Penn Medicine

CLINICAL BRIEFING™

Penn Lung Center • Pulmonary Medicine • Interventional Pulmonology Program

Endobronchial Valves for Lung Volume Reduction in Advanced COPD

Interventional pulmonologists at the Penn Lung Center are performing endobronchial lung volume reduction for select patients with advanced chronic obstructive pulmonary disease (COPD).

Since the completion of the National Emphysema Treatment Trial (NETT), perspectives on the treatment of severe COPD have evolved dramatically in the United States. NETT compared the efficacy of lung volume reduction surgery (LVRS) plus medical management to medical management alone in more than 1,200 patients with severe emphysema. Both arms of the study involved rehabilitation.

Among the important findings of NETT was that LVRS affords a substantial improvement in quality of life by comparison to optimal medical therapy in persons with predominantly upper-lobe emphysema and low baseline exercise capacity.

Despite these benefits, LVRS (which removes diseased nonfunctional lung tissue to allow the functional lung to expand), is limited by strict patient selection criteria, cost and safety concerns, including postoperative stroke and pneumothorax.

A number of innovations have emerged in recent years to both increase access to effective therapy for severe COPD and improve upon the limitations of LVRS. Among these is **endobronchial lung volume reduction (ELVR)**, a relatively new nonsurgical procedure available at the Penn Lung Center for selected patients with COPD.

ELVR uses implantable endobronchial valves to prevent re-inflation once air has escaped a targeted lobe. In a fully occluded lobe, this will precipitate collapse, leading to a reduction in air trapping and hyperinflation. Endobronchial valves have been shown at 6 – 12 months following treatment to improve dyspnea, exercise tolerance and quality of life in selected persons with advanced COPD. Of note, patients cannot have had prior LVRS on the target lobe, and must be non-smoking, among other qualifications for endobronchial valve implantation.

For questions about evaluation for nonsurgical lung volume reduction for the treatment of advanced COPD, or to schedule a time to connect with the Penn Interventional Pulmonary service, please contact Gloria Foreman at **215.662.3202**.

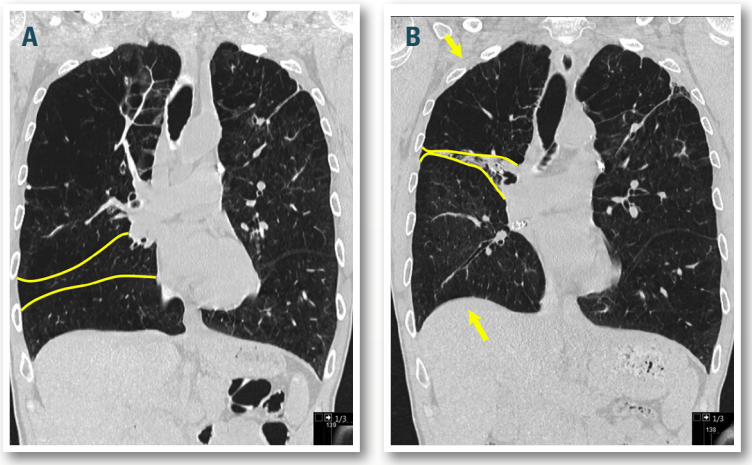

Figure 1: Figure 1: Coronal view of the right lung prior to therapy (A) and complete deflation of the middle lobe with significant reduction of the upper lobe (arrows) and improved inflation following ELVR (B).

CASE STUDY

Mr. G, a 60-year-old gentleman, was referred to the Interventional Pulmonology section of the Penn Lung Center for consideration of non-surgical lung volume reduction using endobronchial valves for the treatment of advanced COPD. Mr. G's past medical history was otherwise unremarkable.

At his evaluation, Mr. G described progressive dyspnea over the last few years, and reported that difficulty climbing the stairs of his two story house had confined him to the first floor. Having previously completed pulmonary rehabilitation, he was on maximal medical therapy, and refused to consider surgery.

At Penn, Mr. G was started on supplemental oxygen. His prior breathing tests demonstrated severe COPD with an FEV1 of 0.82L (23% of predicted), severe hyperinflation (TLC of 9.14L, 126% of predicted) and severe air trapping (RV 5.71L, 224% of predicted). On a 6-minute walk test he was able to walk 276 meters. His CT scan demonstrated severe emphysema in the right upper lobe and right middle lobe with an intact major fissure suggesting the absence of collateral ventilation. This information suggested that he could benefit from endobronchial valves to treat his COPD.

At bronchoscopy, a direct measure of collateral ventilation confirmed the absence of collateral ventilation to the right middle lobe and right upper lobe. A total of 7 endobronchial valves were deployed in these targeted lobes.

Mr. G was monitored for complications over 4 days in the hospital and recovered well. CT scans following his ELVR demonstrated substantial expansion in lung capacity (Figure 1B). At his first follow-up visit 1 month later he noted significant improvement in his dyspnea and was now walking up and down his stairs without difficulty. Repeat spirometry noted an improvement of over 500mL to 1.4L.

On his 2 month follow-up, Mr. G was no longer wearing oxygen, and notably improved in mood. At his 6-minute walk test, he was able to walk 390 meters, a 43% improvement over his pre-procedure performance.

FACULTY TEAM

The Penn Lung Center is among the oldest and most advanced providers of interventional pulmonology in the nation. An affiliate Program, Penn Interventional Pulmonology employs bronchoscopy and other minimally invasive techniques to diagnose and treat advanced lung conditions. The Program works closely with the Pulmonary, Allergy, and Critical Care Division and thoracic surgery, medical and radiation oncology, otorhinolaryngology and transplant specialists to provide seamless care for advanced lung disease.

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