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Reference


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Modern Invasive Hemodynamic Assessment of Pulmonary Hypertension

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Keywords
Right heart catheterization · Pulmonary vascular resistance · Partitioning of pulmonary vascular resistance · Pulmonary vascular impedance · Right ventricle-arterial coupling

Abstract
Since 1998 pulmonary hypertension has been clinically classified into five well-defined, distinct categories. A definitive diagnosis of pulmonary hypertension requires the invasive confirmation of an elevated mean pulmonary artery pressure of 25 mm Hg or above during a right heart catheterization. From a hemodynamic point of view, pulmonary hypertension is classified into precapillary and postcapillary pulmonary hypertension on the basis of a pulmonary artery wedge pressure threshold value of 15 mm Hg. Pulmonary vascular resistance is better characterized by multi-point pressure/flow measurements than by single-point determination. Multi-point pulmonary vascular resistance calculation could be useful for early disease identification as well as for treatment response assessment. Occlusion analysis of the pulmonary artery pressure decay curve after balloon inflation at the tip of the pulmonary artery catheter permits locating the site of predominantly increased resistance and could be useful in differentiating proximal from distal vaso-lopahy, especially in chronic thromboembolic pulmonary hypertension. The pulsatile hydraulic load of the pulmonary circulation can be better appreciated by pulmonary vascular impedance or via the resistance-compliance relationship than by means of pulmonary vascular resistance. Determination of right ventricle-arterial coupling permits assessing the impact of an elevated afterload on right ventricular function, which ultimately determines the symptoms and prognosis of patients with pulmonary hypertension. The clinical utility of combining different invasive hemodynamic approaches is still uncertain and remains to be determined.

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Introduction
Pulmonary hypertension (PH) is a hemodynamic and pathophysiological condition characterized by the presence of a resting mean pulmonary artery pressure (PAPm) of $\geq 25$ mm Hg as assessed by right heart catheterization (RHC) [1]. In the general population, the exact prevalence of PH is unknown; however, it is presumed to represent the third leading cardiovascular condition after systemic hypertension and coronary artery disease [2].