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## Topic 5. Thoracic aorta, congenital heart diseases, right heart

Thursday, June 13, 2019 - 15h45–16h30

Poster n° 23

### 6-month echocardiographic changes in pulmonary hypertension patients - Prognostic value of 3D area strain

P. Mocerì<sup>1,\*</sup>, N. Duchateau<sup>2</sup>, D. Baudouy<sup>1</sup>, A. Poulard<sup>1</sup>,  
 C. Sanfiorenzo<sup>1</sup>, F. Squara<sup>1</sup>, E. Ferrari<sup>1</sup>, C.H.U.M. Sermesant<sup>3</sup>

<sup>1</sup> CHU de Nice, Nice, France

<sup>2</sup> CREATIS INSA, Lyon, France

<sup>3</sup> INRIA Équipe Epione, Sophia Antipolis, France

\* Corresponding author.

E-mail address: [mocerì.pamela@gmail.com](mailto:mocerì.pamela@gmail.com) (P. Mocerì)

**Introduction** Outcomes in pulmonary hypertension (PH) are related to right ventricular (RV) function and remodeling. We hypothesized that changes in RV function, especially area strain (AS), could provide incremental prognostic data as compared to baseline data. We aimed to assess RV function changes between baseline and 6-months visit and evaluate their prognostic value in PH using 3D echocardiography.

**Method** 95 PH patients were prospectively included in this longitudinal study. All patients underwent 2D and 3D transthoracic echocardiography at baseline and 6-month follow-up. 3D RV echocardiographic sequences were analyzed by semi-automatic software and output meshes were post-processed to extract regional deformation.

**Results** Improvements in the global area strain (lower 2nd measure of area strain) were associated with stable or improving clinical condition as well as survival free from transplant ( $P < 0.001$ ). The most significant regional changes occurred within the septum. Over a median follow-up of 24.8 months [22.1–25.7], 21 patients died from PH or were transplanted. On multivariate COX analysis, changes in WHO class, BNP and RV global AS were independent predictors of outcomes. Using follow-up data, RV area strain significantly improves the current risk stratification.

**Conclusion** Changes in RV function and especially follow-up 3D RV AS and RV end-diastolic volume are of prognostic importance. Our study underlines the importance of follow-up data in comparison with baseline data only and demonstrates the additional prognostic value of following changes in RV deformation using 3D echocardiography (Figure 1, Death or transplant).

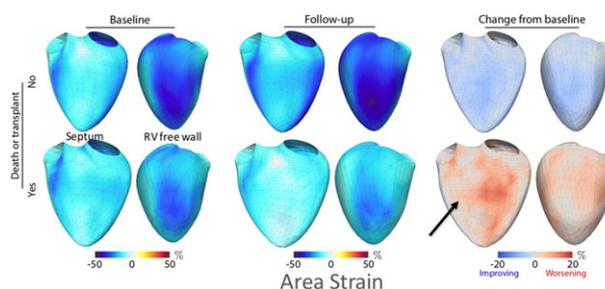


Figure 1

**Disclosure of interest** The authors have not supplied their declaration of competing interest.

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Poster n° 24

### Can the right ventricular diastolic dysfunction in obstructive sleep apnea patients be improved by weight control and continuous positive airways pressure ventilation?

D. Radulescu<sup>\*</sup>, E. Buzdugan, M.L. Radulescu, A. Grosu,  
 L. Stoicescu

University of Medicine and Pharmacy, Cluj Napoca, Romania

\* Corresponding author.

E-mail address: [dan.rad31@yahoo.com](mailto:dan.rad31@yahoo.com) (D. Radulescu)

**Introduction** To document if weight control and continuous positive airways pressure ventilation (CPAP), in obese, obstructive sleep apnea (OSA) patients, with right ventricular (RV) diastolic dysfunction, can improve right ventricular diastolic parameters.

**Method** Fifty obese with associated OSA patients (body mass index  $> 30$ ), with altered RV diastolic performance but preserved RV ejection fraction, were included in our study. The patients were treated with CPAP, diet and physical exercise. Over a period of 1 year, we obtained in 44 of them a significant weight loss (BMI  $34 \pm 6.8$  versus  $24 \pm 3.4$ ). RV diastolic function was evaluated in these 44 patients at the start of study and at 1 year, by measuring the transtricuspid inflow parameters: maximal velocities of E



(Emax) and A waves (Amax), E wave deceleration time (DT) and pressure half time (PHT) of E wave.

**Results** We found out altered RV diastolic filling parameters in the 44 obese patients at the start of treatment, with a significant improvement at 1 year. Emax was decreased at the start but higher at the end of study ( $44.6 \pm 6.6$ , versus  $56.6 \pm 8.8$  cm/sec), while Amax decreased significantly at the end of study ( $50.4 \pm 10.2$  versus  $44.6 \pm 12.4$  cm/sec). E wave PHT prolonged at the start, was significantly shorter at the end of study ( $66.24 \pm 8.22$  versus  $60.44 \pm 14.22$  msec.) and also E wave DT ( $244.6 \pm 26.6$  versus  $198.4 \pm 30.2$ ). In patients with a longer history of obesity and associated OSA, RV diastolic parameters were more severely impaired and also the response to treatment was less pronounced, compared to patients with a recent onset.

**Conclusion** In obese patients with obstructive sleep apnea, the altered RV diastolic parameters can be significantly improved at one year, by continuous positive airways pressure ventilation and weight control.

**Disclosure of interest** The authors have not supplied their declaration of competing of interest

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Poster n°25

### Clinical evaluation of wall shear stress by ultrafast vector flow imaging in carotid atherosclerotic stenosis



G. Goudot<sup>1,2,\*</sup>, O. Pedreira<sup>1</sup>, L. Khider<sup>2</sup>, T. Mirault<sup>2</sup>, J.M. Alsac<sup>3</sup>, P. Julia<sup>3</sup>, M. Pernot<sup>1</sup>, E. Messas<sup>2</sup>

<sup>1</sup> Institut Langevin, Inserm U979, ESPCI Paris, CNRS UMR 7587, PSL Research University, Paris, France

<sup>2</sup> Vascular medicine department, hôpital Européen-Georges-Pompidou, AP-HP, Paris, France

<sup>3</sup> Vascular surgery department, hôpital

Européen-Georges-Pompidou, AP-HP, Paris, France

\* Corresponding author.

E-mail address: [guillaume.goudot@wanadoo.fr](mailto:guillaume.goudot@wanadoo.fr) (G. Goudot)

**Introduction** Carotid plaque vulnerability assessment is an important factor in guiding the decision to perform carotid endarterectomy in case of asymptomatic stenosis. Ultrafast Ultrasound Imaging (UUI) offers the possibility of evaluating local flow velocities over an entire 2D image, allowing access to measure the wall shear stress (WSS). Our objective was to evaluate the feasibility of WSS measurement in a prospective series of patients with carotid stenosis.

**Method** We used a linear probe (7.5 MHz, SuperSonic Imagine®). UUI acquisitions last 600 ms with 3 tilted plane waves for an effective frame rate of 5000 Hz. We evaluated the flow velocity in 5 areas of the carotid wall: common carotid artery (1), plaque ascent (2), peak (3), descent (4), and internal carotid artery (5) (Figure 1). WSS was computed with the vector field speed. Shear stress measurement method was validated using a laminar flow phantom with laminar flow.

**Results** Good correlation was found between in vitro measurement and the theoretical WSS values ( $R^2=0.95$ ;  $P<0.001$ ). 25 patients were included (mean age:  $72 \pm 5$  years), with a mean percentage of stenosis of  $75 \pm 12\%$  (NASCET). The maximum WSS value over one cardiac cycle follows the shape of the plaque with a progressive increase to a maximum value at the peak ( $2.12 \pm 1.27$  Pa). The post-stenotic descent zone has the lowest shear stress ( $0.57 \pm 0.39$  Pa), lower than the WSS values in the healthy zone ( $1.02 \pm 0.36$  Pa for the common carotid and  $0.68 \pm 0.39$  Pa for the internal carotid artery) (Figure 1).

**Conclusion** This method allowed the local and direct evaluation of the plaque's wall shear stress. Unlike the global evaluation of speed using conventional Doppler, these measurements make it possible to better characterize the haemodynamic conditions to better identify areas of vulnerability.

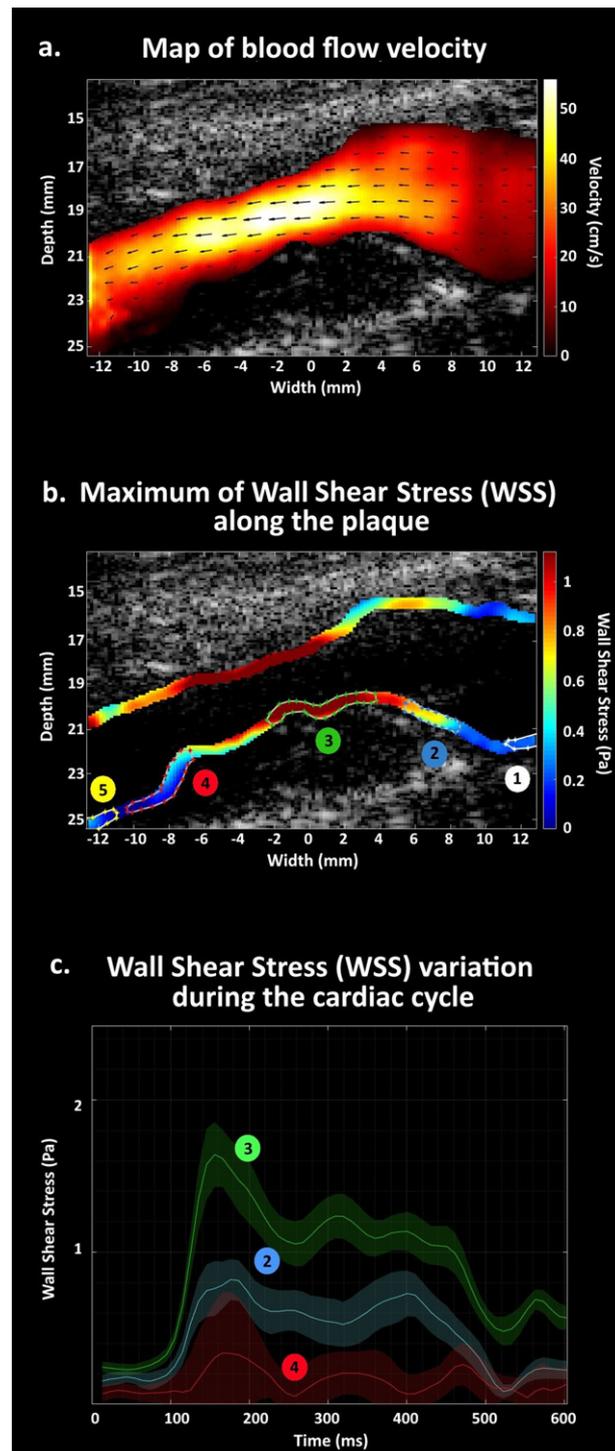


Figure 1

**Disclosure of interest** The authors have not supplied their declaration of competing of interest

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