Bronchoscopic Lung Volume Reduction: A Window for the Future?

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Lung volume reduction (LVR) surgery (LVRS) is an interesting therapeutic option which has been developed over the last decade in patients with end-stage emphysema. Initially cohort studies [1–3] and then randomized trials versus medical treatment [4] have demonstrated that lung function, exercise capacity, and quality of life are improved after LVRS.

However, many questions remain unanswered. Recent reports showed that the mortality rate after LVRS remains increased (5%) [4, 5] in patients with a $FEV_1 < 20\%$ predicted or either a very low diffusing capacity of CO or a homogeneous emphysema as compared with a medically treated group [5]. In patients who survived the procedure, the quality of life was not better than after medical treatment, and a limited benefit with regard to lung function and exercise testing was noted [5]. It is unclear whether bilateral LVRS has better results than the single one. Another question is whether classical surgical procedures are doing better versus the thoracoscopic LVR [6]. Also, the technique to be applied, laser or staple method, is questionable, since the laser technique was found to result in a higher mortality rate [7]. Does sternotomy offer better results and better patient comfort than lateral thoracotomy [7]? Finally, the NETT [8], OBEST [9], and Canadian

LVR [10] trials may fail to answer important questions such as risks and benefits of LVRS, as the patients' enrollment failed to be as predicted. Also the question which patients should be referred for LVRS is still pending, since the patients' profile in trials is different [11].

Nowadays, flexible fiberoptic bronchoscopy (FFB) has been largely applied for diagnosis and therapy of lung diseases. Its simplicity together with the wide application and better physician knowledge made this procedure a major tool in pneumology [12, 13]. There are recent reports using FFB for LVR [14, 15]. Experiments performed in sheep showed that LVR was possible by FFB using a biocompatible fibrin-based glue system [14]. The success rate was 55% in healthy animals [14] and 91% in animals with a papain-induced experimental emphysema [16]. The lung function parameters showed improvement in this animal emphysema model [16].

Lately, a second team performed bronchoscopic LVR (BLVR) by using a valve implant in a unilateral setting [15]. This phase II pilot study was done in 8 patients with a severe emphysema (median FEV_1 23.7% predicted). They placed the valves in all segmental airways leading to the upper lobe most affected by bullae. The procedure was performed under a combined propofol-remifentanyl anes-

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thetia. BLVR was successful in 4 patients (50%), and improvement persisted during the follow-up period. Two patients developed pneumothorax (25%), and 3 had acute exacerbations of chronic obstructive pulmonary disease. Improvement of the lung function was noted only in patients with successful BLVR [15].

In a recent issue of *Respiration*, the same authors describe the methodological aspects of this approach [17]. They give details about physician's training, team coordination, and anesthesia and a step-by-step approach of the procedure [17]. Despite the difficulties of targeting the right area, which may explain the low success rate in the first study [15], concept and realization of such an

attempt are exceptional. It is necessary that this method will be further developed in order to be more effective. The next step must be phase III studies comparing BLVR with valve implants in LVRS in patients with a severe emphysema [11]. The method should enable physicians to apply a simple, safe, and cost-effective therapy to patients with end-stage chronic obstructive pulmonary disease. It may also change completely the physicians' way of thinking, considering BLVR in the management of late-stage emphysema patients. Furthermore, this method shows the wide area of applications of FFB in the the new millennium.

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