increased pulmonary pressure, and increased natriuretic peptides. This finding suggests that IAB may represent a marker of myocardial involvement and may indicate a poorly compliant left atrium.

Conclusion.— IAMD is a simple parameter showing good correlations with all other usual indices of heart involvement. We believe that it should be added to the routine echocardiographic evaluation of scleroderma patients, and that its prognostic value should be evaluated.

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Athlete’s heart: Echocardiographic modifications at rest and during exercise
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Introduction.— The intense and prolonged exercise training is accompanied by modifications of echocardiography and electrocardiogram.

Objective.— Our work has compared the echocardiographic and electrocardiographic parameters of sporting subjects to control subjects in good health whose main difference is the sport.

Materials and methods.— We report the results of a prospective study compared 30 athletes and 30 normal subjects, and whose only difference is the sport. This study analyzed the electrocardiogram, transthoracic echocardiography at rest and at peak of exercise. The statistical analysis used the Student test to compare means, and percentages using SPSS. The significance level was set at 5%.

Results.— The average age of our patients was 21 years and six months, range: 14 years to 45 years, with a male predominance (78.3%), 47 male and 13 female. Clinically the two series show no statistically significant difference regarding age, weight, height and blood pressure. At the electrocardiogram, athletes have a lower heart rate (45.2 ± 7.0 bpm) vs. (71.3 ± 8.9 bpm) (P = 0.005), a PR interval longer (0.27 ± 0.4s) vs. (0.12 ± 0.7s) (P = 0.05), a Sokolow largest (37.4 ± 4.3 mm) vs. (22.6 ± 3.2 mm) (P < 0.0005) and abnormal repolarization mainly represented by negative T waves (P = 0.02), an ST segment elevation in V2 and V3 (P < 0.0005) and a right bundle branch block (P = 0.003). Echocardiography showed dilated right cavities: right atrial (20.3 ± 4.3 cm²) vs. (10.5 ± 3.4 cm²) (P = 0.0125) and right ventricular (26.2 ± 4.1 mm) vs. (21.3 ± 2.3 mm) (P = 0.025). Left ventricular walls are thicker in athletes: septal wall (11.5 ± 3.2 mm) vs. (7.2 ± 2.0 mm) (P = 0.0125) and posterior wall (10.5 ± 2.3 mm) vs. (7.1 ± 2.0 mm) (P = 0.025). Despite a difference in the values of left ventricular diastolic diameter (5 mm on average, between two series), the level of significance was not reached. The left atrial is also dilated (18.2 ± 5.6 cm²) vs. (13.4 ± 4.0 cm²) (P = 0.025). The average myocardial mass indexed to body surface area was 148.3 g/m² in athletes vs. 97.21 g/m² in normal subjects (P = 0.005).

Conclusion.— Echocardiographic and electrocardiographic changes are the result of a prolonged and intense sporting activity. Abnormalities of cardiac parameters (echocardiography) concomitant with a moderate physical training should force them to seek an etiology.

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Aortic root dilatation in young stroke patients with patent foramen ovale
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Background.— No previous study has looked for an association between aortic dilatation and the clinical sequelae of patent foramen ovale (PFO), although a possible relation has been identified in case reports. The aim of this study was to compare aortic dimensions in patients with symptomatic PFO with healthy controls.

Methods.— Forty-seven consecutive patients were identified who (a) presented with cerebrovascular accident (CVA) assessed as most likely secondary to PFO (confirmed on bubble study), (b) were under 50 years old, (c) underwent percutaneous PFO closure, and (d) had stored transthoracic echocardiogram images of the aortic annulus and root, as well as 47 age, sex and BSA-matched healthy controls.

Results.— Among the 47 patients, 35 patients (74%) also met the diagnostic criteria for atrial septal aneurysm (ASA). Aortic root diameters were greater in patients with PFO at all three levels. The difference (about 10%) was more marked at the levels of the sinuses of Valsalva (34.4 ± 4.0 mm vs. 30.6 ± 3.4 mm, P < 0.01), and in the proximal ascending aorta (31.8 ± 4.1 mm vs. 28.8 ± 3.1, P < 0.01), and more modest at the level of the aortic annulus (23.1 ± 2.6 mm vs. 22.4 ± 1.8 mm, P = 0.2). Left ventricular measurements showed that PFO patients did not have larger hearts overall (end-systolic diameter: 30 ± 4 mm vs. 32 ± 5 mm, P = 0.10, end-diastolic diameter: 48 ± 5 mm vs. 50 ± 4 mm respectively, P = 0.04).

Conclusion.— This study shows that aortic diameter is increased in young PFO patients who have sustained a CVA compared with healthy subjects. This association may be due to a mechanistic effect, or more probably to a common underlying tissue disorder. Our results support further research in this area.

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Echocardiographic assessment of left atrial function in paroxysmal atrial fibrillation
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Objectives.— The conduct of anticoagulation in paroxysmal atrial fibrillation is still disputed based on scores adopted by learned societies. Can we rely on echocardiographic study of atrial function to decide of the anticoagulation? Is the left atrial function retained when the arrhythmia is paroxysmal?

Patients and methods.— The prospective study includes 31 patients suffering from heart disease. All patients were undergoing a transthoracic echocardiography. The goal was to compare atrial function in patients with paroxysmal atrial fibrillation history (AF+) and patients with sinusal rhythm (FA–).

Results.— The average age of patients was 55.24 ± 15 years (range: 12 years, 90 years). Nine patients had a history of paroxysmal AF. The (AF+) group had a significantly dilated left atrium (max Vol: 110.5 ml vs. 48.67 mL, P < 0.0001) and left atrial systolic function is more impaired (left atrial ejection fraction: 27.8% vs. 58.8%, P < 0.0001). There was no significant difference between the two groups concerning the ejection fraction of LV systolic (P = 0.12). The peak velocity of systolic wave at mid lateral wall of the left atrium is significantly lower in (AF +) group (11.26 vs. 13.89 cm/s, P = 0.02), an ST segment elevation in V2 and V3 (P = 0.005) and a right bundle branch block (P = 0.003). Echocardiography showed dilated right cavities: right atrial (20.3 ± 4.3 cm²) vs. (10.5 ± 3.4 cm²) (P = 0.0125) and right ventricular (26.2 ± 4.1 mm) vs. (21.3 ± 2.3 mm) (P = 0.025). Left ventricular walls are thicker in athletes: septal wall (11.5 ± 3.2 mm) vs. (7.2 ± 2.0 mm) (P = 0.0125) and posterior wall (10.5 ± 2.3 mm) vs. (7.1 ± 2.0 mm) (P = 0.025).

Conclusion.— Echocardiographic and electrocardiographic changes are the result of a prolonged and intense sporting activity. Abnormalities of cardiac parameters (echocardiography) concomitant with a moderate physical training should force them to seek an etiology.

Conclusion.— This study shows that aortic diameter is increased in young PFO patients who have sustained a CVA compared with healthy subjects. This association may be due to a mechanistic effect, or more probably to a common underlying tissue disorder. Our results support further research in this area.

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Left ventricular systolic function is not accurately evaluated by left ventricular ejection fraction after a long distance running
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Background and objectives.— Left ventricular (LV) systolic function evaluated by LV ejection fraction (LVEF) is depressed after a long distance running for some studies, not for others. These discrepancies...
may be explained by a poor design of the protocols or a wrong interpretation of the results, since LV EF is load dependant. We aimed to evaluate twice LV systolic function in long distance runners using echo, before and immediately after a relay race (each athlete ran around 60 km), in 2008 and in 2009, using the same protocol.

**Methods.**— Among 150 runners engaged in the 600-km Paris-Courchevel race (teams of 12 runners taking over from one another during four days and three nights), 22 male runners in 2008 (mean age 47.8 ± 5.5 years) and 23 male runners in 2009 (mean age 49.4 ± 7.7 years) accepted on a voluntary basis to have an echocardiography the day before the race (pre) and immediately after the end of the race (post). The same physician performed all the examinations pre (PD) and post (MS) in 2008 and 2009. Analysis was performed off-line blinded to clinical data. The following echo parameters were measured: LV fractional shortening (FS), LV EF using biplane Simpson method and end systolic stress (ESS). We also calculated a predicted FS according to ESS, and a ratio of observed/predicted FS (o/p ratio).

**Results.**— In 2008, pre LV EF (69.2 ± 4.9%) and pre FS (48.5 ± 4%) were significantly higher than post LV EF (65.3 ± 4.4%, \(P = 0.007\)) and post FS (42.6 ± 6.0%, \(P = 0.0005\)), but not in 2009 (pre LV EF 66.7 ± 5.3% and post LV EF 67.6 ± 5.4, \(P = 0.5\)) (pre FS 37.7 ± 4.6% and post FS 36.9 ± 5.5, \(P = 0.3\)). However, end systolic stress (ESS), an afterload index, was not modified after the 2008 race (pre ESS 40.7 ± 6.2 103 dynes/cm², post ESS 43.9 ± 11.0 103 dynes/cm², \(P = 0.22\)), but it was in 2009 (pre ESS 52.0 ± 14.3 103 dynes/cm², post ESS 47.6 ± 11.9 103 dynes/cm², \(P = 0.03\)). O/p ratio was significantly lower after the race, both in 2008 (pre o/p 117.0 ± 8.4%; post o/p 104.1 ± 11.0%, \(P < 0.0001\)) and 2009 (pre o/p 98.2 ± 8.7%; post o/p 93.1 ± 11.5%, \(P = 0.03\)).

**To conclude.**— In the present study, LV EF decreased in runners after the race in 2008, but not in 2009. This could lead to an opposite conclusion concerning LV systolic function in long distance running. However, using adapted indices, sensitive to contractility and load, we found a comparable result with a significant and slight reduction of LV systolic function both in 2008 and 2009 immediately after a long distance running.

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**Analysis of right ventricular global strain by 2D speckle imaging in patients with myocardial infarction**

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Right ventricular (RV) myocardial strain (\(e_s\)) is a new useful tool to evaluate RV function. The aim of our study was to use 2D speckle imaging (2DSI) on the different walls of the RV to derive regional and global indexes of RV function and to study the clinical value of these parameters in patients with first-time acute myocardial infarction (AMI).

**Methods.**— We analysed 30 patients admitted with AMI (58 ± 14 years, 21 inferior wall AMI and nine anterior) treated with primary percutaneous coronary intervention. We compared them to 24 healthy patients (53 ± 11 years, ns for age). Complete echocardiography was performed between two and four days after admission. To assess RV function, we analysed the three walls of the RV: septal and lateral from 4 C view and inferior from RV2 C view.

We measured maximal systolic \(e_s\) (%) in the basal, median and apical segments of these three walls by 2DSI. We calculated lateral, inferior and septal \(e_s\) as the means of three segments of respectively lateral, inferior and septal walls and global RV \(e_s\) as the mean of these nine values. All strain values were averaged on three consecutives cycles. We also measured TAPSE, RV MPI (Tei index) and maximal velocity of systolic wave (S max) on the lateral tricuspid annulus using Doppler tissue imaging. For statistical analysis, we calculated Spearman’s correlations coefficients between RV \(e_s\) values and other echographic parameters. Student t-test and Mann & Whitney test were used for group comparisons as appropriate.

**Results.**— All \(e_s\) values correlated significantly with TAPSE, Tei index and S max (respectively, global RV: \(r = −0.712\) \(P < 0.001\); \(r = 0.381\) \(P < 0.001\); \(r = −0.555\) \(P < 0.001\)). All \(e_s\) values and TAPSE, but not Tei index or S max, were significantly higher in normal patients than in patients with AMI. Alteration of RV global \(e_s\) in patients with anterior AMI was mainly due to a significant decrease in septal \(e_s\). RV global \(e_s\) was more severely altered in patients with inferior than with anterior AMI, because of an additional decrease in inferior and lateral \(e_s\) (see Table).

**Conclusion.**— 2DSI allows the calculation of RV global strain which is well correlated to standard echocardiographic parameters of RV function. Furthermore, study of regional and global RV \(e_s\) adds interesting information in the evaluation of RV dysfunction in patients with AMI. A decrease of global RV \(e_s\) was noted in all types of AMI and was mainly due to a decrease of septal \(e_s\) in anterior AMI. In patients with inferior AMI, an additional decrease in RV inferior and lateral \(e_s\) explained the lower values of RV global \(e_s\) as compared to anterior AMI. Larger studies will be necessary to compare RV strain values in patients with inferior AMI extended or not to the RV.

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