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Images in COPD

Bronchoscopic Lung Volume Reduction Using Endobronchial Valves: Imaging Appearance

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Abbreviations: bronchoscopic lung volume reduction, **BLVR**; endobronchial valve, **EBV**; computed tomography, **CT**

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Introduction

Bronchoscopic lung volume reduction (BLVR) using endobronchial valves (EBV) provides an effective and safe alternative approach for reducing hyperinflation in patients with severe emphysema who are poor surgical candidates. Imaging plays a pivotal role in appropriate patient selection, target lobe identification and in the post-procedural management of adverse events.

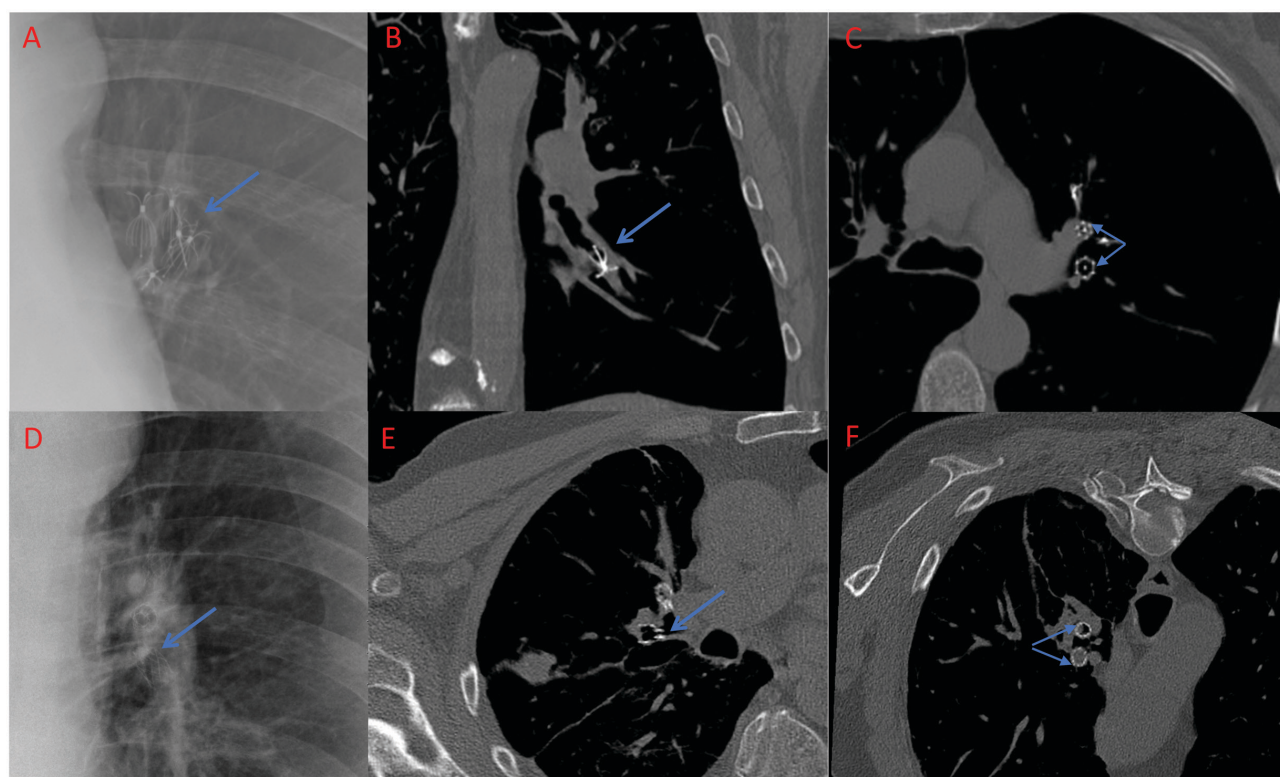
History

“A.B.” a 70-year-old female with a 50 pack-year smoking history and known severe emphysema presented for evaluation for BLVR. The patient had been previously managed medically, however, had persistent and worsening symptoms. The patient had been deemed a poor surgical candidate. After evaluation by the pulmonary team, A.B. was cleared for BLVR with one-way EBVs. A total of 5 EBVs (Spiration Valve System) were deployed in the left upper lobe segmental bronchus.

Imaging Findings

The following images were taken of patient AB. (Figures 1, 2 and 3)

Figure 1. Radiographic and High-Resolution Computed Tomography Appearance of Endobronchial Valve



Top row shows the expected appearance of Spiration valves (arrows) on frontal chest x-ray (A) and on multiplanar CT of the thorax in profile (B) and end on (C). The bottom row shows the expected appearance of Zephyr valves (arrows) on frontal chest x-ray (D) and on multiplanar CT of the thorax in profile (E) and end on (F).

CT=computed tomography

Discussion

With the recent Food and Drug Administration approval of the Zephyr valve and the Spiration Valve System, BLVR using one-way EBVs is increasingly used in patients with advanced emphysema who remain symptomatic despite optimal medical management and are poor surgical candidates.^{1,2}

Given the higher incidence of pneumothorax after EBV placement, chest radiographs are required within 4 and 24 hours of EBV valve placement and daily thereafter until discharge. Knowledge of the types of EBV used, and the expected normal imaging findings following placement of EBV are essential to avoid misinterpretation of these imaging studies.

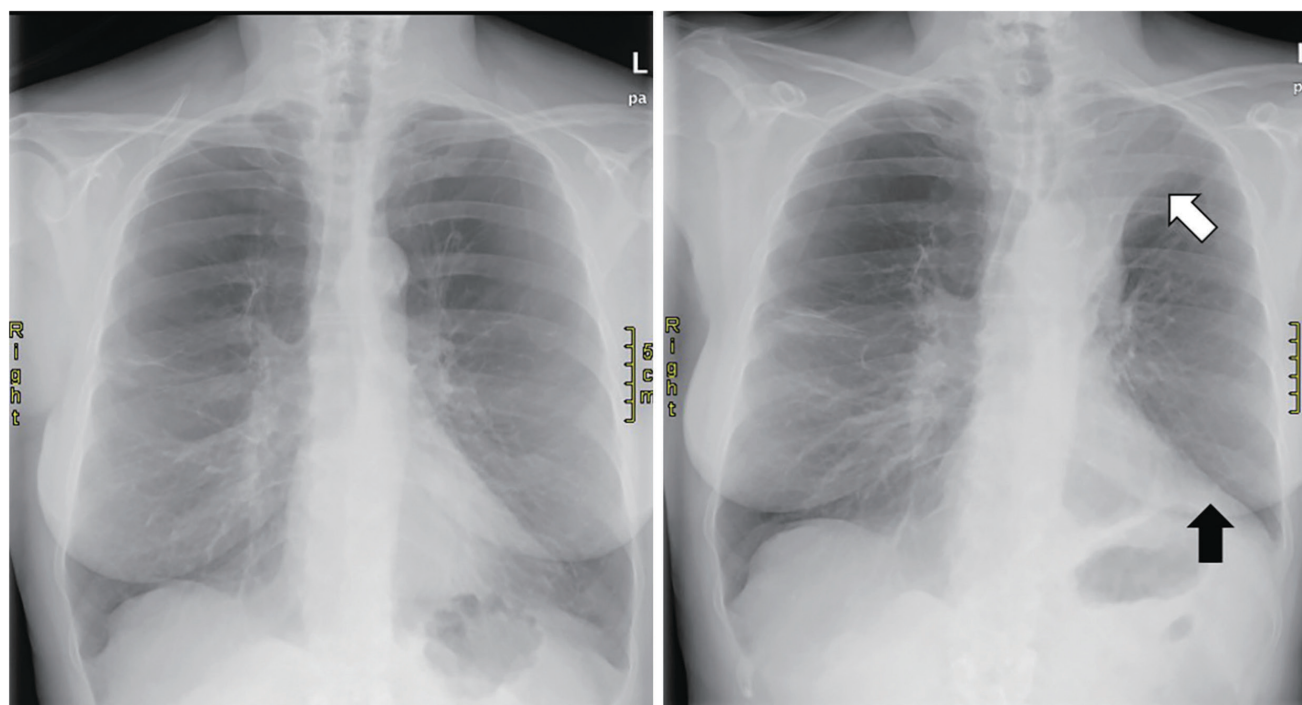
Significant volume reduction or atelectasis of the treated lobe may be observed within the first few days,

although in some patients it may take up to a month. Criteria for premature reevaluation of these patients have been established and imaging plays an important role in their evaluation and management.³ An expert panel recommends a low dose computed tomography (CT) scan at around 30–45 days post-procedure to assess valve placement, particularly if there is no perceived improvement or breathing deterioration.³ The multidetector CT is evaluated by focusing on the valve count, location (migration/malpositioning) and the target lobe(s) total volume change (for either volume reduction or re-expansion after initial collapse).

Declaration of Interest

The authors have no conflicts of interest to declare at this time.

Figure 2. Frontal Chest Radiographs

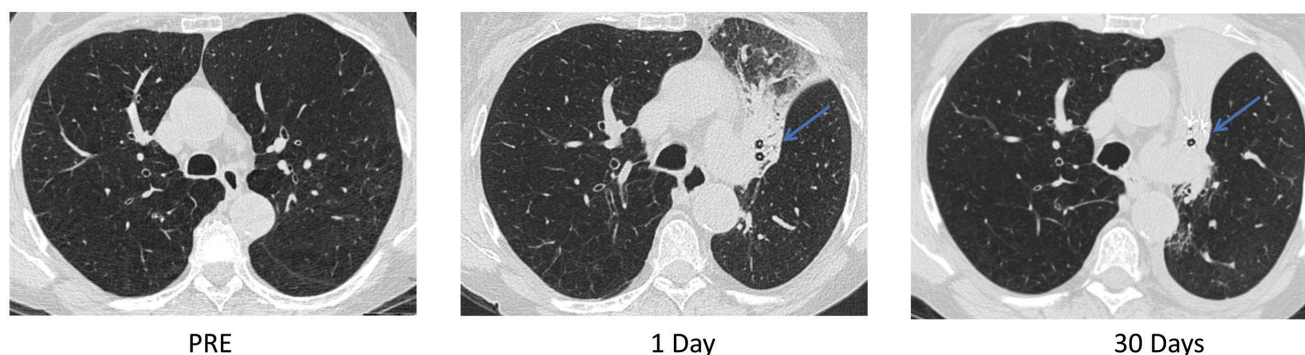


(a) Preprocedural radiograph with emphysematous upper lobes.

(b) Complete collapse of the left upper lobe (white arrow) at 2 weeks after EBV placement. Elevated left dome of diaphragm secondary to volume loss (black arrow).

EBV=endobronchial valve

Figure 3. Axial High Resolution Computed Tomography Images at the Level of Upper Lobes



(a) Preprocedural CT showing severe emphysema in both upper lobes.

(b) Partial collapse of the left upper lobe at 24 hours after EBV placement (blue arrow).

(c) Complete collapse of the left upper lobe at 30 days with EBVs in situ (blue arrow). Mediastinal shift towards left due to volume loss.

CT=computed tomography; EBV=endobronchial valve

References

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