

THE MANAGEMENT OF DECOMPRESSION
SICKNESS
PROBLEMS AND MISTAKES

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'Project Stickybeak' has well demonstrated that diving accidents and deaths are multifactorial in genesis. Usually there have been several bad choices or judgements leading to death or disability. Mistakes also occur in assessment and treatment.

This paper, based on experience gained since the first use of the short oxygen table in Australia, at Bairnsdale in early 1968 (1) by my then partner, Dr Palmer, is offered to help others avoid these mistakes.

The mistakes and problems mostly have a simple psychological basis in the need in all of us, and especially in doctors, to avoid the 'Red Face Disease', and to conceal the incidence of the 'Headless-Hen Syndrome'. Hence both doctors and divers often reject or rationalise.

Decompression sickness (DCS) is evidence of diving malpractice in almost all cases. Residual injury is often evidence of delay in treatment or of medical mismanagement.

In most doctors of first contact (ie. GP's and Admitting Officers) there is a serious or total lack of training, knowledge and experience of diving medicine. With these inadequacies, combined with lack of knowledge or referral and disposal, it is surprising that people with serious DCS do not die in the water, or on the beach, or in an inadequate treatment facility.

It should be emphasised that the treatment of DCS is primarily recompression, at maximum oxygen partial pressures. The diving doctor at the chamber also treats the fluid loss, the oxygen toxicity, the coagulopathy and the prostaglandin release.

Table 1 gives the common distortions of information reaching the diving doctor or the doctor of first contact. I have indicated the likely effect on the latter. As well, I have indicated the areas of error liable to occur amongst the more experienced diving doctors.

The common denominator of these varied factors is rejection, often of the objective. But the message is simple. Cases of DCS are almost always more serious than is initially perceived, and do often require more sophisticated facilities and management than is expected at the initial assessment. There is little danger in over treatment. Two historical concepts need eradicating:

Firstly, In water recompression should be totally rejected. This has been adequately condemned in the August 1982 issue of "The Scuba Diver". (2)

The second legacy, is the nebulous concept of an 'acceptable clinical result' from treatment of DCS. This means that residual disability, ie. failure to improve, is acceptable. This is not so. An acceptable result is one with no detectable residual injury (Wood-Burgess). Residual paralysis (Charles Krebs) is not acceptable. These two cases show the need for speed and the unacceptable results of delay in spite of the use of sophisticated equipment and diving medical practice.

Since the middle of 1982, adequate recompression facilities have been available for sports divers in Victoria.

TABLE 1

FACTORS THAT NEGATIVELY INFLUENCE THE
DECISIONS OF THE TREATING DOCTOR AND
THE OUTCOME IN CASES OF DCS

DIVER

MINIMISES

Symptoms
(giddiness vs severe pain)
Severity
Depth of onset
Bottom time
Depth of dive (swell height ignored)
Avoidable intra-dive hazards
eg. temperature, current, visibility Equipment deficiencies
Equipment malfunction
Poaching or other peccadilloes
(therefore, frank lies about anything and everything)

MAXIMISES

Time at, and between, stops
Dive conditions
Pre-dive planning (? nearest RCC)
Quality of equipment
First aid knowledge and administration

ATTENDANTS, BUDDIES, ASSOCIATES
AND BYSTANDERS

MINIMISE

Likelihood of diagnosis
Severity of symptoms
Progression of symptoms

MAXIMISE

Difficulty of transport
Advantages of the only recompression facility they know

DOCTOR OF FIRST CONTACT

DISREGARDS

The need for speed
The need for specialist advice
The need for O₂, aspirin and IV therapy
The need for a catheter
The need for integration of communication

TREATING PHYSICIAN

MINIMISES

Severity of symptoms
(Increased severity requires a longer table)
Failure to respond
Failure to progress
Need for mixed gases
Need for saturation

A multiplace, 2 lock Recompression Chamber (RCC) is

available for treatment of divers. Access is through the National Safety Council of Australia (NSCA) Gippsland Region, based at 9 Chickerall Street, Morwell. Telephone 051-34-5212 or 051-34-1726, or through Bass Strait Medical Services, 281 Main Street, Bairnsdale. Telephone 051-52-3055 (all hours)(CG Macfarlane, AH: 051-52-4859; P Laverick, AH: 051-52-5233).

The chamber is equipped for mixed gas treatment, as well as saturation, and has complete logistical support, including an ambulance helicopter capable of night flights. The two compartment chamber, which can accommodate two patients lying down or eight seated adults, is mounted on a semitrailer powered by a MAN tandem drive prime mover. Also on the trailer are a diesel generator, a 95 cfm 150 psi compressor, high pressure cylinders of air, medical oxygen and 80/20 Heliox, as well as comfortable living quarters for the attendants. The operational team consists of a treating physician (diving doctor), a diving supervisor

and two attendants. Table 2 shows the details of the equipment.

REFERENCES

1. Palmer RP. Minimal-pressure oxygen recompression treatment of decompression sickness. *Med. Jnl. of Aust.* 1968; 2: 174-176.
2. Knight J. First aid for decompression sickness. *The Scuba Diver.* 1982; August: 71-72.

DECOMPRESSION ACCIDENTS IN WESTERN AUSTRALIA

Harry Oxer

The only treatment chamber in Western Australia belongs to the Royal Australian Navy (RAN) and is at HMAS LEEUWIN, inconveniently located in relation to Fremantle Hospital. A new building at Fremantle Hospital is designated as The Hyperbaric Facility, but at the present time the money is not available to buy a chamber. So we continue to use the RAN chamber and are very grateful for the Navy's co-operation in treating our patients.

All diving accidents in Western Australia are referred to the Fremantle Hospital. I will discuss six consecutive cases which presented during the early part of 1982.

I would emphasize that we have seen more cases of arterial gas embolism than of decompression sickness. I believe this may be due to success in indoctrinating divers about the use of decompression tables and the dangers of long underwater times. Perhaps we have not done enough to warn them of the dangers of surfacing in an uncontrolled manner even after a very short time at a very shallow depth.

The first patient was a 32 year old sports diver who was operating on a hookah in about 9m of sea water off Augusta. He was by himself, diving from a small boat, when the compressor motor stopped. He nipped up to the surface. Unfortunately he had never heard of having to exhale on the way up. When he got to the surface he fortunately had buoyancy because he was partly paralysed, confused and dyspnoeic. One of the other boats nearby rescued him.

When he got to the hospital in Augusta, he had upper motor neurone signs in both legs, left complete pneumothorax, and gross subcutaneous emphysema in his neck and chest. He was confused and grey. He was managed with 100% oxygen, catheterised, and an intravenous infusion put up. He was given dexamethasone. A chest drain was put in. He was flown to Perth by the Royal Flying Doctor Service. They provide an excellent retrieval service and have three pressurised aircraft so that the patient can be kept at sea level from any part of the state. If a pressurised aircraft is not available, because all the centres of population where people dive are on the coast, we can fly at almost sea level along the coast.

TABLE 2

NSCA MOBILE DECOMPRESSION CHAMBER

SPECIFICATIONS

	Entry Lock	Main Chamber
Length	1.30m (4'3")	2.70m (8'10")
Diameter	1.80m (5'10")	1.80m (5'10")
Volume	3,310L (120cf)	7,252L (259cf)

COMMUNICATIONS

External	HF UHF Radiotelephone Telephone (Telecom provision fitted)
Internal	Aqua Air Helium Voice Processor 2 National Video Monitors

MEDICAL FACILITIES

Medical Lock
2 Scott oxygen masks
ECG Input
Suction unit
Comprehensive first aid kit
Oxygen monitor

POWER SOURCE

240 Volts/Mains (50m cable carried)
or
Dunlite diesel generator 10KVA (fitted)

GAS SUPPLY

Ingersol Rand Compressor
Capacity - 98cfm at 150 psi
Domnick Hunter Filter System
HP cylinders
92,400L (3,300 cf) HeO₂ (80:20)
184,800L (6,600 cf) Air
92,400L (3,300 cf) Medical O₂