4. Ponticelli F, Khokhar AA, Leenders G, et al. Safety and efficacy of coronary sinus narrowing in chronic refractory angina: insights from the RESOURCE study. *Int J Cardiol.* 2021;337:29–37.
5. Severo A, Jimenez-Valero S, Galeote G, Moreno R, Jurado-Román A. Coronary sinus reducer transfemoral extraction after intraprocedural device migration to the pulmonary artery. *J Invasive Cardiol.* 2022;34:E345.

https://doi.org/10.1016/j.rec.2022.10.012
1885-5857/


## Impact of the revised hemodynamic definition of pulmonary hypertension

### *Impacto de la nueva definición hemodinámica de la hipertensión pulmonar*

**To the Editor,**

The European Society of Cardiology (ESC) and the European Respiratory Society (ERS) have recently published new guidelines for the diagnosis and treatment of pulmonary hypertension (PH),[1] replacing the 2015 ESC/ERS Guidelines[2] and updating the hemodynamic definition proposed by PH experts at the 6th World Symposium of Pulmonary Hypertension held in Nice in 2018.[3]

For hemodynamic diagnosis, the pulmonary vascular resistance (PVR) cutoff level has been lowered from 3 to 2 WU, thus redefining pulmonary arterial hypertension (PAH) as mean pulmonary arterial pressure (mPAP) > 20 mmHg with pulmonary arterial wedge pressure (PAWP) < 15 mmHg and PVR above 2 WU. Group 2 postcapillary PH is redefined as mPAP > 20 mmHg, PAWP > 15 mmHg, and PVR < 2 WU, and combined precapillary and postcapillary PH is redefined as mPAP > 20 mmHg, PAWP > 15 mmHg, and PVR > 2 WU. The new hemodynamic definition is based on population studies confirming the normal range for mPAP and PVR.

The impact of changes to the hemodynamic criteria of the earlier consensus guidelines has been specifically studied in patients with systemic sclerosis (SSc).[4,5]

The aim of our study was to determine the impact of the new grading criteria on patients who underwent right heart catheterization (RHC) at our hospital between September 1, 2019 and July 31, 2022 and who had an indication for a PH study due to unexplained dyspnea or for PAH screening in the case of SSc.

**Table 1**
Hemodynamic parameters of right heart catheterization with PVR between 2 and 3 WU

| Disease | mPAP, mmHg | PAWP, mmHg | PVR, WU |
|---|---|---|---|
| CTED | 28 | 12 | 2.7 |
| CTED | 24 | 14 | 2.8 |
| CTED | 21 | 6 | 2.1 |
| SSc | 29 | 14 | 2.8 |
| SSc | 26 | 13 | 2.9 |
| SSc | 21 | 7 | 2.4 |
| SSc | 34 | 14 | 2.6 |
| SSc | 22 | 11 | 2.1 |

CTED, chronic thromboembolic disease; mPAP, mean pulmonary arterial pressure; PAWP, pulmonary arterial wedge pressure; PVR, pulmonary vascular resistances; SSc, systemic sclerosis; WU, Wood units.

A total of 74 RHCs were performed as per the protocol in our hospital, and all patients gave written informed consent. According to the previous guidelines, 40 (54%) patients did not meet the criteria for PH whereas 8 (10.8%) were classified as group 1, 22 (29.7%) as group 2, and 4 (5.4%) as group 4; all of these patients retained the PH diagnosis on application of the new criteria.

The new definition impacted 18 (24.3%) patients with mPAP > 20 mmHg and PVR between 2 and 3 WU. Among these patients, 10 with postcapillary PH were reclassified as combined precapillary and postcapillary PH, 3 patients with chronic thromboembolic disease were reclassified as having chronic thromboembolic PH (group 4), and 5 patients with SSc met the criteria for PAH (group 1) (figure 1).

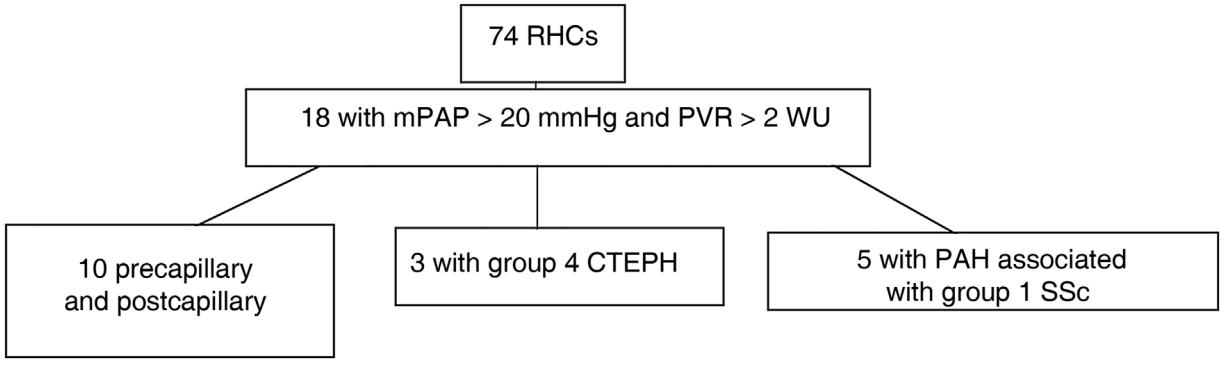


**Figure 1.** Hemodynamic reclassification of RHCs. CTEPH, chronic thromboembolic pulmonary hypertension; mPAP, mean pulmonary arterial pressure; PAH, pulmonary arterial hypertension; PVR, pulmonary vascular resistance; RHC, right heart catheterization; SSc, systemic sclerosis; WU, Wood units.

Table 1 lists the hemodynamic data for the 8 patients reclassified as group 1 and group 4 PH according to the new 2022 grading criteria.[1]

In all, the disease diagnosis was changed for 8 (10.8%) of the 74 RHCs performed. The guidelines provide no specific recommendation for starting a specific drug therapy for these patients, but close follow-up is necessary to monitor for signs of progression.

In view of these results, we believe it is necessary to review the RHC results of patients with a suspicion of PH, especially in high-risk subpopulations, such as SSc, chronic thromboembolic disease, or high-risk genetic mutations.

## FUNDING

None.

## AUTHORS' CONTRIBUTIONS

J.L. Callejas Rubio, E. Moreno Escobar, E. Navascues Martinez, P. Martín de la Fuente, T. Gil Jiménez, and N. Ortego Centeno have contributed to the article as follows: *a)* substantial contributions to the conception and design, data acquisition, analysis, and interpretation; *b)* manuscript drafting and critical review; *c)* final approval of the published version, and *d)* assumption of responsibility for all aspects of the article and for investigating and resolving any issue with the accuracy and veracity of any part of the project.

## CONFLICTS OF INTEREST

None declared.

José Luis Callejas Rubio,[a,*] Eduardo Moreno Escobar,[b] Emilia Navascues Martínez,[c] Pilar Martín de la Fuente,[b] Teresa Gil Jiménez,[b] and Norberto Ortego Centeno[d]

[a]*Unidad de Enfermedades Sistémicas, Servicio de Medicina Interna, Hospital Clínico Universitario San Cecilio, IBS Granada, Granada, Spain*
[b]*Servicio de Cardiología, Hospital Clínico Universitario San Cecilio, Granada, Spain*
[c]*Servicio de Neumología, Hospital Clínico Universitario San Cecilio, Granada, Spain*
[d]*Departamento de Medicina, Universidad de Granada, IBS Granada, Spain*

* Corresponding author.
*E-mail address:* jlcalleja@telefonica.net (J.L. Callejas Rubio).
@joselu39370004

Available online 06 January 2023

## REFERENCES

1. Humbert M, Kovacs G, Hoeper MM, et al. ESC/ERS Scientific Document Group. 2022 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension. *Eur Heart J.* 2022;26:237.
2. Galiè N, Humbert M, Vachiery JL, et al.ESC Scientific Document Group. 2015 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension: The Joint Task Force for the Diagnosis and Treatment of Pulmonary Hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS): Endorsed by: Association for European Paediatric and Congenital Cardiology (AEPC), International Society for Heart and Lung Transplantation (ISHLT). *Eur Heart J.* 2016;37:67–119.
3. Simonneau G, Montani D, Celermajer DS, et al. Haemodynamic definitions and updated clinical classification of pulmonary hypertension. *Eur Respir J.* 2019;53:1801913.
4. Jaafar S, Visovatti S, Young A, et al. Impact of the revised haemodynamic definition on the diagnosis of pulmonary hypertension in patients with systemic sclerosis. *Eur Respir J.* 2019;54:1900586.
5. Xanthouli P, Jordan S, Milde N, et al. Haemodynamic phenotypes and survival in patients with systemic sclerosis: the impact of the new definition of pulmonary arterial hypertension. *Ann Rheum Dis.* 2020;79:370–378.

https://doi.org/10.1016/j.rec.2022.10.017
1885-5857/


## Third-degree atrioventricular block associated with the SARS-CoV-2 mRNA vaccine

### *Bloqueo auriculoventricular de tercer grado asociado a la vacuna de ARNm contra el SARS-CoV-2*

**To the Editor,**

More than 40 million people are vaccinated against COVID-19 in Spain.[1] Adverse reactions to the vaccine are usually insignificant and do not outweigh the benefits. In relation to cardiac adverse effects, complete heart block (CHB) was not reported in the clinical trials of COVID-19 vaccines.[2]

We report a case of CHB with temporal association with COVID-19 vaccine administration, which recovered with corticotherapy. Written informed consent for publication was obtained from the patient.

Six days after the first dose of SARS-CoV-2 mRNA vaccine (Pfizer-BioNtech, United States), a 49-year-old man presented to the emergency department with dizziness and dyspnea, with onset 3 days previously. Physical examination revealed bradycardia. Blood pressure was 136/60 mmHg, heart rate 40 beats/min, oxygen saturation was 100% and the patient was afebrile. Electrocardiogram (ECG) showed CHB with right bundle branch block (figure 1A). A blood test showed normal renal function, electrolytes and hemogram. C-reactive protein (CRP) was 15.7 mg/L (< 5), high-sensitivity troponin T 17 ng/L (< 13), creatine kinase 57 U/L (< 189), and N-terminal pro-B-type natriuretic peptide (NT-proBNP) 307 ng/L (< 300). Transthoracic echocardiography showed normal ejection fraction without structural heart disease.

The patient had had a nonseminomatous testicular germ cell tumor in 2003 with pulmonary metastatic disease. He was treated with orchiectomy and chemotherapy with complete remission. His previous ECG was normal.

During hospitalization, a blood test showed normal electrolyte concentration and minor CRP elevation (15.7→11.7 mg/L). Negative troponin (17→17→12 ng/L) and the absence of ventricle wall motion abnormalities ruled out ischemic heart block (HB). Transthoracic echocardiography and cardiac magnetic resonance (CMR), with a protocol including cine, short tau inversion recovery (STIR), $T_1$, $T_2$ mapping and late gadolinium enhancement sequences, revealed normal cardiac function and structure and absence of edema, excluding cardiomyopathies or myocarditis (figure 2). Negative immunological study (ANA, ENA) and