

Abstract

Decompression sickness (DCS) is a serious health complication of diving and its incidence is higher in divers with a right-to-left shunt (RLS), most commonly in the form of a persistent patent foramen ovale (PFO). Transcranial Doppler Sonography (TCCS) with administration of a pulmolabile echocontrast agent is suitable for screening. Since 2006, we have been systematically screening divers and enrolling them in the DIVE-PFO Registry. As of January 2024, it contains data from 1204 individuals. By studying the diving population in the Czech Republic, we were able to verify a significant correlation between the occurrence of DCS and the presence of RLS. As the degree of shunting increases, so does the risk of DCS, especially its most dangerous variant, DCS with neurological symptoms. Repeated dives in one day are common circumstances accompanying the occurrence of DCS. During an experimental dive in a barometric chamber, we demonstrated a reduction in the occurrence of bubbles in both venous and arterial blood when the ascent rate was reduced compared to standard mode. During a simulated dive, we also demonstrated the disappearance of bubbles in arterial blood in divers after PFO catheterization compared to divers with an open PFO. With long-term follow-up over several years, we have demonstrated the efficacy of PFO closure in preventing the recurrence of DCS. In the same cohort, we also demonstrated a reduction in the incidence of DCS in all other divers with proven PFO who were recommended a conservative diving profile.