As the conditions were calm more tests need to be done in windy and rough conditions.

Lessons

Inflated plastic tubes standing vertically in the water are easily seen regardless of colour. Red tubes lying on the water are easily seen from the air. These tubes would be a worthwhile piece of equipment for every diver. They are cheap, easy to make and easily carried.. They are simple, have no valves, are easily blown up using a regulator or by mouth. They are very visible from a boat, so preventing divers getting lost, and from the air. However some care is needed in storage.

CONCLUSION

These tubes are now available as Safety Sausages from TL Begg and Sons Ltd, PO Box 5216, Dunedin, New Zealand. The Australian distributor is Diving Security (a branch of RJ Knight Pty Ltd), PO Box 6298, Melbourne VIC 3004.

Bob Begg's address is TL Begg and Sons Ltd.

TWO POWERLESS CHAMBERS CASE REPORTS

Douglas Walker

These two cases, taken from very widely separated sources, illustrate that arrival at a recompression chamber is not necessarily the end of the accident phase for the victim, and that chamber operation is not immune from the effects of Murphy's Law.

Case 1

While a naval diver was making a working dive to change a vessel's propeller he was crushed when it unexpectedly, and for some unknown reason, slid forwards. His tender quickly recognised that he was in trouble and the stand-by diver was sent down. He managed to pull the propeller off the victim, who was now unconscious. The victim started to sink as soon as he was freed. He was quickly hauled to the surface by his lines by the topside crew and brought into the dive boat. He was unconscious, fitting, and had suffered physical injuries so he presented them with a very urgent, serious, and difficult management problem. He was transported to a naval hospital and the staff of the recompression chamber were alerted.

His condition was deteriorating rapidly so it was decided to recompress him in the chamber despite it being unready for use because of maintenance work. The moisture separators were out of the compressed air system so it was not possible to refill the high pressure air bank by the usual means. However, the air bank had been topped up to 3,000 psi (43,050 scf) and was holding the equivalent of 1 at IATA, so it was possible to commence treatment. From here on problems plagued the operation.

An operation call for assistance brought divers from several ships. This was not an unmixed blessing as they had never practiced together for such an emergency situation. There was a malfunction of an O-ring in the high pressure valves which made it impossible to ventilate the chamber. While this was being replaced two surface supply umbilicals were rigged from a dive boat to the gauge stop in the chamber's control panel to supply low pressure air to the chamber. This proved adequate. As a precaution the local fire brigade was asked to lend their high pressure compressor, used for filling their emergency air breathing apparatus cylinders. This compressor was attached to the chamber's emergency air supply.

The treatment also was not routine, the scenario being as follows. The victim was recompressed to 50 msw (165 fsw), to where he showed a limited response. As he had not obtained a complete response by 30 minutes it was decided, by the master diver and two medical officers, to bring him to 18 msw (60 fsw) and place him on 100% oxygen. This decision was based on the uncertainty concerning the extent of his internal injuries. Two minutes after commencing on this treatment he began to improve. The treatment table was extended by three additional 25 minute periods at 18 msw (60 fsw) as he continued to show progress. Upon arrival at 9 msw (30 fsw) the patient was asymptomatic except for chest pain on inspiration.

After completing the chamber treatment the patient was transported to hospital for a complete medical examination. The chest x-ray revealed the presence of a right haemopneumothorax, mediastinal emphysema, which extended into the fight upper quadrant of the abdomen, and a pneumopericardium, so he was transferred to the care of a cardio-thoracic surgeon at another hospital. Four days after the accident a further x-ray examination revealed multiple fractured ribs and a fractured sternum. The degree of recovery he achieved from these injuries is unknown.

Case 2

The patient, a 56 year old diver, was being treated for a spinal bend when a power failure occurred. As a result the chamber operators were unable to prevent a build-up of carbon dioxide in the chamber. Through the police they contacted the diving team at a naval establishment and were supplied with a two-ton generator complete with crane. This source of emergency electrical power took 4 hours to arrive and in the meantime the diver had been given an emergency resuscitation set. Mains electricity was restored 1 hour later.

The diver had been on mixed gas treatment for 72 hours before the power failure. There would normally have been sufficient reserve facilities available in the unit to cope with a power failure, but on this occasion a second diver was receiving treatment in their other chamber. The unit is now seeking to raise sufficient money to obtain a carbon dioxide "scrubbing" system for the chamber to take care of such an eventuality should it ever occur again.

The diver had apparently been following an accepted Table while he made a no-stop dive but suffered a spinal bend and been flown by helicopter to the treatment centre. Following the recompression treatment he was transferred to a hospital near his home. He has been advised he should never dive again.

Discussion

These cases illustrate the fact that there is far more involved in having a recompression chamber unit for local use than the chamber itself and a staff of willing volunteers. Those who are to be responsible for treatments must not only be trained but be sufficiently experienced to be flexible in their response to the problems peculiar to each patient, and to unexpected external factors such as are reported here. They must be a team with a clear basic management protocol to ensure that the patient has correct evaluation before recompression is commenced. In Case 1 the incident depth is unknown, nor how far he sank before being recovered, but the depths can be assumed not to be great or there would have been a recompression chamber (RCC) at the dive site. The use of recompression down to 50 msw (165 fsw) gauge a trial of 100% oxygen at 18 msw (60 fsw) gauge made the case management more difficult than necessary. However recompression to 50 msw for suspected air embolism is still recommended by many authorities. Both the patient and those treatment him were very fortunate that his pneumothorax did not produce serious clinical symptoms during the ascent phase in the chamber.

In Case 2, the fact that the patient was on a mixed gas therapy implies that the staff of this recompression unit was experienced in the management of serious and complicated cases. Yet despite this it seems that their "disaster plan" was quite inadequate to cover total power failure when both their chambers were in use. There was too great a trust that a power cut would never occur while their facilities were fully extended. They had forgotten Murphy's Law! They would have benefited from remembering how "Papa Topside" anticipated just such a problem and devised a simple answer. Wartime submariners would have told them to scatter sodasorb on the chamber floor.

In the post-war years of rapid developments in diving one of the notable characters who entered the United States Navy (USN) Medical Corps, after an active and unusual stint in general practice, was Dr George Bond. He realised that some problem might result in a "bell" (personnel transfer capsule or PTC) remaining an unexpectedly long period underwater without adequate ventilation. This situation would lead to a dangerous build up of carbon dioxide, so he considered what would be the simplest remedy. He proposed, and successfully chamber tested, a simple no-moving-parts carbon dioxide scrubber. This consisted of one or two pairs of pantyhose filled with sodasorb. Lateral thinkers consider the objective (exposure of sodasorb to the carbon dioxide loaded air) rather than concentrating on modification of the mechanical method which is giving trouble. Dr Bond's paper was reprinted in the SPUMS Journal 1979, April-Sept, p 41-45 and is reprinted in this issue for the benefit of our newer members and as a tribute to the memory of an intelligent and humane Diving Doctor.

These cases are presented because there is a tendency on the part of both divers and civil authorities to under-appreciate the problems which may arise in association with the management of a safe and efficient recompression facility. The sources of these case histories are thanked for making them available for use in this paper. In the interests of confidentiality the sources are not stated here.

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ASTHMA AND DIVING
A CASE REPORT

CJ Lowry
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The patient, aged 33 years, had been a qualified diver for six years. He was a known asthmatic and had been observed to use Ventolin aerosol frequently in the preceding week. He had no hospital admissions for asthma.

The dive was off Boat Harbour, near Kernell, on Sunday, 11 May 1986. His buddy was a female friend, of recent acquaintance and who had just completed her C Card certification. At no stage did they descend more than 30 feet in depth, and they were underwater for approximately 20-30 minutes prior to the patient signalling that he would ascend and get his bearings. He proceeded to do this, leaving the female diver on the sea bed. He then returned to her, in a state of some apprehension. He signalled that they should surface, and then he proceeded to do so at a considerable rate, faster than she thought safe. Nevertheless she continued with him because he seemed to be in distress, and arrived on the surface soon after him. He was thrashing around with his hands, started swimming overarm and had taken his regulator out of his mouth. She attempted