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A PROGRESS REPORT ON DIVING MEDICINE STUDIES IN THE ROYAL NEW ZEALAND NAVY

Des Gorman, Alison Drewry and Maurice Harden

Abstract

Studies of oxygen-helium and lignocaine in the treatment of decompression illness and the role of girdling in protecting against pulmonary barotrauma are underway at the Royal New Zealand Navy's Auckland Naval Base.

Introduction

A series of diving medicine studies are underway at the Auckland Naval Base. These include:

a prospective controlled randomised studies of oxygen versus oxygen-helium and lignocaine versus placebo in the treatment of decompression illness (DCI) arising from recreational air diving; and,

b a study of the role of chest and abdominal splinting in the prevention of pulmonary barotrauma.

These studies are reviewed below.

Oxygen-Helium Study

The rationale for a comparison of oxygen and oxygen-helium as the ideal therapeutic gas mixture to be breathed during the recompression of divers with DCI has been described previously.[1] This study is now underway. The progress results are detailed in Table 1. The outcome data after discharge are still being accumulated for these patients and are not reported here. Treatment, including compression to beyond 2.8 bar, and retreatments were determined by the study protocol.[1] No patients were compressed beyond 4 bar. Clearly, no significant advantage has been demonstrated yet and the study continues.

Lignocaine Study

The potential efficacy of lignocaine in the treatment of DCI has been demonstrated by both in-vivo studies and a clinical report.[2] A pilot study of lignocaine in

TABLE 1

PRELIMINARY RESULTS FROM A PROSPECTIVE CONTROLLED RANDOMISED STUDY OF OXYGEN VERSUS OXYGEN-HELIUM IN THE TREATMENT OF DECOMPRESSION ILLNESS

Parameter	Oxygen group		Oxygen helium group	
Number of subjects	29		24	
Compression beyond 2.8 bar	3	(10%)	4	(16%)
Number retreated	19	(65%)	16	(66%)
Mean number of treatments (±SD)	3.1	(1.8)	2.4	(1.4)

cases of DCI that are refractory to recompression and rehydration has been completed. Patients with DCI, who had persistent symptoms and signs and no sustained improvement after two consecutive hyperbaric treatments were given a 48 hour lignocaine infusion (240 mg for one hour, 120 mg for one hour and then 60 mg/hour continuously. Treatment was adjusted to relieve toxic symptoms and/or maintain plasma levels between 6 and 9 mmol/l). Seventeen patients have been given such an infusion and the results are detailed in Table 2.

TABLE 2

RESPONSE OF SEVENTEEN DIVERS, WITH DECOMPRESSION ILLNESS THAT WAS REFRACTORY TO RECOMPRESSION, TO A 48 HOUR LOW DOSE LIGNOCAINE INFUSION

Patient response	Number	%
Complete resolution	5	29
Improvement	8	47
No change	4	24
Deterioration	0	
Total 17	**100**	
Toxic symptoms	5	29

It is evident that most divers with symptoms and signs of DCI that are refractory to recompression will recover, in some cases completely, if given a lignocaine infusion. A prospective controlled randomised study of lignocaine versus a placebo (saline) infusion in refractory DCI is about to be initiated. Once the oxygen-helium study (described above) is completed, the lignocaine study will be extended to include the initial treatment of divers with DCI.

Pulmonary Barotrauma Study

Studies on rabbits and cadavers have shown that girdling of the abdomen and chest protects against pulmonary barotrauma.[3] Application of this technique has not proceeded because none of the girdles that have been trialled has produced a consistent change in pulmonary function.

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Pulmonary barotrauma,
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