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GUIDELINES

Recreational scuba diving in patients with congenital heart disease: Time for new guidelines

Plongée sous-marine de loisirs chez des patients ayant une cardiopathie congénitale : mise à jour des recommandations

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Summary The number of recreational scuba divers is steadily increasing. In its latest recommendations, the French Federation of Undersea Studies and Sports listed congenital heart disease as a formal and final contraindication to scuba diving. On the other hand, with the progress made in their management, the prognosis and quality of life of patients with congenital heart diseases have improved considerably, enabling them to engage in physical and sports endeavours, which are known to confer general health and psychological benefits. As a

Abbreviations: CHD, congenital heart disease; FFESSM, French Federation of Undersea Studies and Sports; LV, left ventricular; MET, metabolic equivalent; O_2, oxygen; RV, right ventricular; VO_2, O_2 consumption.

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consequence, the ability of these patients to dive has become a regular and recurrent issue. We review the various types of scuba diving, the physical performance required for its practice, its effects on cardiovascular function and the elements that need to be considered before recommending whether it can be practiced safely at various levels of difficulty. Because of the diversity and broad heterogeneity of congenital heart diseases, a detailed evaluation of each patient's performance based on clinical criteria common to all congenital heart diseases is recommended.

MOTS CLÉS
Cardiopathies congénitales ;
Plongée sous-marine ;
Sports aquatiques ;
Recommandations médicales

Résumé Le nombre d'adeptes aspirant à la pratique en loisir de la plongée sous-marine en scaphandre s'accroît. Dans les dernières recommandations de la Fédérations française d'études et de sports sous-marins, les cardiopathies congénitales font parties des contre-indications définitives à la pratique de cette activité dans la liste éditée par la Commission médicale et de prévention nationale. Parallèlement, en raison des progrès dans leur prise en charge, le pronostic des cardiopathies congénitales a considérablement été amélioré. La cohorte de patients ne cesse d'augmenter. Leur qualité de vie a aussi été améliorée, leur permettant de prétendre et d'accéder aux activités physiques et sportives desquelles on connaît les effets bénéfiques. La question de l'aptitude à la plongée se pose donc de plus en plus souvent. Nous revoyons les différents types de plongée, les performances physiques nécessaires à leur pratique, leurs effets sur les fonctions cardiovasculaires et les éléments médicaux devant être pris en compte pour autoriser sa pratique à différents niveaux de difficulté. En raison de leur diversité et d'une importante hétérogénéité au sein même d'un groupe de cardiopathies congénitales, nous proposons pour chaque patient une évaluation précise de son aptitude à partir de critères cliniques et paracliniques communs à l'ensemble des cardiopathies congénitales.

Background

A consequence of the growing access to scuba diving is an increase in the number of followers of this recreational, fun and contemplative athletic activity. According to the latest recommendations by the French Federation of Undersea Studies and Sports (FFESSM) published in 2012 [1], congenital heart disease (CHD) is a formal and final contraindication to scuba diving. On the other hand, with the progress made in their surgical as well as percutaneous catheter management, the prognosis of patients with CHD has improved considerably [2]. As a result, the population of adolescent and adult patients continues to grow at a rate of 5% per year, surpassing the number of children for the past 10 years [3,4]. In France, approximately 150,000 adults currently have CHD. Besides the increase in their number, their quality of life has improved, enabling them to attempt—and often succeed—in engaging in physical and sports endeavours, which are well known for conferring general health and psychological benefits [5,6].

Because the issue of aptitude to engage in scuba diving presents itself regularly, we felt the need to reflect on the matter, with a view to contributing decisive elements for or against the practice of this activity. These thoughts address recreational diving exclusively, and exclude all commercial and military divers, whose medical supervision is specific. Furthermore, some valvular diseases, systemic hypertension and coronary heart disease, independent of their possible congenital origin, are often definitive contraindications to the practice of scuba diving. Therefore, we refer the readers to the existing recommendations for these disorders [7].

The anatomical presentation of CHDs is highly variable; they may, consequently, be responsible, alone or in combination, for shunts, valvular stenosis or regurgitation, myocardial disease, pre- or postcapillary (or mixed) pulmonary arterial hypertension, dilatation of the aorta, pulmonary artery or both, and atrial or ventricular arrhythmias or conduction disorders [8]. This variability complicates the formulation of recommendations based on the usual and traditional classification of CHD as shunts, left or right stenosis, valvular diseases and others. Within each group of CHD, the anatomical and, consequently, clinical presentations are highly heterogeneous, which mandates for each patient a precise evaluation of each constitutional malformation. Inspired by Budts et al. [9], we formulated our recommendations on the basis of elements that are common to all CHDs, from which each individual can be separately evaluated. The importance of considering, for each patient, several extracardiac factors, including pulmonary, thoracic and haematological disorders, as well as therapeutic interventions, cannot be overemphasized [10].