A case is reported that provides further evidence of an old occupational hazard, dysbaric osteonecrosis, presenting in a new population (sports scuba divers) who also appear to be at risk. It highlights the need for an accurate diagnosis of diving related illness.

A case is reported that provides further evidence of an old occupational hazard, dysbaric osteonecrosis, presenting in a new population (sports scuba divers) who also appear to be at risk. It highlights the need for an accurate diagnosis of diving related illness.

CASE REPORT

A previously fit and healthy 35 year old scuba diver presented to his local accident and emergency department. He had been diving the previous day and was now complaining of his legs “feeling woolly”, pins and needles in his toes, and poor hand-eye coordination the previous evening. Given the classic symptoms of decompression illness (DCI) and a recent history of diving, a provisional diagnosis of DCI was made. He was placed in 100% oxygen and transferred to our hospital’s recompression facility for further care.

On arrival, his symptoms were unchanged, but close questioning revealed that he had been complaining of pain in his left shoulder for several months. Detailed neurological examination was normal. Heel to toe walking and sharpened Romberg time were within normal limits. A diagnosis of acute DCI was made and a decision taken to treat with therapeutic recompression.

In view of the patient’s long standing shoulder complaints, a radiograph of the shoulder joint was taken before recompression treatment. The radiograph (fig 1) showed ABN as an advanced necrotic humeral head (A4b MRC classification). Treatment was started using the United States Navy recompression treatment table 6. The recompression treatment was uneventful, and the patient made a full recovery from acute DCI.

During follow up, the patient was offered a radiographic long bone survey, and magnetic resonance imaging (MRI) of any lesions found. Radiographs revealed subtle “snow capping” of the right humeral head with increased subchondral density typical of early ABN (fig 2). MRI detailed the extent of the damage underlying the bony changes seen on plain radiographs (figs 3 and 4).

DISCUSSION

Radiographic examination is not routine in assessing diving illness. However, when making a diagnosis one needs to exclude other causes, such as trauma, so as not to treat symptoms that do not origin from acute diving illness, thereby avoiding the expense and inconvenience of prolonged recompression treatment. We identified evidence of ABN that accounted for the shoulder pain. The extent of the damage was striking in the light of the patient’s continued use of the limb, his occupation as a fireman, and pursuit of an arduous physical sport.

The patient has no history of known medical causation of ABN other than hyperbaric exposure—for example, diabetes, steroid use, hyperlipidaemia, or trauma. He is a non-smoker, and consumes less than 15 units of alcohol a week. As an experienced diver, he was conducting sports dives to the limits of technology—that is, relatively deep dives using multiple gas mixtures rather than depth limiting air as the breathing medium. Although such deep diving practice is currently restricted to the more adventurous, advancements in technology and equipment are making such dives more commonplace.

ABN is a well documented hazard of pressurised tunnel work and to a lesser extent professional diving. It was first reported in 1911 by Bassoe. When associated with pressure

Figure 1 Plain radiograph of left shoulder, showing established avascular bone necrosis of the proximal humerus with collapse of the articular surface.

Abbreviations: ABN, avascular bone necrosis; DCI, decompression illness; DON, dysbaric osteonecrosis; MRI, magnetic resonance imaging
exposure, it is often referred to as “dysbaric osteonecrosis” (DON). Ohta and Matsunga6 and Wade et al7 reported an incidence of DON greater than 50% in discrete populations of professional shell fishermen in Japan and Hawaii who conduct deep scuba dives. When it affects the articular surfaces of the joints, it can lead to disablement of the affected limb. Its initial presentation can be painless necrosis of the joint detectable only by MRI, radiography, or similar diagnostic tool. It can occur in divers and tunnel workers who have not reported experiencing acute DCI. There are only three previous case reports in the world literature of DON in amateur scuba divers.8–10 In one of the reports, the diver had a history of insulin dependent diabetes and joint trauma, thus detracting from hyperbaric exposure as the sole causation. DON is believed to result from inadequate decompression.11 There is convincing evidence that pathologically DON is the result of nitrogen and lipid emboli initiating a coagulation cascade in both tissue and the microcirculation of bone.12 There are reports of other “diving” related causes, including theories about the compression/decompression cycles. There is, however, little direct supporting evidence.13 DON can occur months or years after exposure to increased atmospheric pressure. It appears that only one pressure exposure is needed to trigger the condition.

Wilmshurst14 reported that advancement of technology does not always advance the safety of sports divers. With increasing modern equipment and changing life styles, amateur divers go deeper for longer, more often. Perhaps more worrying, amateur divers have a no (or low) risk perception of DON, a potentially disabling condition.

Authors’ affiliations
G D M Laden, East Riding Hospital, Anlaby, UK
P Grout, Accident and Emergency Department, Hull Royal Infirmary, Hull, UK

Correspondence to: Gerard Laden, East Riding Hospital, Anlaby, UK; gerardladen@aol.com

Accepted 16 June 2003

REFERENCES
Aseptic bone necrosis in an amateur scuba diver

G D M Laden and P Grout

doi: 10.1136/bjsm.2002.003129

Updated information and services can be found at:
http://bjsm.bmj.com/content/38/5/e19

These include:

References
This article cites 8 articles, 2 of which you can access for free at:
http://bjsm.bmj.com/content/38/5/e19#BIBL

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/