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EDITORIAL

Highlights on pulmonary hypertension: a commentary

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For almost two decades, pulmonary vascular disease has been neglected. This reflects the difficulty of diagnosis and the paucity of treatments.

During the 1980s, there has been an explosion of knowledge on the structure and function of the pulmonary vasculature. Radically new treatments have been developed.

Noninvasive investigations have enabled screening for pulmonary hypertension. Experience has been amassed in many countries on the efficacy of long-term oxygen therapy (LTOT). Pulmonary vascular responses to acute lung injury have been described, which, in the field of critical care, has allowed for the introduction of novel treatments, such as inhaled nitric oxide (NO). Lung and heart-lung transplantation now provide a treatment for patients with end-stage primary and secondary pulmonary hypertension.

Echocardiographic technology has advanced, Doppler echo provides a noninvasive measure of pulmonary artery pressure (Ppa) [1], whilst pulsed Doppler now offers an assessment of cardiac output [2]. Right heart catheterization is still required to confirm the diagnosis and severity of pulmonary hypertension [3], but these new methods have expanded the numbers of patients who can be screened for the diagnosis.

Classification of the abnormalities on ventilation/perfusion ($\dot{V}/\dot{Q}$) lung scintigraphy [4] has allowed assessment of the probability of pulmonary emboli. This has considerably lessened the need for pulmonary angiography. Also, detection of deep vein thrombosis has been aided by the introduction of a noninvasive test for proximal thrombi, with impedance plethysmography [5]. A treatment for chronic pulmonary thomboembolic disease by endarterectomy was effective in many patients [6]. Whilst continuous intravenous infusion of prostacyclin (PGI_2) and heart-lung transplantation have been shown to improve survival of patients with end-stage primary pulmonary hypertension [7].

In many countries, long-term oxygen therapy was found to enhance quality of life [8], and survival [9], in patients with secondary pulmonary hypertension from chronic obstructive lung disease (COLD). Children with pulmonary hypertension have since been similarly treated [10]. Indications for such treatment have now been generally agreed upon. Implicit in the clinical studies is the idea that continuous oxygen can reverse the pulmonary vascular structural abnormalities within the chronic hypoxic lung.

Physiological description of the pulmonary vascular response to hypoxia and to disease has clarified the function of pulmonary arteries. The understanding of the cellular regulation of vascular tone has proceeded at a rapid pace, with the discovery of endothelium-derived relaxing factor (EDRF) [11], and its identification as the gas nitric oxide (NO) [12]. Also, endothelin-1, a polypeptide elaborated by endothelium, has been found to be the most powerful natural vasoconstriction [13]. Production of endothelium-derived nitric oxide (EDNO) and endothelin-1 are influenced by hypoxia. EDNO may be reduced in COLD [14], whilst endothelin-1 [15] can be increased by hypoxia. These observations not only provide insight into the possible role of endothelium in pulmonary hypertension but have led to radically new treatments. Inhaled NO is a selective pulmonary vasodilator [16], and may have an important action in improving gas exchange in patients with acute respiratory distress syndrome (ARDS) [17].

Finally, the vascular smooth muscle cells of the pulmonary arteries may be particularly important in determining hypoxic vasoconstriction [18].

The articles included in the series on Pulmonary Hypertension published in this and future issues of the Journal provide new insights into major areas of growth of knowledge in the pulmonary vasculature. For brevity, much has been omitted, particularly the description of the pulmonary vasculitides or the involvement of the blood vessels in systemic disease. These will, no doubt, be covered by future symposia; by which time, the structural and functional consequences of chronic hypoxia on pulmonary vasculature are likely to have been fully elucidated.

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