

INFLUENCE OF SCUBA DIVING ON ASYMPTOMATIC ISOLATED PULMONARY BULLA

Germonpré P. (1), Balestra C. (2), Pieters T. (3)

(1) Centre for Hyperbaric Oxygen Therapy, Military Hospital « Queen Astrid », Brussels

(2) Free University of Brussels, I.S.E.P.K., Brussels

(3) Pneumology Dept, Military Hospital « Queen Astrid », Brussels

Introduction

Pulmonary blebs and bullae are considered an absolute contra-indication for SCUBA diving, because of a high estimated risk for pulmonary overpressure syndrome due to air-trapping inside the bulla. Usually, air-trapping is considered likely on the basis of either a one-way valve mechanism (“real” air-trapping) or a volume increase upon ascent because of a narrow inlet-outlet opening (“virtual” air-trapping). The case of an isolated, non-ventilated bullae is in most cases not considered different, although no plausible explanation is given.

Methods

We describe two patients in whom isolated, non-ventilated pulmonary bullae were observed to increase in size during a period of three years of intense SCUBA diving. In one case, this led to an episode of pulmonary overpressure syndrome with cerebral arterial gas embolism (CAGE). In another diver, the condition was discovered timely and during the next 7 years of not-diving, the bulla remained stationary in size.

Discussion

To our knowledge, these are the first documented case reports of pulmonary bullae increasing in size, attributable to SCUBA diving activity. The most likely mechanism for this phenomenon is a “stretching” of the bulla upon ascent from the dive: after a period of compression (Boyle’s Law), there is a gradual diffusion of air through the bulla wall, with restoration of initial size at the end of the dive. Upon ascent, the air diffuses only slowly out of the bulla, causing a temporary increase in diameter and stretching of the bulla wall. This repeated stretching causes the bulla to grow gradually. At one point, the bulla wall may become critically thin and rupture during the ascent.

Conclusions

Because of the relatively low sensitivity of plain chest X-rays, it may be advisable to obtain CT scans of the chest in candidate divers where the medical history leads to suspect possible pulmonary parenchymal damage.