

DCS will reverse all the significant damage already sustained by the central nervous system. Long term follow-up studies are needed on a big scale. Most recreational divers have little understanding of the seriousness of DCS to themselves.

A level of gross irresponsibility still prevails amongst elements of the sport diving population. The pursuit of the dollar causes some to turn a blind eye to safe practices. In others irresponsible behaviour due to a combination of poor self-discipline and sheer ignorance has resulted in an expensive, and occasionally risky, retrieval and treatment; sometimes innocent dive buddies have needed treatment as well! Such financial costs are presently borne by State Departments of Health, or even carried by the NSCA! We believe the time has come for clearly evident irresponsibility by a diver or his supervisors to be rewarded with a bill for the costs of his or her retrieval and medical treatment. We would advocate consideration of carefully worded legislation to that effect.

A therapeutic recompression chamber is a specialised intensive care patient locality. Its safe application is only possible as an integrated part of a fully functioning in-hospital intensive care unit, with staff trained in that speciality. At the same time its safe operation and maintenance requires full technical support. Large therapeutic RCC's are best located inside, or in immediate proximity to hospitals, and should function as part of an intensive care unit.

ACKNOWLEDGEMENTS

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REFERENCES

- Gorman, D.F., Browning, D.M., Parsons, D.W., Traugott, F.M. The distribution of arterial gas emboli in the pial circulation. *SPUMS J.* 1987; 17: 101-116.
- Haydon, J.R. Williamson, J.A., Ansford, A.J., Sherif, S., Shapetr, M.J. A scuba-diving fatality. *Med. J. Aust.* 1985; 143: 458-462.
- Management procedures covering diving/medical emergencies based on and from Townsville. Revised ed. Emergency Hyperbaric Unit, Townsville NSCA Emergency Services, P.O. Box 137, Garbutt, Qld. 4814. 1985.

Dr John Williamson is Visiting Consultant, Dr John Orton is Senior Staff Anaesthetist and Dr Vic Callanan is Directorat: The Department of Anaesthesia, Intensive Care, & Marine Medicine, Townsville General Hospital, North Ward, Queensland 4810, Australia.

Mr William Ellery was formerly Field Operations Manager, Mr John Hardman Field Operations Manager at: The Australian Institute of Marine Science, Private Mail Bag No. 3, Mail Centre, Townsville, Queensland 4810, Australia.

Mr Ray Palmer is Life Support Technician and Mobile RCC Supervisor at the Emergency Hyperbaric Unit, The National Safety Council of Australia, P.O. Box 137, Garbutt, Queensland 4814, Australia.

Correspondence should be addressed to Dr John Williamson.

DIVING CASE HISTORY

Lloyd Jenkins

This episode occurred over the Australia Day weekend (January 23rd to 25th 1988). The sequence of events involved a new instructor to the area, hereafter called A, his 22 year old girlfriend, who came up from Melbourne for the weekend, B, another experienced diver employed by the Dive Shop as coxswain and instructor's help, C, and three others, all from Melbourne.

The first dive was on Saturday, 23rd January, 1988, to 15 metres for 60 minutes in a class of 6 people and was uneventful. On Sunday, 24th January, 1988, the same class dived again to 15 metres for 90 minutes in the morning, presumably using 2 tanks, and in the afternoon to 18 metres for 40 minutes, both in open water. The surface interval was not specified but even allowing for 4 hours surface interval the second dive was 4 minutes over the limit for a no-decompression dive on US tables and 14 minutes over on Bassett tables. On Monday, 25th January, 1988, a group of 6 including A, B, C, dived in the morning to 12 metres for 40 minutes and around midday or perhaps 1300 hours, which would give a surface interval of possibly 4 hours, they dived

to 30 metres for times varying between 22 and 25 minutes depending on whose time-keeping is believed,. At best this is 4 minutes over no-decompression times on US tables and 8 minutes over on Bassett tables.

This day there was a slight southerly breeze and the sea was not rough. The boat was anchored over an area thought to contain a shark gutter, and all six people donned gear and dived overboard. On the trip out B complained of being cold and tired. She had no watch or time-keeping device. A (the instructor) had a non functioning depth gauge. He apparently stayed close to B and used her depth gauge, and she relied on his watch. After 22-25 minutes they had reached 30 metres and had not found the gutter and proceeded to ascend. C (the coxswain) had a free flow from his regulator at 15 m and made a rapid ascent, surfacing some 100 m from the boat. A ordered a decompression stop at 3 m for 3 minutes, but B would not stay with him because she was cold, and went on to surface where she found she was 70 m from the boat, to which she swam.

A stayed with the other 3 and they surfaced approximately 70 m from the boat as well. B needed to be helped aboard and immediately complained of exhaustion and sleepiness and lay down in the boat and appeared to sleep or doze all the way back to shore.

My first knowledge of the dive came from C (the coxswain) who presented at the surgery complaining of a pain in the left wrist. He said that he felt he had hurt his wrist helping the girl into the boat and then steering the boat through choppy water.

He was taken to the local hospital and put on 100% oxygen head down for two hours with 5 minute air breaks every half hour. He said that he was fine when I saw him again 2 hours later and was allowed to go home. That night at 23.45., I was called to the hospital to see three divers who had symptoms suggestive of decompression sickness. They were the instructor A, girl-friend B and another from Melbourne D, who admitted to no complaints at all but who had been persuaded to attend by A, with whom he was staying. B complained of skin tingling, headache, a rash on her left knee, pain in the left shoulder and right knee and loss of balance. She said that she had been exhausted immediately after surfacing but the other symptoms came on one and a half hours later. On examination she was quite unable to stand or walk without help, a rash was present, the blood pressure was 130/70 and the pulse 84.

A complained of headache, pains in his neck and right shoulder, lower abdomen and back This had started 15 minutes after surfacing. His symptoms were complicated by the fact that he had suffered neck and shoulder injuries in a motor vehicle accident some 2 years before and was still awaiting an insurance settlement or a court case. I had previously seen him with similar pains. He admitted to abdominal pain only after transfer to Sydney.

I put an I.V. line in to both and administered 100% oxygen while arranging transport to Sydney Prince Henry Hospital, and both were given intravenous dexamethasone 4 mg. There was no doubt about B, but at that stage I was not convinced that A was bent, however Dr. Ian Unsworth was in no doubt and recompressed him because of increased complaints. The Air Ambulance arrived at 5.15 a.m. and both A and B were transferred to Sydney, where they were recompressed on a modified Table 6 using 100% oxygen at 18 metres and 9 metres with 2 air breaks. Both responded completely to the single treatment.

The other chap with no complaint was very anxious to leave and go home to Melbourne and was allowed to do so.

C whom by now I had realised was part of the same dive presented again to Casualty at 10.30 a.m. on 26th January, 1988, with similar wrist pain which again subsided with oxygen therapy for 2 hours, and again he was allowed home. On 27th January, 1988 he still complained of joint pain and now depression, and so he also was transferred by air ambulance to Sydney where he was treated successfully by recompression on modified Table 6.

There are lessons to be learned from this episode by both divers and medical therapists.

1. A sense of responsibility and psychological maturity is essential in diving instructors, and the instructor organisations for the most part are aware of this.
2. Equipment must be in first class condition and each diver should be fully equipped and use his or her own equipment.
3. Diving to the limit of no-decompression tables can be dangerous,
4. All conditions should be considered, such as the temperature of water and fitness of the divers, when planning deeper dives.
5. Nobody was left in attendance in the boat. This is a dangerous practice.
6. Some of the effort could have been taken out of the post dive period if a shot line had been used.
7. The girl was cold and tired before she dived and probably should not have dived at all.
8. The deep dive should not have followed the morning's shallow dive.
9. The symptoms were not recognised for 8 hours afterwards.

10. Oxygen therapy is only emergency treatment. If symptoms are suggestive of decompression sickness and they respond either partially or temporarily to 100% oxygen, then that should be sufficient to convince the attendant that recompression is essential.

Dr Lloyd Jenkins' address is Pambula Plaza, Pambula, New South Wales 2549, Australia.

ANOTHER WAY TO GET BENT

John D. McKee

This 32 year old patient had been abalone diving for sixteen years, mostly just south of Nowra and south of Eden. He had had seven abalone diving days during 1988, of which four were in March, and his most recent dive had occurred south of Eden on 21.3.88.

The history

His diving profile for the day had involved an initial dive to 18 m for 45 minutes, after which he brought his abalone bag back to the boat. He then immediately descended again. The second dive was to 21 m for 70 minutes, although in fact he did admit later that he spent approximately 10 minutes of the 70 minutes at 27 m. He then surfaced, gave his abalone to his sheller, and immediately descended to between 6 and 9 m where he spent the next ten minutes.

I saw this patient and his sheller on 23.3.88, and the sheller said that while he was aboard their boat at Cape Howe off the New South Wales-Victorian border, a boat, a shark cat, had approached at great speed, rammed their boat. The shark cat driver jumped aboard, pushed the sheller out of the way, and then drove their boat off at high speed, dragging the diver along below for a distance of about 100 metres. During this alleged episode, the sheller kept yelling out that there was a diver below.

Eventually, the "pirate" driver stopped the boat, allegedly indicated that he was a "Fisheries Inspector", and dragged the diver out of the water. He then drove the boat and its occupants to Gabo Island. Subsequently the patient and his sheller were interviewed for two hours, by Inspectors, and the boat was confiscated.

That night, 21.3.88, the patient complained of fairly severe pains in his hips, shoulders and right elbow, and he had a troublesome headache. He was seen by nursing staff at a local hospital, and apparently he was given oxygen to

breathe for 20 minutes, but at no stage was he seen by a doctor.

The following day he was no better, and when referred to me the next day, 23.3.88, he seemed to be rather vague with a poor memory, and most of the information and history I obtained from his sheller, who was an amateur diver.

His mate had known him for some years, and he had observed a pronounced loss of alertness, lethargy, definite memory loss, a slowness in doing all things, especially manual activities, and he had observed the diver's hands shaking from time to time. The diver complained of a whistling sound in both ears, and he still had pain in both hips, both shoulders, the right elbow and the upper abdomen.

On examination the patient was fully conscious, there was no gross neurological abnormality, he walked with a "wide base", but he was tender in both groins, and I suspected his abnormal gait was due to tearing of ligaments when he was towed through the water. His response to questions and his response to commands was slow, but all movements were normal, there was no obvious muscle weakness, but there was a suggestion of diminution of light touch perception in the lower limbs.

Treatment

I formed the opinion that this patient almost certainly had cerebral decompression sickness, and I arranged for his transfer by air ambulance to Sydney, by a fixed wing aircraft, pressurised to sea level, during which time he received 100% oxygen.

Following his arrival at the Prince Henry Hospital in Sydney, he was treated in the hyperbaric unit recompression chamber for 265 minutes at 2.8 atmospheres. At the commencement of treatment, he still seemed to have poor short term memory, he was complaining of a "buzzing" in the left ear, fairly severe pain in his right shoulder, hip, and abdomen. He complained of some paraesthesia and numbness in both legs.

After 10 minutes at depth he indicated that he was feeling much better, his shoulder pain had almost completely disappeared, his hip pain was 50% better, and his abdominal pain had ceased.

Six hours after the commencement of treatment he had voided urine, he appeared to be much more alert, he had lost his headache, and he only had minimal residual pain in the right hip. As well, there was only minimal residual auditory hallucination.

Finale

This diver, who had had normal long bone x-rays in