LEADING ARTICLE

ACUTE DECOMPRESSION SICKNESS IN COMPRESSED AIR WORKERS

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Although not very common, some types of work have to be carried out under increased air pressure. Such work includes underwater diving and underground tunnelling with the use of compressed air. In the construction of Mass Rapid Transit Systems in several countries, including Singapore, such tunnelling was required.

A well-known hazard in relation to work in compressed air environments is decompression sickness, commonly known as the "bends". This varies from mild manifestations of skin changes and joint pain to serious involvement of the nervous and other systems which can result in paralysis and death.

There are many factors involved. An obvious one is the level of air pressure used. Other factors include the duration of exposure, the level of physical activity, the age of the worker and whether he is obese (1).

Decompression sickness is thought to result either from the embolic or pressure effects of gas bubbles formed from supersaturated blood and tissues during compression or from air embolism from the lungs or both. Decompression tables have been designed to reduce the ambient pressure in such a way that either bubble formation is negligible or bubbles do not attain a significant diameter for long. Many tables have followed the British table of 1958 which was based on Haldane's observations (2). But over the last 20 years, decompression tables have been considerably modified as a result of experience with their use. Following observation of various civil engineering contracts, it became obvious that the British decompression procedures of 1958 were inadequate. New decompression tables have been calculated on the basis of theoretical conclusions reached as a result of laboratory tests on animals and human volunteers. (3).

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In the UK, the Blackpool Decompression Tables are now used. These tables, although regarded as an improvement in that decompression sickness rates are reduced, still do not prevent it entirely especially at high pressures. Decompression tables often represent a compromise between practicability and theoretical ideals (3).

In assessing a decompression procedure, generally a 2% bends rate could be considered acceptable (4). In the Singapore Mass Rapid Transit project, the Blackpool Tables were used in all contracts. In Phase 1 of the construction, the bends rate was only 0.07% (5). This was lower than the rates experienced in Hong Kong where the Blackpool Tables had also been used (6).

The Blackpool Tables do not provide for staged decompression where the exposure is to less than 1 bar gauge pressure. This is because it is rare for decompression sickness to follow exposure to gauge pressures below 1 bar (3). In the Hong Kong experience, there were no cases of illness after exposures at such pressures in the first phase of the construction of the railway, and only one case during the second phase (Island Line) giving a bends rate of 0.002% (6).

The paper by How et al in this issue is thus interesting in highlighting the occurrence of 10 cases of decompression sickness among workers who had been exposed to less than 1 bar gauge pressure in the underground tunnels. The paper postulates several factors which might have played a part. In particular, the long exposure times were significant. Although the manifestations were mild and all the cases recovered with recompression therapy, such occurrences should not be ignored because they may indicate inadequacy of the safety provisions. Mild attacks may also lead to chronic bone damage years later although there is no clear relationship between getting the bends and subsequently suffering bone damage (7).

At present, there is no decompression procedure that will protect all workers at all times from decompression sickness (3). But exposures to pressures of less than 1 bar gauge may not be as harmless as it may at first sight appear.

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