

The relationship between time to recompression treatment and clinical outcome for decompression illness treated in Scotland

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Introduction

While the body of open medical opinion accepts that decompression illness should be treated as rapidly as possible, the body of published research revealing time to recompression chamber after the onset of symptoms is unclear. Although there are studies relating a relationship between time to treatment and clinical outcome in decompression illness, there have been concerns over the validity of these studies. The issue is of some importance since severe decompression illness can be life threatening due to the risk of neurological or cardiac injury and is associated with hypoxic death. Such conditions require aggressive medical management and specialist medical care. There are in the UK a number of specialist hyperbaric medicine centres dealing in the treatment of decompression illness under existing arrangements with the NHS. This paper considers whether cases of decompression illness occurring in industry should be treated in the nearest hyperbaric recompression chamber whilst medical or nursing support or whether cases are transferred to a specialist unit for treatment.

Methods

NHS provision for the treatment of decompression illness in our area has been central to the recompression facility. The initial recompression regime used is the United States Navy table 6 algorithm or the Royal Navy equivalent table 62 which may be repeated in the event of relapse after treatment. Relapsed symptoms may be treated with either hyperbaric oxygen and/or the addition of neurological support may be required using halothane oxygen rebreathing. Each chamber publishes a 24-hour clinical and paramedic monitoring patient list to a central unit by means of a fax machine. The details are basic clinical details of treatment of decompression illness. The form was completed retrospectively from the clinical notes for cases presenting up to the end of 1996 (105 cases); subsequently, the standard form was completed prospectively by the treating physician (105 cases). Prior to 2001 every 24-hour unit, each chamber publishes a fax sheet against the clinical notes for decompression illness. Where there were gaps they were corrected for after discussion with the treating physician where possible.

Severity of illness was assessed as the need for referral to the nearest unit, after the first recompression treatment and/or final discharge after all treatment was completed. On certain categories of severity were used to assess the severity of decompression illness or referral according to the most significant signs or symptoms. Six categories were employed: mild only; some form of sensory disturbance; ataxia; motor weakness; visual or hearing; cerebral symptoms only. Four outcome measures were assessed: spontaneous resolution before referral; full resolution of symptoms; no signs at the recompression treatment; full resolution of symptoms; no signs at discharge from any of the recompression treatment; full resolution of symptoms; no signs at discharge from any of the recompression treatment; full resolution of symptoms; no signs at discharge from any of the recompression treatment; full resolution of symptoms; no signs at discharge from any of the recompression treatment. These measures were used to assess the relationship between time to treatment and clinical outcome.

For analysis the data were stratified in two ways

- Type 1 or Type 2 according to the exposure condition
- Mild, sensory or ataxia disturbance or severe motor, cerebral or vestibular presentation

Table 1: Subject and clinical characteristics

	Recreational n=459	Professional n=178
Age (n=529) (mean (s.d.), range)	35.2, 14-73	33.2, 15-62
Male	974	71
Female	73	5
Mean depth, metres (n=505) Mean (s.d.)	22 (7-115)	31 (5-100)
Number of dives (n=491) Mean (s.d.)	1 (1-4)	2 (1-10)
Multi-day dives (n=420)	53.8%	59.5%
Respiratory problems (n=529)	27.8%	21.1%
Diving with symptoms (n=529)	3.8%	14.1%

Aim

To examine whether the benefits of early treatment of decompression illness justify the provision of recompression treatment in an out of hospital environment.

Results

529 cases were exposed by the work, 60% notification to the emergency services or hyperbaric unit, 26% of cases were taken to the hyperbaric unit in less than 6 hours. Fifty-five cases had symptoms prior to referral. There was no correlation between time to treatment and the chance of significant sequelae.

Table 2: Subject and clinical characteristics

	Latency (n=474)	Time to present (n=472)	Transfer time (n=470)	Total time to treatment (n=517)
Mean	4.77	22.91	4.04	25.89
Minimum	0.17	12.00	0.00	0.40
Median	0.25	2.47	2.42	5.77
SD ¹ (s.d.)	18.70	44.03	5.94	47.49

Table 3: Subject and clinical characteristics

	Cure 1 st treatment	Cure on Discharge	Sequelae
Mild	0.93h ¹ , 0.97-1.00	0.99h ¹ , 0.93-1.00	N/A
Severe	0.99h ¹ , 0.97-1.04	0.99h ¹ , 0.93-1.004	1.004h ¹ , 0.993-1.01

Table 4: Subject and clinical characteristics

	Cure 1 st treatment	Cure on Discharge	Sequelae
Mild	0.93h ¹ , 0.97-1.00	0.99h ¹ , 0.93-1.00	N/A
Severe	0.99h ¹ , 0.97-1.04	0.99h ¹ , 0.93-1.004	1.004h ¹ , 0.993-1.01

Cure per hour delay treatment time, 95% confidence interval for cure and significant sequelae values for proportion of cases, age and retrospective or prospective data. There is a significant (p<0.001) relationship between time to treatment and cure or no treatment.

Stratification by type 1 or type 2 cases revealed relationships between time to treatment in both categories since type 2 cases are predominantly mild sensory or ataxia presentation. This was seen as the 21% population of DCI cases is predominantly mild in nature and no treatment outcome relationship was seen. The balance of cases is severe and no relationship was seen. This observation may explain the lack of correlation seen in the clinical literature regarding the relationship between time to treatment and outcome in decompression illness.

Table 5: Subject and clinical characteristics

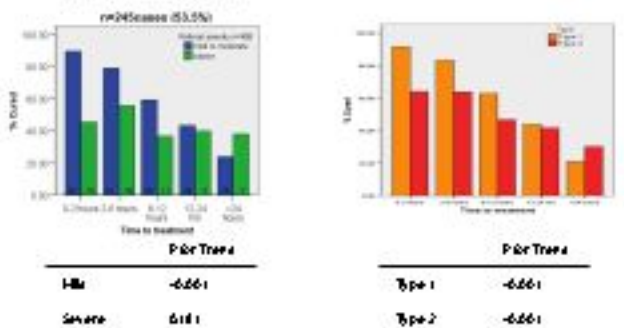
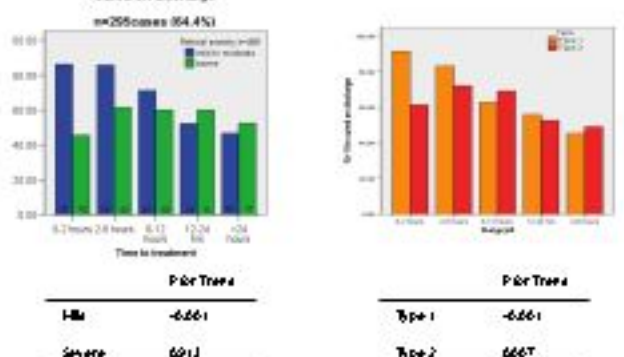


Table 6: Subject and clinical characteristics



Conclusions

There was a strong time to recompression treatment effect for mild decompression illness with a good outcome if treatment was within six hours of the onset of symptoms.

Within the time-span examined there was no demonstrable benefit to rapid recompression treatment for severe disease.

These observations do not support the provision of recompression treatment within an industrial setting in coastal and inshore diving in our area.

The relationship between time to treatment in any population of DCI cases will depend upon the balance between mild and severe cases.