Embolic inner ear decompression illness

Klingmann C¹, Benton P², Ringleb P³, Knauth M⁴
Dr. med. Christoph Klingmann
HNO Universitätsklinik Heidelberg
Im Neuenheimer Feld 400
69120 Heidelberg, Germany
www.tauchersprechstunde.de
christoph_klingmann@med.uni-heidelberg.de

Introduction:
Inner ear decompression illness (IEDCI) is thought to be a rare phenomenon in recreational divers, isolated signs and symptoms of inner ear dysfunction usually being attributed to inner ear barotrauma (IEB). A right-to-left shunt has been described before as a risk factor to develop decompression illness. The correlation between a right-to-left shunt and IEDCI was first described by our workgroup in 2001. We reported a case of a diver who suffered two episodes of IEDCI who responded well to HBO treatment. In this diver we found a right-to-left shunt of high hemodynamic relevance¹. This year Cantais et al.² presented 34 divers with IEDCI of 101 divers who have been treated for DCI. 24 of the 34 divers (70 %) had a right-to-left shunt whereas only 25 of 101 divers in the control group had a right-to-left shunt (p<0.001).

Methods and Findings
In the last six years we examined 9 divers with 11 episodes of IEDCI. Every diver but one performed at least 6 air dives before the accident dive. One diver performed a trimix dive to 55 meters of 65 minutes duration. All dives lasted at least 6 hours and the minimum diving depth was 25 meters. Symptoms occurred in 9 episodes after 15 – 30 minutes. One diver developed symptoms while passing a mountain and one diver developed vertigo and hearing loss while taking a hot shower. We screened the divers by transcranial doppler sonography and found a right-to-left shunt of high hemodynamic relevance in all 9 divers. Eight divers showed a shunt with more than 99 bubble signals at rest and one diver had more than 50 bubble signals after Valsalva manoeuvre. The probability of this group of nine divers all having a right-to-left shunt of high haemodynamic significance is about 0.15⁰ (0.00000004) and therefore the association between a right-to-left shunt and presumed IEDCI appears to be highly significant.

Conclusion
The Institute of Naval Medicine/British Hyperbaric Association dive accident database shows that 71 (10.4%) of the 681 divers treated for neurological DCI in the 6 years 1995-2000 reported vestibular dysfunction. Germonpre has estimated that 25 – 30% of all divers with neurological symptoms treated at the naval hospital in Belgium have suffered IEDCI (personal communication).

Table 1: All symptoms occurred during the first 30 minutes and not anymore after the dive apart from case 1 and 8 (see comments). Two divers experienced two episodes each (Case 4 & 5) and (Case 6 & 8). The divers with HBO treatment reported faster restitution of vertigo but a central compensation was noted in all cases. Divers that suffered hearing loss responded well to HBOT (hyperbaric oxygen treatment). In only 6 of 11 cases the correct treatment was applied. Case 8 had a delay of 7 days until she reached our hospital and could be treated by HBO. Therefore only five of eleven cases had the proper treatment regime!