Royal Netherlands Navy

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Diving Medical Center

LIDOCAINE IN DECOMPRESSION ILLNESS, A RETROSPECTIVE CONTROLLED STUDY IN 17 DIVERS

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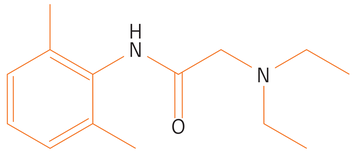
Introduction

Lidocaine (Fig. 1.), a commonly used local anesthetic and antiarrhythmic drug, has been shown to provide protection to the ischemic central nervous system in vivo[1]. We investigated the effect of lidocaine on the neurological outcome of divers treated for decompression illness (DCI) in our recompression chamber.

Fig. 1.



Methods

From 2000-2007 46 divers were treated for DCI with US Navy table 6. From 2000 to 2003 29 divers were treated, and from 2003 to 2007 17 divers were additionally treated with lidocaine. The infusion schedule was a 1.5 mg/kg bolus followed by a 3 mg/min infusion during treatment for a total time of 8 hrs.

All analyses were performed with Stata SE software (StataCorp version 9.2). A 2-sided p value < 0.05 was the criterion for statistical significance. To test for normality we used the Shapiro-Wilk test. For comparison of the demographic data between both groups we used the two-sample t test with equal variances. The Wilcoxon rank-sum test was used to compare ordinal and non-normally distributed data. We performed a power analysis on immediate outcome score in both groups in order to find the group size that would result in a significant difference.

Results

Both groups were similar for the demographic data, score of complaints and time until recompression. The number of treatment tables, outcome immediately after treatment and after three months showed no statistical differences. Power size calculation yielded a required sample size of n = 271 per group to detect a significantly different immediate outcome at the $p<0.05$ level.

Discussion

Lidocaine administered during and after treatment of DCI did not improve neurological outcome in this study group. The group of divers has a great variety of presenting symptoms of DCI and delay of treatment after surfacing the dive. This phenomenon is common practice for the diving physician who is responsible for treatment, but makes it different to compose a homogenous group of divers with the same signs and symptoms. Most treating physicians have only a small number of injured divers on a yearly base (or even longer period) to perform a prospective, randomized study in order to assess the positive effect of lidocaine. Therefore, multicenter studies are needed to evaluate the protective effects of lidocaine in DCI.

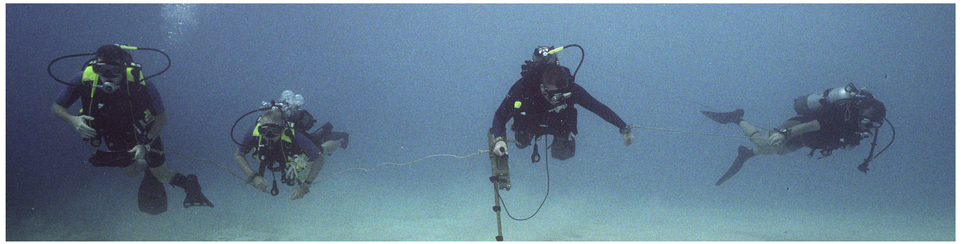


Table 1 : Neurological DCI severity scale[2] (maximum possible score is 10).

Sensory grade		Motor grade	
1	paresthesia single limb or area	1	weakness single limb or muscle group
2	paresthesia multiple regions	2	weakness multiple limbs or muscle groups
3	numbness single region or limb	3	paralysis single limb
4	numbness two regions or limbs	4	paralysis two limbs
5	numbness three or more limbs	5	paralysis three or more limbs

Table 2 : Demographic data of both groups.

	No lidocaine n=29		Lidocaine n= 17		p value
	mean	SD	Mean	SD	
Length (cm)	180	7.8	182	8.5	0.487
Weight (kg)	76.6	13.4	84.4	15.9	0.093
Body mass index (m/kg2)	23.6	3.6	25.4	3.5	0.076
Age (yr)	36.0	8.9	35.4	7.9	0.812

References

1. Mitchell SJ. Lidocaine in the treatment of decompression illness: a review of the literature. Undersea Hyperb Med 2001(28):165-74.

2. Dick AP, Massey EW. Neurological presentations of decompression sickness and air embolism in sport divers. Neurology 1985(35):667-71.

Table 3 : Overview of results.

	No lidocaine n=29		Lidocaine n= 17	
	mean	SD	Mean	SD
Total score of complaints	4.13	2.08	4.00	1.50
Time to complaints (min)	428	738	169	264
Time until recompression (h)	57.0	58.0	48.7	48.8
Amount of treatments	2.4	2.1	2.6	2.1
Outcome score immediately	5.2	1.0	5.5	0.9
Outcome score after three months	5.9	0.4	6.0	0.0

Total score of complaints was calculated using the scoring system in table 1.

Outcome scores were defined as :
1 = dead
2 = worsening
3 = no changes
4 = major improvement
5 = no objective residuals
6 = no residual symptoms.