manifested by joint or limb pains (Type I DCS), patients may present with a wide array of symptoms, such as neurologic deficits, headache, fatigue, nausea, and respiratory difficulty. A thorough knowledge of the differential diagnosis and a strong index of suspicion are crucial to the proper management of DCS. Presented herein are two cases of altitude-related DCS which were confused initially with a viral syndrome. A discussion of the symptoms of DCS is included.

Key terms: Recompression
 Altitude chamber
 Hyperbaric chamber
 Hyperbaric oxygen therapy



Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

DECOMPRESSION SICKNESS PRESENTING AS A VIRAL SYNDROME

The United States Air Force (USAF) has extensive experience in the management of decompression sickness (DCS). Records of all DCS cases treated in USAF hyperbaric chambers are maintained at the USAF School of Aerospace Medicine (USAFSAM), Division of Hyperbaric Medicine, Brooks Air Force Base, Texas. Since 1985, two cases of altitude chamber DCS have been treated with hyperbaric oxygen therapy which were initially mistaken for a flu-like illness. Summaries of these cases are presented below, followed by a brief discussion of the signs and symptoms of DCS.

Case 1

RC, a 19-year-old male, participated in an altitude chamber exposure to 35,000 feet. Several hours after descent he noted the onset of a frontal headache and nausea without emesis. He noted no other problems. He presented to a local medical center for treatment, and was given aspirin, and fluids, with partial resolution of symptoms. He was discharged from the emergency department with a presumptive diagnosis of viral syndrome, and was advised to report to his flight surgeon in the morning. The following morning the headache and nausea again increased in intensity, and was associated with abdominal discomfort. He had no fever, chills, or diarrhea. Examination revealed only mild abdominal tenderness without rebound or guarding. The remainder of the examination was normal. The possibility of decompression sickness was considered, and he was referred for recompression therapy. He was treated with a USAF treatment table 6. Within 30 minutes on 100% oxygen at 2.4 FSW all symptoms resolved. He remained asymptomatic throughout the treatment dive, and repeatedly requested food. Symptoms did not recur.

Case 2

RC, an 18 year-old female altitude chamber technician, had an altitude chamber exposure to 35,000 feet. Immediately after the exposure she noted low back pain, followed shortly thereafter by lightheadedness, slow speech, headache, and fatigue. She also noted mid-abdominal discomfort and nausea without emesis. She later noted mild numbness and paresthesias in her left forearm. She attributed the symptoms to a viral syndrome, and took two aspirin and increased her fluid intake. The following morning all symptoms except the numbness and paresthesias had resolved, and she presented to her flight surgeon for treatment. Physical examination revealed decreased sensation in the left arm in the C6-C7 dermatome. No other abnormalities were noted. The diagnosis of Type II decompression sickness was considered, and she was referred for recompression therapy at a local hyperbaric chamber. Midway through a USAF table 6 treatment dive all symptoms resolved, and she remained asymptomatic.

DISCUSSION

Decompression sickness is caused by the formation of bubbles of inert gas (usually nitrogen) within body tissues. Rapid lowering of the ambient pressure, such as during ascent in flying or in diving, leads to an increase in the tissue nitrogen load. When this nitrogen load reaches a threshold level (critical supersaturation level), bubbling occurs. Repetitive exposures before the body nitrogen level returns to equilibrium, such as with repetitive diving or with flying after diving, increases the risk of DCS substantially (3). Factors which may play a role in increasing susceptibility to DCS include increasing age (5), obesity (4), female sex (1), and exercise or other stress at depth (6).

The clinical manifestations of decompression sickness are variable, with many of the symptoms being protean. The varied nature of DCS has led Behnke to compare it with the spirochete as the

"great imitator" (2). The great number of signs and symptoms of DCS led Golding to classify it into Type I (joint/ limb pain only), and Type II (systemic symptoms) (7). This classification system is now widely used.

The many signs and symptoms of DCS can occur in any combination, which can make the diagnosis difficult. In 1964, Rivera published the experience of the U.S. Navy in treating 935 cases of DCS (8). In this series, localized pain was the most common symptom, occurring in 91.8% of cases. Other symptoms, in order of frequency, included numbness or paresthesias (21.2%), muscular weakness (20.6%), skin rash (14.9%), dizziness or vertigo (8.5%), and nausea or vomiting (7.9%). Other less common symptoms included headache (3.9%), fatigue (1.2%), and intestinal disturbance (0.4%).

From the above list of signs and symptoms, it is easy to see how, in the proper combination, DCS could be confused with a viral or flu-like syndrome. In Case 1, a physician diagnosed DCS as a viral syndrome when the patient presented with acute onset of headache and nausea. The diagnosis of DCS in this patient was confirmed when all symptoms rapidly resolved with recompression therapy. In Case 2, the patient interpreted the symptoms of back pain, headache, fatigue, lightheadedness, and nausea as a flu-like illness, which resulted in her delay in seeking treatment. These symptoms resolved spontaneously, but the numbness and paresthesias which developed in her arm resolved only after recompression therapy was instituted the following day.

A requirement for the treatment of any disease process is a full understanding of the clinical picture of the disease. This understanding can be especially difficult in DCS, with its broad spectrum of presenting signs and symptoms. In many cases, all or most of the manifestations are subjective, and the patient must be relied upon to present an accurate and truthful description of the problem. Divers and flyers must be educated to present for medical treatment when problems develop after the flying or diving activity. Health care providers must be able to identify individuals at risk for DCS and to recognize the bewildering array of possible presentations that are possible. When doubt exists, consultation with a diving or

hyperbaric physician should be obtained. In general, a test of pressure in a hyperbaric chamber is both diagnostic and therapeutic in these cases.

REFERENCES

1. Bassett BE. Twelve year survey of the susceptibility of women to altitude decompression sickness. Preprints of the Aerospace Medical Association Annual Scientific Meeting. Alexandria, VA: Aerospace Medical Association, 1980: 12-3.
2. Behnke AR. Decompression sickness. *Mil Med* 117: 257-271, 1955.
3. Bennett PB, Dovenbarger JA, Bond BG, Wachholz CJ. DAN 1987 diving accident incidence for flying after diving. In Sheffield PJ ed: *Flying after diving. Thirty-ninth Undersea and Hyperbaric Medical Society Workshop*. Bethesda: Undersea and Hyperbaric Medical Society, 1989: 29-34.
4. Dembert ML, Jekel JF, Mooney LW. Health risk factors for the development of decompression sickness among U.S. Navy divers. *Undersea Biomed Res* 11(4): 395-406, 1984.
5. Dewey AW. Decompression sickness, an emerging recreational hazard. *N Engl J Med* 267: 759-765, 1962.
6. Francis TJR, Dutka AJ, Hallenbeck JM. Pathophysiology of decompression sickness. In Davis JC, Bove AA, eds: *Diving Medicine*. Philadelphia, WB Saunders, 1990: 170-187.
7. Golding FC, Griffiths P, Hempleman HV, Paton WDM, Walder DN. Decompression sickness during construction of the Dartford Tunnel. *Br J Indust Med* 17: 167-180, 1960.
8. Rivera JC. Decompression sickness among divers: An analysis of 935 cases. *Mil Med* 129: 314-334, 1963.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS None	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.	
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE		4. PERFORMING ORGANIZATION REPORT NUMBER(S) USAFSAM-JA-90-22	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) USAFSAM-JA-90-22		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION USAF School of Aerospace Medicine	6b. OFFICE SYMBOL (if applicable) USAFSAM/HM	7a. NAME OF MONITORING ORGANIZATION	
6c. ADDRESS (City, State, and ZIP Code) Human Systems Division (AFSC) Brooks AFB, TX 78235-5301		7b. ADDRESS (City, State, and ZIP Code)	
8a. NAME OF FUNDING / SPONSORING ORGANIZATION USAF School of Aerospace Medicine	8b. OFFICE SYMBOL (if applicable) USAFSAM/HM	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code) Human Systems Division (AFSC) Brooks AFB, TX 78235-5301		10. SOURCE OF FUNDING NUMBERS	
		PROGRAM ELEMENT NO. 81216F	PROJECT NO. HM
		TASK NO. 9994	WORK UNIT ACCESSION NO. 01
11. TITLE (Include Security Classification) Decompression Sickness Presenting as a Viral Syndrome			
12. PERSONAL AUTHOR(S) Rudge, Frederick W.			
13a. TYPE OF REPORT Final	13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
16. SUPPLEMENTARY NOTATION			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	
06	10		
06	05		
		Decompression sickness; Altitude chamber; Viral; Recompression; Hyperbaric oxygen therapy. (JKS) E	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) Decompression sickness (DCS) is a well-known hazard of exposure to significant variations in ambient pressure. The diagnosis and management of DCS is frequently a source of confusion. Although the majority of cases are manifested by joint or limb pains (Type I DCS), patients may present with a wide array of symptoms, such as neurologic deficits, headache, fatigue, nausea, and respiratory difficulty. A thorough knowledge of the differential diagnosis and a strong index of suspicion are crucial to the proper management of DCS. Presented herein are two cases of altitude-related DCS which were confused initially with a viral syndrome. A discussio of the symptoms of DCS is included.			
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL Frederick W. Rudge, Major, USAF, MC		22b. TELEPHONE (Include Area Code) (512) 536-3281	22c. OFFICE SYMBOL USAFSAM/HM