

SPUMS SCIENTIFIC MEETING 1981
DECOMPRESSION DISEASES PART II
TREATMENT

THE NEW ZEALAND APPROACH

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In New Zealand most diving is done in the north. There is a rocky coastline, with many offshore islands, which provides us with a tremendously wide range of diving areas. One of the most popular ones is the Poor Knights Islands, about 15 miles offshore. One of the dive sites there is the Rico Rico Caves. You can sail straight into it. Boats often take visitors there, going right in and out again. At the base of the cliff, the bottom is at 120 feet. But as one goes around the point it gets deeper, going down to about 150 feet. We can not say to divers that they must not go down there, because they are free people. They are just as inclined to explore as anyone else and were we to say that nobody must dive below 150 feet the rule would be disobeyed. You may say that this is far too deep, but we had to settle for what people will accept. Divers go there and it is often beautifully calm. They will go down to the bottom at 120 feet where one can still see a great deal of fish life. One may see black coral trees and a whole host of interesting things in very deep water. To say that one must not dive to the depths of interest would be to negate the whole idea of amateur sport diving.

Many people go diving to the Poor Knights hopefully to depths not greater than 150 feet. Occasionally of course, people do go much deeper than 150 feet, indeed to 250 feet. Then of course they find that they have run out of air, which happens all too readily at those depths. So they make a rapid ascent. If they are lucky the boat has an attendant in it, who helps them into the boat and looks after their sickness while (hopefully) somebody else speeds them back to the harbour. If it is a well-equipped boat it has a radiotelephone so arrangements can be made for an ambulance to be waiting. Hopefully after half an hour's trip at full speed, they will reach the coast and the ambulance will take the patient 120 miles south to us at the Navy Hospital and its chamber complex. There are two chambers so we can treat two patients at once.

In the past we would reach a snap diagnosis on the basis of their presenting symptoms and the history and put them in the chamber. This seemed to work fairly well in most cases. However, I was left with a feeling of inadequacy when things did not happen according to the text books. There was always a delay due to transport difficulties. We could put them in the chamber quickly and reach a diagnosis. We could put them onto oxygen using a Normalaire mask which is quite comfortable to wear for long periods. We treated a lot of people with oxygen on the longer air tables long before the Goodman and Workman oxygen tables came in.

Nevertheless, this did not seem to be entirely satisfactory. We had a diver come to us in 1972 who had been to 250 feet. We put him in the chamber with all haste, we did not go into any great medical investigation of his situation.

There was no doubt about the diagnosis - he obviously had either an air embolism or decompression sickness. It was impossible to get a history. We treated him with the long air tables and found that his general condition did not improve. He remained comatose for the whole of the duration of his time in the chamber. Subsequently he became a quadriplegic. His dive pattern was descent to 250 feet for a dubious period of time, then a rapid ascent to the surface. We know that his decompression meter was into the red sector. He lapsed into coma, was given some treatment and eventually brought to us. He was treated for two days in the chamber and really we did not do him very much good.

At the same time we received another man who had dived at the same place, who had also been to 250 feet. Henry was a bit delayed reaching us, so the other patient was already under pressure. So we had to put him into the second chamber. Its normal working limit was to about 100 feet, but because of the severity of Henry's symptoms we decided to push it to its maximum depth. But Henry came to us having also dived to 250 feet in the same area going for proper. He had seen a fish and had gone after it to 250 feet. He had come to the surface knowing that he needed to decompress. It was his practice to call to the boat "Throw me another tank and I'll go down and de-coke". But the people on the boat were busy because someone had opened one of the sea-cocks of the boat and it was sinking. They were not interested in Henry on the surface and he did not get the aid that he expected. By the time they had stopped the boat sinking, Henry had already lapsed into stupor. By the time they got him into the boat he was in a coma. He convulsed a couple of times and then seemed to come right.

When his party tried to organise an air evacuation the people on the evacuation service did not really believe that there could be yet another neurologically bent diver from the same place and they were also rather slow in arranging the process. So Henry got to us very much later that Sunday evening. I went over him carefully, following all the rules in all the text books and the diving manuals about wasting no time at all. I sent Henry to the chamber post haste. He said to me just as he went into the chamber "Silly bloody business this", and I replied "Henry, you will be fine". He was quite lucid at this stage and seemed to me to be already coming right, all his vital signs were good, his blood pressure was good, and he seemed to be the one who was least at risk.

Henry started to go to sleep, then was unrousable and eventually died in the chamber. To have somebody die in the chamber is a sobering experience. It was not a two compartment chamber, so the attendant had to stay in with the dead man, which was an unpleasant process. Afterwards I had to write to the coroner and tell him all about it. I had to say that we had not investigated the case, that we had not done any real thorough workup of the management of this particular person's illness. In my view he had not been treated as a sick man should have been treated. He had not been treated as a hospital patient at all. We had not done a chest X-ray. We had not done any investigations. We had treated him as we thought best at the time and I did not

feel that this was satisfactory.

The diving manuals deal with divers who are well disciplined. Navies and big commercial organisations do not like to lose too many people, they find it difficult to explain away. But sports divers are a law unto themselves and should be. I do not think that we should try to legislate against people who are trying to do their own thing. All our patients are sports divers. Now following that incident of Ulf and Henry and another diver from the same diving site, on the same weekend, with a neurological bend also, who had preceded Ulf into the chamber, we treat every patient who comes to us as a hospital patient to be properly investigated before treatment. Ulf was treated with a very prolonged air table. The newer tables give us a great deal more scope. I always put the patient on oxygen whilst treating them.

Most people are against the decompression meter (DCP). Many would say that one of the reasons that we have a very high incidence of decompression sickness in New Zealand is because we always use these meters. We have watches and we have tables, and the meter should be an added help to the management of the dive profile. If it is used to make sure that one does not get into the zone requiring decompression, and if the diver used it as a guide to remaining in a state so that one can surface fairly rapidly, then the device is very helpful in spite of its manifest inadequacies.

When we were chopping up the Wahine, which sank in Wellington Harbour in a position where it had to be removed, after getting two bends using US Navy tables, we started a system whereby they also used DCP's. The divers clocked up something like 12,000 diving hours on the Wahine, at a depth of 60 feet to 70 feet without a single bend. The same system was used on the Seawise University in Hong Kong Harbour. I think they did something like 50,000 hours diving in relatively shallow depths using the DCP as an aid in decompression procedures. So it has its uses even though it is anathema to all Australian divers and to most European divers.

I will mention another case prior to the days of admitting people to hospital. A man who had been on the Wahine consulted me with a simple limb bend, pain in the knee. After he had been treated, we X-rayed his knee and found an osteonecrotic lesion which decided us to explore further. He had positively refused to have any investigations before treatment. He wanted to get into the chamber as quickly as possible. So we put him in the chamber, re-compressed him quite quickly and his pain was relieved. When he came out of the chamber he had a very nautical gait. So we X-rayed his hips and found that he had grossly distorted hip joints which was surprising as he did not have any pain. He had shifted more steel off the Wahine than any other diver despite having severe osteonecrosis. His age then was about 48.

Not all the cases that come to us, although they are diving accidents, are necessarily decompression sickness. This

again is a good reason why one should treat everyone as a hospital patient. I went down to the helicopter one day to meet a patient. I started to get some sort of history from him, when he said "To hell with that Doc, I must piss". I felt there was every good reason for getting him into a situation where he could be treated. In the hospital bed when I started to examine him again he said "Oh, Doc, I must shit now". That indicated that there was nothing much the matter with him from a decompression sickness point of view. We had a chest X-ray done which showed diffuse mottling. His problem was water inhalation. He had got his regulator caught in a fishing net that he had gone down to retrieve. He had choked and spluttered when he came ashore. Someone said "You have been diving. I knew someone who was in the Navy once. All divers get bends. You must go to the hospital at Devonport, because you have got the bends". We put him on oxygen and we gave him some frusemide. The next day he was a much happier man and he spoke quite civilly to us despite his earlier rather less than courteous way of describing his symptoms.

A chap who had been diving to 100 feet on his first check-out sea dive at the Poor Knights (that is a crazy thing to do but most of them manage without getting into difficulties). He had had a good medical beforehand, which included an X-ray that did not show any significant abnormalities. When he came to us he was stuporose and very obviously severely ill and when I tried to listen to his heart, I could not hear any heart beat at all. Just after we had taken a chest X-ray he suddenly vomited blood all over me. So we put up a drip, took him down to the chamber and started off his therapeutic regime with a 6A oxygen table. We had to change to a prolonged air table because he convulsed with the oxygen. When we finally brought him out of the chamber and transferred him to the critical care unit at Auckland Hospital, he was still comatose and still obviously very severely ill. We had done nothing for him by putting him in the chamber. After his spell in critical care where he was in coma for about two weeks, he went to the neurological unit where they decided that he had certainly not had an air embolism and that it might be some strange demyelinating disease. At a seminar where we discussed this case, the physician in charge of critical care was so affronted with this neurological diagnosis that he jumped up and said "Oh, bilge", which would typify the reaction of most people who knew something about diving accidents. Amazingly this patient has gone back to work as a surveyor. He has virtually no lesions at all. It staggers me to think that anybody could be so severely ill and can do so well with medical management.

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