Equipoise between surgical and bronchoscopic approaches to lung volume reduction in COPD

Chronic obstructive pulmonary disease (COPD) is one of the most common causes of morbidity and mortality in South Africa (SA), as well as, globally. Pharmacotherapy, together with smoking cessation, pulmonary rehabilitation and vaccination are the cornerstones of management. Hyperinflation in COPD is most pronounced in those with an emphysematous-predominant phenotype. In emphysema, there is a heterogenous occurrence of blebs, bullae and reduced elastic recoil, with early airway closure during expiration. The resultant air trapping and hyperinflation reduces expansion of the more preserved lung, places the diaphragm at a mechanical disadvantage, and increases chest wall elastance. These contribute to an increased sensation of breathlessness.[1,2]

Lung volume reduction, in carefully selected patients, targeting the most affected lung can significantly improve respiratory mechanics resulting in improvements in symptoms, physiology and functional status, with reduced morbidity and mortality. Traditionally, this was achieved surgically, but bronchoscopic approaches are increasingly being used internationally.[2,3]

Buttery *et al.*[4] reported on the findings of the CELEB (Comparative Effectiveness of Lung Volume Reduction Surgery for Emphysema and Bronchoscopic lung volume reduction) trial, in the UK. They included 88 patients who were carefully selected as suitable for either procedure for randomisation, following a multidisciplinary team discussion.

Eligibility criteria included forced expiratory volume in 1 second (FEV_1)a <60% predicted, hyperinflation, and the presence of heterogenous emphysema on computed tomography (CT). The study cohort had a mean age of 65 years, a median of 2 exacerbations but no emergency department attendance, a Medical Research Council dyspnoea score of 4 and very severe obstruction with a median FEV_1 to forced vital capacity ratio of 28.

The bronchoscopic lung volume reduction (BLVR) was performed with Zephyr valves whilst the surgical approach was at the discretion of the surgeon.

The study found no significant difference in the primary outcome or improvement in the i-BODE (body mass index (BMI), airflow obstruction (FEV_1 % pred), Medical Research Council (MRC) dyspnoea score and exercise capacity (incremental shuttle walk test (ISWT)) score between the LVRS and BLVR groups. Scores improved from a mean of 5.9 to 4.8 and 5.1, respectively. There was also no significant difference in a range of other secondary outcomes, except for the COPD Assessment Test, which favoured LVRS.

The median length of stay in hospital for the BLVR group was the protocol-specified 3 days, (compared with 9 days for those undergoing LVRS). This was necessitated by a high rate of pneumothorax (30.4%), a known complication of BLVR, consistent with other studies and usually occurring within 3 days of the procedure. There was 1 procedure-related death reported in this arm while 39% experienced a respiratory adverse event, compared with 50% in the LVRS arm. Seven patients required repeat bronchoscopy while 2 crossed over to the LVRS arm.

The authors found that, in a select group of patients with very severe emphysema considered suitable for either LVRS or BLVR, both approaches appear to produce clinically meaningful improvements with similar safety profiles.

One challenge in this study was interruption of follow up due to the coronavirus disease 2019 pandemic, with primary outcome data only available for 49 (56%) patients. The study arms were thus smaller than the initial sample size calculation required, but a *post hoc* recalculation suggested that the trial was in fact adequately powered.

A 1-point difference in the i-BODE score has been shown to be a significant predictor of prognosis when assessing COPD interventions. This was achieved in the LVRS arm, but not the BLVR arm (-0.82±1.61). However, a *post hoc* calculation showed no difference between the proportions of each arm achieving this level of benefit.

While the bronchoscopic approach and shorter hospital stay may be appealing, it was associated with a greater number of repeat procedures and crossovers. The authors advise larger studies and economic evaluation of trial data to better understand the comparative value of the two approaches.

Lastly, several participants withdrew from this study following randomisation to the surgical arm. This may indicate a patient preference for what is perceived to be a less invasive procedure, and should be explored further.

Endoscopic valves have become commercially available in South Africa and BLVR was performed for the first time in 2023.[5] Prospective patients should be referred to subspecialist centres for proper evaluation and to ensure that the correct patients who are likely to gain benefit from this costly procedure, are selected. A recent position statement published in *this journal* provides guidance on the selection and work up of suitable patients.[1]

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