and administered under pressure. Oxygen toxicity is a prime concern during this manoeuvre, therefore, if the situation indicates saturation, a positive decision must be made and carried out with all dispatch.

Lowering the recompression chamber partial pressure of oxygen to 0.5 atmospheres absolute by dilution with 100% nitrogen and installing a portable carbon dioxide scrubber will provide the necessary additional requirements. Because gas and equipment are not always readily available on site, it is a good idea to have planned for this eventuality ahead of time, so that one radio or phone call can mobilize all of the necessary people and supplies.

There are many factors to be weighed when dealing with a possible or known bend, no matter what the degree. It is important to have well-trained people on each dive site who are trained in diving medicine, such as an EMT-D and an experienced diving supervisor. These professionals should be able to recognise when a neurological examination and test of pressure are negative and the patient may be decompressed without treatment. They must determine how much treatment a diver/patient may require and how much he can physically tolerate.

There is no one magic answer to diving medical problems, and any oversimplified rule of thumb can lead to more problems than it resolves. Training, experience, and planning are our greatest allies during normal operations and emergency situations. By using a logical, well-planned response scenario, we can respond, without over-reacting and manage to a successful conclusion any diving medical problem that might arise on site.

THE DECISION TO "EMERGENCY SATURATE"

Marcel Johnson

Occasions sometimes arise in the treatment of decompression sickness when the normally used USN Treatment Tables are not adequate for a particular situation. A patient may require more time at his depth of relief than allowed by these tables, or he may need time at depth on O_2 and be physically unable to tolerate O_2 therapy. For whatever reason, if a patient needs to remain at his depth of relief for a prolonged period or needs deep recompression therapy, two items must be addressed immediately: Oxygen toxicity and decompression commitment.

The possible need for emergency saturation should be discussed and planned for at an earlier date by persons connected with diving operations, because when emergency nitrox saturation therapy must be conducted, time is very important. Because of the high level of oxygen the chamber occupants may have already been exposed to, the chamber environment must be brought within acceptable saturation limits and maintained there until such time as saturation decompression is indicated and completed.

The following is a step-by-step example of such a procedure, as used in actual field emergencies. It is offered only as a reference to those interested. The author assumes no responsibility for its use by others.

On the job site a double lock DDC is used. Should a decompression problem arise, it is treated in this chamber. The patient and inside tender go into the chamber and are pressurised to treatment depth and then undergo therapy as indicated. If during the course of events saturation therapy is indicated, saturation procedures are initiated while the patient and tender are at the patient's depth of relief. They will remain under pressure until proper decompression is completed.

1. Load into outer lock the following items as soon as possible and pressurise outer lock to inner lock depth.

   a. Emergency Medical Technician (Diver) (EMT-D).
   b. Medical kit
   c. CO_2 scrubber
   d. Portable heater/chiller unit
   e. Chamber lights
   f. Two crescent wrenches
   g. One pipe wrench
   h. Teflon tape
   i. Wiring harness for scrubber, heater and lights
   j. Wiring harness installation-under-pressure tool
   k. Thermometer, hygrometer

2. After blowing the outer lock down to inner lock depth with air.

   a. Inside the chamber, the EMT-D conducts a thorough neurological examination and administers medical assistance as necessary.

      Outside the chamber, the topside crew installs a 100% nitrogen supply whip to the outer lock blow down valve. Air or treatment mix is plumbed to the chamber built-in breathing system supply (BIBS), and a chamber atmosphere analysis tube and flow cap are installed.

   b. The EMT-D transfers from the chamber inner lock to the outer lock. He then passes all of the previously loaded items from outer lock to inner lock.

3. Close the inner lock hatch and commence decompression of EMT-D on the appropriate table.

   a. The inside chamber tender installs the wiring harness installation-under-pressure tool in a through hull penetrator.

   b. The outside tender installs the through hull penetrator with its pig tail resting in the installation-under-pressure tool.

c. The inside tender may now remove the installation-under-pressure tool revealing the through hull electrical penetrator's pig tail, which is now accessible inside the chamber.

d. The wiring harness for the scrubber, heater, and lights, which was passed inside during Step 2 may now be installed to the through hull electrical penetrator pig tail.

e. Activate the heater, scrubber, and lights. Check each component for proper operation.

4. The outer lock reaches the surface and its hatch is opened.

a. EMT-D exits chamber.
b. Load into outer lock the following items:
   1. Plastic bags
   2. Toilet paper
   3. Bucket
   4. Towels
   5. Blankets
   6. Drinking fluids
   7. Food
   8. Any miscellaneous items deemed necessary at this time
   9. BIBS overboard dump panel if available

5. Chamber occupants go on BIBS breathing air (or treatment mix).

6. Pressurise the outer lock to the same depth as the inner lock with 100% nitrogen and open the inner lock hatch.

a. Allow the chamber atmosphere to settle and adjust same as necessary until a PPO_2 of 0.5 ATA is reached.
b. Chamber occupants may go off BIBS at this point as desired and/or directed.
c. If a BIBS dump panel is to be used, this is the time to install it.

The chamber occupants may remain at this depth indefinitely without ill effects from O_2 or other contaminants as long as proper saturation procedures are adhered to.

The chamber temperature should be maintained at a level comfortable to the occupants. The patient should remain supine as much as possible and force himself to consume fluids beyond the level called for by the normal thirst reflex. It is important that the whole body circulation and hydration be optimal in order to facilitate inert gas wash out from the patient's body.

A competent doctor knowledgeable in diving medicine should be called to the site if possible and/or the chamber with its support equipment should be loaded onto appropriate transportation and transported to a proper hyperbaric treatment facility where therapy is completed and the patient is thoroughly examined by the attending hyperbaric physician. Follow up examinations are conducted as deemed appropriate by the physician.

PERSONAL PROFILE

Michael D (Marcel) Johnson has trained in diving and diving medicine at the US Naval School of Diving and Salvage, the US Navy Experimental Diving Unit, the US Naval School of Deep Diving Systems and Saturation Diving, the Professional Association of Diving Instructors and the Daniel Freeman Hospital's Emergency Medical Technician-Diver Program, under the auspices of the Commercial Diving Center in Los Angeles, California. Mr Johnson has been active on the Association of Diving Contractors (ADC) Medical, Safety, and Technical Committees. He has served as Director of Diving Safety, Western Hemisphere, to Oceaneering International Inc., in Morgan City, Louisiana, and is at present an active commercial diver.

UNDERSEA MEDICAL SOCIETY INC. ANNUAL SCIENTIFIC MEETING JUNE 1-5, 1982, NORFOLK, VIRGINIA

Noel Roydhouse

The UMS started off in 1967 when a group of about 200 underwater medical research scientists wanted to create a forum where they could exchange views, discuss problems and obtain an overview of the research going on in the various research centres. UMS has expanded considerably and now has a membership of 1928 members in 47 different countries. Affiliated to UMS, and each having a member on UMS National Executive, are the South Pacific Underwater Medical Society (SPUMS) and the European Underwater Biomedical Society (EUBS).

When it comes to talking, those research workers who apparently lock themselves up or are locked up in their laboratories, really let themselves go. The locking up is in reference to the various naval laboratories where secret research is carried out, little of which is permitted to reach the public eye. In fact, to get into these laboratories one has to have a naval connection and even then certain areas are restricted.

Hence the programme was heavily oriented towards pure research with such papers as "Free Radical-induced lipid peroxidation and ion flux as a mechanism in oxygen convulsions" and "Muscle-twitch contractions appear to be slower and stronger in man during deep saturation diving". For the physician interested in the Bends and Decompression there was one whole day and another day of poster presentations containing much valuable information.

From the exercise physiology point of view the "Underwater Ergonometry with a US Navy Team" was interesting. They used the principle of a cycle ergometer moved by the hands which was mounted on a frame so that a person could be exercised lying in any plane. The brief synopsis was that the maximum oxygen uptake did not vary with the position of the diver. In the clinical session on "Exercise Limitations in Diving", the belief was that, contrary to