

chronic non-healing diabetic wounds of the foot.

The second day, with the diving oriented program, attendance was doubled, with participation from recreational diving professionals (instructors). Three presentations from different regions of Australia related experiences in divers working in commercial aquaculture; pearling in Broome, Western Australia, salmon farming in Tasmania and tuna farming based in Port Lincoln, South Australia. Descriptions of these industries and the incidence of decompression illness (DCI) in this workforce revealed the successes and future challenges in improving safe diving practices. Fremantle Hospital Hyperbaric Unit reported a 16% incidence of residual symptoms, during a four and a half year retrospective review of sports divers receiving recompression therapy for DCI. The dangers of nitrous oxide anaesthesia or analgesia causing DCI in a diver undergoing an operation soon after diving showed up the general lack of knowledge in the medical community of gas load risks. A preliminary report of in-water Holter (cardiac) monitoring of experienced recreational divers raised questions about cardiac related diving risks and their identification. Professor Mader described a rare case of acute progressive pulmonary decompression illness with pulmonary oedema and its response to recompression treatments. A lively discussion resulted from the presentation of risks vs. benefits of nitrox diving by recreational divers.

In addition to the formal program, the participants

were provided with tours to the submarine escape training facility at HMAS STIRLING and the Fremantle Hospital Hyperbaric Medical Unit. All observers were awed by the perfectly controlled slow ascent from an air lock at 20 m to the surface using only the gas volume of the lungs for buoyancy control by a submarine escape instructor.

Congratulations to the Fremantle Hospital Hyperbaric Unit staff, especially Sharon Keetley, the HTNA and the generous sponsors for organising an excellent scientific and social program. All the presentations kept to time, the audiovisual support worked well throughout, and it was encouraging to hear good quality papers from the HTNA members as well as from the medical community.

I look forward to the HTNA's 3rd Annual Scientific Meeting on Diving and Hyperbaric Medicine in Melbourne, September 22-23, 1995, at the Carlton Radisson Hotel, organised by the Hyperbaric Medicine Unit of the Alfred Hospital. For those interested in the 1995 meeting, contact Kevin Fabris or John Houston: (03) 2760-2323, fax: (03)276-3780.

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DIVING DOCTOR'S DIARY

DIVING IS A PAIN IN THE GUT

Carl Edmonds

Case report

JD, a male aged 31, had been scuba diving for two years, logging 110 hours over 160 dives.

He had no difficulty for the first couple of days of any diving trip, but then would develop a burning pain in his epigastrium, and the right hypochondrium. It would last for four or five days. He would be forced to suspend diving.

Food aggravated the discomfort, mild antacids relieved it. He tended to sleep propped up at night during these episodes. Sometimes donning the diving equipment (double tanks, wet suit, weights etc.) also aggravated the disorder. He commented that he often belched when ascending the diving ladder.

On the most recent diving trip he only lasted until the second day before the abdominal pain caused the dive to be aborted. On reaching the surface he vomited (although this tendency was actively suppressed whilst underwater). There was no history of motion sickness, the seas were calm and there was no alcohol intake. (They do not make divers like they used to.)

Apart from the pain being observed in association with diving activities, he had no other clinical problems.

Provisional diagnosis

A provisional diagnosis was made of ascent gastrointestinal barotrauma and reflux oesophagitis. Referral to a gastroenterologist was arranged.

Discussion

The symptomatology was easily explained, with

reference to both the diving technique and also the oesophagoscopy.

Like many other divers, he tended to perform a head-first descent, using Valsalva manoeuvre to equalise his middle ear spaces. With the increased oro-nasal pressure in the inverted position, gas can move more easily up the oesophagus, into the stomach.

He had noted the abdominal discomfort and distension on previous occasions, during or immediately after ascent. The gas would expand, causing eructation, occasional vomiting and oesophageal discomfort when the gastric contents move through the oesophageal sphincter. Subsequently, exertion from the effort of donning diving equipment, aggravated the existing oesophagitis.

In this particular case an oesophagoscopy was performed because of the persistence of the symptomatology for many days after the diving. There was 3 cm of gastric epithelium observed (Barrett's epithelium). This usually follows gastro-oesophageal reflux, in this case without the presence of an obvious hiatus hernia.

By utilising the correct diving technique, no further symptoms were experienced.

Review

Abdominal pain and discomfort, bloated sensations, nausea, vomiting or eructation during or following ascent, all are features of the gastrointestinal barotrauma syndrome. There have been about half a dozen such cases in which abdominal viscera have ruptured, sometimes causing death.

There have also been a couple of cases in which the persistence of symptoms, as happened in the above case, would sometimes be misdiagnosed as decompression sickness. A diver with a similar history to this one received hyperbaric treatments for this disorder, without a great deal of success, in one of Australia's more prominent hyperbaric units, and the large gas shadows on abdominal x-ray were interpreted as partial ileus due to decompression sickness! Relief with recompression was considered as verification of the diagnosis. The latter was only clarified after further clinical episodes were terminated by preventive measures.

As regards first aid procedures available to the diver, the symptoms during ascent can be reduced by relieving abdominal restrictions, e.g. removing the weight belt, undoing the harness and unzipping the wet suit. These simple measures have sometimes allowed divers to reach the surface in safety.

After the initial presentation and symptomatic

treatment, the only effective prevention is to change the diver's habits. Performing the Valsalva manoeuvre, or Toynbee (swallowing), in the inverted position, is a precursor to most of these cases. Feet first descent clears these complaints up.

Occasionally similar symptomatology can be precipitated by taking gaseous liquids, especially if they are consumed in large volumes, whilst under pressure (i.e. prior to decompression, as in a compression chamber or a caisson).

One example of the latter comes to mind. A gas gangrene patient (following a mauling by a tiger) celebrated his final hyperbaric treatment by drinking a whole bottle of carbonated beverage, at a depth of 15 metres in the recompression chamber. Apart from complaining that the "drink was flat", he suffered mightily on ascent to the surface, as the gas came out of solution and distended his stomach.

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Gleanings from Medical Journals *continued from page 120*

TRISMUS INTERFERING WITH DIVING

Trismus in a naval diver as a complication of inferior dental nerve block.

Cooper NK. *Dental Corps International* 1994; 1: 7-8

An illiterate Omani leading seaman diver, with a good command of spoken English and employed as an instructor, had two left lower molars filled under local analgesia. During the inferior dental block injection he complained of a severe burning sensation in his left jaw and left side of his face. This distribution of pain indicated that the local was injected into the maxillary artery.

After the fillings he was unable to open his mouth more than 5 mm. This made eating solids and inserting a diving mouthpiece impossible. His doctors were unable to help and decide that he had psychogenic trismus. After six weeks, having lost 10 kg, he was seen by the author who made the correct diagnosis and arranged for manipulation and physiotherapy in the oral surgery department of a London teaching hospital. After some eight weeks he returned to Oman and was diving two months later.

Abstract prepared by SPUMS Journal