

# Early Pulmonary Rehabilitation after Pulmonary Endarterectomy: Both Safe and Effective?

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To the Editor,

We read with great interest the study of Nagel et al. [1] regarding pulmonary rehabilitation (PR) as an early follow-up treatment after pulmonary endarterectomy (PEA). For a long time in the past, intense physical activity has been discouraged for patients with pulmonary hypertension (PH) due to the risk of worsening of the disease; nevertheless, during the last decade, exercise training has been shown to improve exercise capacity, quality of life, and possibly pulmonary hemodynamics among patients with PH [2], although confirmatory studies are still needed. Under this scope, the study of Nagel et al. [1] adds further interesting data to this field.

The lack of controls is a limitation, as the authors have correctly noted, so conclusions regarding the effect size of PR cannot be definite. PEA is the gold standard for the treatment of chronic thromboembolic pulmonary hypertension (CTEPH). Previous data indicate that the conduction of operation per se results in a significant increase of exercise capacity, as the 6-min walking distance may even double, and a significant improvement of pulmonary hemodynamics, as mean pulmonary artery pressure and pulmonary vascular resistance decrease within a few months after the operation [3, 4]. Thus, the inclusion of a control group would be necessary in order to differentiate between the improvements attributed to PEA and the fur-

ther changes evoked by the PR program. According to published literature, there seems to be no further improvement in exercise capacity 2 years after PEA [4]; thus, there is a need for more randomized control trials of supervised training programs, both during the early postoperative phase and during the late stable phase, in order to investigate which is the optimal timepoint that PR should be delivered in CTEPH patients to further improve their functional capacity and change their prognosis.

In the study of Nagel et al. [1], patients with residual PH received the same PR program and were not analyzed as a separate group. However, changes in exercise capacity and hemodynamics with time are different in these patients [4], while long-term outcomes are worse [5]. Under this scope, it would be important the safety and efficacy of this early phase PR program be separately described among them.

In conclusion, this is an interesting study indicating that PR during the early phase after PEA may be safe and effective. Large randomized control studies are urgently needed to define the optimal timepoint at which PR should be applied among CTEPH patients, the most appropriate training program that should be used, and whether there are patient subcategories that should be trained differently, in order for the short- and long-term outcomes to be optimal.

## Statement of Ethics

The article is exempt from ethical committee approval, as it is a letter to the editor, commenting on a recently published article.

## Conflict of Interest Statement

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