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

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With the progress made in their management, the prognosis and quality of life of patients suffering from congenital heart diseases have improved considerably, enabling them to engage in physical and sports endeavours. As a consequence, the ability of these patients to dive has become a regular and recurrent issue.

**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.


**Rules to discriminate patients able or unable to practice sports used to be based mainly on the type of cardiopathy. In this review, the authors attempted to build a simple rule for scuba diving based on 3 criteria:**

1/ **Geometrical and functional data (mostly echocardiography)**

- **Left ventricular evaluation**
  - male / female:
  - Ejection fraction > 50 %
  - Endiastolic diameter < 56 mm (m) < 52 mm (f)
  - Endystolic diameter < 41 mm (m) < 37 mm (f)
  - Septal thickness < 13 mm (m) < 12 mm (f)

- **Right ventricular evaluation**
  - Fractional shortening > 35 %
  - Ejection fraction by 3D > 45 %
  - or by isotope or RMN imaging > 50 %
  - Tricuspid annular plane systolic excursion > 16 cm
  - S’ wave > 10 cm /sec

- **Gradient measurement**:
  - Mean aortic < 25 mm Hg
  - Left intraventricular < 30 mm Hg
  - Maximum Pulmonic < 40 mm Hg
  - Mean pulmonary artery pressure < 20 mm Hg

- **Ascending aorta**
  - Diameter < 45 mm or z score < 3


2/ **Electrocardiogram and exercise testing**

- **Absence of functional symptoms.**
- Absence of major change in repolarisation
- Maximum functional capacity > 8 MET
- 1st ventilatory threshold > 4 MET
- Normal adaptation of the systemic blood pressure.
- Transcutaneous oxygen arterial saturation > 95 %
- **Absence of significative arrhythmia** including Holter recording during exercise
  - In case of arrhythmia, implanted cardioverter stimulator or defibrillator, refer to French underwater federation guidelines

3/ **In cases of cardiac shunts**

-Since the shunt is exclusively left ➔ right, and **cannot be reversed** (intra-ventricular shunts, ductus arteriosus): No contraindication.

-**Inter-atrial shunts** are a contraindication because they may reverse when intrathoracic pressure increases and enable the passage of large bubbles in a desaturation phase.

-With regard to **patent foramen ovale**, which is not strictly defined as a congenital heart disease, refer to French underwater federation guidelines:

We originally wrote this document with a view to allow scuba diving under certain circumstances, by patients for whom this activity used to be formally contraindicated. This is based on fragile and debatable scientific data. Therefore, these recommendations are a tool to help in the decision-making based on individual evaluations and openly discuss the possible restrictions that might be imposed.

http://www.clubcardiosport.com
http://www.cardiosub.com