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Title: Accurate monitoring of pulmonary air leak closure during endobronchial valve placement

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Body: Introduction. Endobronchial valves may be effective for the treatment of a prolonged pulmonary air leak (PAL). A traditional chest drainage system relying on a subjective and instantaneous assessment of expiratory bubble formation in the water-seal column lacks accuracy to aid assessments during and after valve placement. Patients and methods. Three patients with a postoperative PAL measuring at least 1000 ml air leakage per minute (ml/min) were evaluated. We attempted air leak closure using endobronchial valves relying on a digital air leak measurement system displaying and recording the expiratory pulmonary air leak in ml/min. The number of valves used was set by either leak cessation or residual leak of <100 ml/min. Results. In all patients, the effect of every single valve placed was accurately assessed in ml/min during the procedure. In 1 patient the air leak stopped after lobar exclusion, while in 2 patients the air leak decreased to <100 ml/min after lobar exclusion. The continuous post-intervention assessment accurately indicated air leak cessation in these two patients within 48 hours after valve placement. Chest drain removal was successful after air leak cessation. None of the patients developed respiratory insufficiency requiring subacute endobronchial valve removal. As planned, all valves were removed 3-4 weeks after their placement. Conclusion. Digital objective air leak assessment guides endobronchial valve placement, indicates the exact timing of air leak cessation, and allows a safe fast-tracking policy of chest tube removal.